



DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF:

CEMVD-PD-L

18 JUN '15

MEMORANDUM FOR Commander, New Orleans District

SUBJECT: Review Plan for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, General Reevaluation Report

1. References:

a. Memorandum, CEMVN-PD-P, 28 May 2015, subject as above (encl).

b. EC 1165-2-214, Civil Works Review, 15 Dec 2012.

2. I hereby approve subject Review Plan (RP) and concur in the conclusion that a Type II Independent External Peer Review (IEPR) to supplement the Type I IEPR is highly probable. The RP, in accordance with EC 1165-2-214, complies with all applicable policy and provides an adequate independent technical review of the plan formulation, engineering and environmental analyses, and other aspects of the plan development. As the RP is a living document, it should be monitored and amended, as appropriate.

Non-substantive changes to this RP do not require further approval.

3. The District should post the RP to its web site and provide a link to the PCX-DDN for their use.

4. The MVD point of contact is Mr. Mincer Minor, CEMVD-PD-L, at (601) 634-5841.

Encl

MICHAEL C. WEHR
Major General, USA
Commanding

CF:

PCX-DDN (Otto)

CEMVN-PM-W (Keen)

CECW-MVD (Douglas)

REVIEW PLAN

**Mississippi River Ship Channel
Gulf to Baton Rouge, Louisiana**

General Reevaluation Report

Mississippi Valley Division – New Orleans District



MSC Approval Date: 18 June 2015
Last Revision Date: 11 May 2015



**US Army Corps
of Engineers®**



REVIEW PLAN

Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana **General Reevaluation Report**

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1. PURPOSE AND REQUIREMENTS

a. **Purpose.** This Review Plan defines the scope and level of peer review for the Mississippi River Ship Channel (MRSC), Gulf to Baton Rouge, Louisiana, General Reevaluation Report (GRR). The MRSC is located in the southeastern portion of Louisiana and consists of the Mississippi River below Baton Rouge and its major outlet to the Gulf of Mexico, Southwest Pass. This Review Plan applies to the GRR effort that will reassess economic, planning, environmental, and engineering elements that were authorized for construction by the 1985 Supplemental Appropriations Act (PL 99-88).

b. References

- Engineering Circular (EC) 1165-2-214, Civil Works Review Policy, 15 December 2012
- EC 1105-2-412, Assuring Quality of Planning Models, 31 Mar 2011
- Engineering Regulation (ER) 1110-1-12, Quality Management, 30 Sep 2006
- ER 1105-2-100, Planning Guidance Notebook, Appendix H, Policy Compliance Review and Approval of Decision Documents, Amendment #1, 20 Nov 2007
- MRSC GRR Project Management Plan, Oct 2014
- Mississippi Valley Division Regional Planning and Environment Division South Quality Management Plan, undated
- ER 1110-2-1150, Engineering and Design of Civil Works Projects
- DIVR 1110-1-13, Cofferdams for Construction Affecting Levees
- Engineering and Construction Bulletin (ECB) 2014-9

c. **Requirements.** This review plan was developed in accordance with EC 1165-2-214, which establishes an accountable, comprehensive, life-cycle review strategy for Civil Works products by providing a seamless process for review of all Civil Works projects from initial planning through design, construction, and operation, maintenance, repair, replacement and rehabilitation (OMRR&R). The EC outlines four general levels of review: District Quality Control/Quality Assurance (DQC), Agency Technical Review (ATR), Independent External Peer Review/Safety Assurance Review (IEPR/SAR), and Policy and Legal Compliance Review. In addition to these levels of review, decision documents are subject to cost engineering review and certification (per EC 1165-2-214) and planning model certification/approval (per EC 1105-2-412).

- District Quality Control/Quality Assurance (DQC). All **decision documents** (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home Major Subordinate Command (MSC).
- Agency Technical Review (ATR). ATR is mandatory for all **decision documents** (including supporting data, analyses, environmental compliance documents, etc.). The objective of ATR is to ensure consistency with established criteria, guidance, procedures, and policy. The ATR will assess whether the analyses presented are technically correct and comply with published US Army Corps of Engineers (USACE) guidance, and that the document explains the analyses and results in a reasonably clear manner for the public and decision makers. ATR is managed within USACE by a designated Risk Management Organization (RMO) and is conducted by a qualified team from outside the home district that is not involved in the day-to-day production of the project/product. ATR teams will be comprised of senior USACE

personnel and may be supplemented by outside experts as appropriate. To assure independence, the leader of the ATR team shall be from outside the home MSC.

- Independent External Peer Review (IEPR). IEPR may be required for **decision documents** under certain circumstances. IEPR is the most independent level of review, and is applied in cases that meet certain criteria where the risk and magnitude of the proposed project are such that a critical examination by a qualified team outside of USACE is warranted. A risk-informed decision, as described in EC 1165-2-214, is made as to whether IEPR is appropriate. IEPR panels will consist of independent, recognized experts from outside of the USACE in the appropriate disciplines, representing a balance of areas of expertise suitable for the review being conducted. There are two types of IEPR: Type I is generally for decision documents and Type II is generally for implementation products.
 - (a) Type I IEPR. Type I IEPR reviews are managed outside the USACE and are conducted on project studies. Type I IEPR panels assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, economic analysis, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, models used in the evaluation of environmental impacts of proposed projects, and an biological opinions of the project study. Type I IEPR will cover the entire decision document or action and will address all the underlying engineering, economics, and environmental work, not just one aspect of the study. For decision documents where a Type II IEPR (Safety Assurance Review) is anticipated during project implementation, safety assurance shall also be addressed during the Type I IEPR per EC 1165-2-214.
 - (b) Type II IEPR, or Safety Assurance Review (SAR), are managed outside the USACE and are conducted on design and construction activities for hurricane, storm, and flood risk management projects or other projects where existing and potential hazards pose a significant threat to human life. Type II IEPR panels will conduct reviews of the design and construction activities prior to initiation of physical construction and, until construction activities are completed, periodically thereafter on a regular schedule. The reviews shall consider the adequacy, appropriateness, and acceptability of the design and construction activities in assuring public health safety and welfare.
- Policy and Legal Compliance Review. All **decision documents** will be reviewed throughout the study process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.
- Cost Engineering Review and Certification. All **decision documents** shall be coordinated with the Cost Engineering Mandatory Center of Expertise (MCX), located in the Walla Walla District. The MCX, or in some circumstances regional cost personnel that are pre-certified by the MCX, will conduct the cost ATR. The MCX will provide certification of the final total project cost.

- **Model Certification/Approval.** EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR. EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. Engineering models are also subject to DQC, ATR, and IEPR.

2. REVIEW MANAGEMENT ORGANIZATION (RMO) COORDINATION

The RMO is responsible for managing the overall peer review effort described in this Review Plan. The RMO for implementation documents is typically either a Planning Center of Expertise (PCX) or the Risk Management Center (RMC), depending on the primary purpose of the decision document. The RMO for the peer review effort described in this Review Plan is the Deep Draft Navigation Planning Center of Expertise (DDNPCX) in Mobile with support on project navigation features that require SAR from the RMC. The project is a single purpose project and life safety issues are not anticipated.

The RMO will coordinate with the MCX to ensure the appropriate expertise is included on the review teams to assess the adequacy of cost estimates, construction schedules and contingencies. The GRR phase will involve creating designs for deepening the MRSC and to prevent salt water intrusion.

3. STUDY INFORMATION

- a. **Decision Document.** The project consists of deepening a segment of the existing Federal navigation project. Because this is an existing authorized project, no congressional authorization is required. The decision document GRR is needed to identify the depth that creates the greatest net benefits up to a 50 foot channel in order to proceed to implementation and to phase the remaining work accordingly. A report released by the Institute of Water Resources (IWR) in June 2012 evaluated the preparedness of U.S. ports to accommodate Post-Panamax size vessels. It found that these vessels currently call at U.S. ports and will dominate the world fleet in the future. These vessels will call in increasing numbers at U.S. ports that can accommodate them. While there are currently no Mississippi River ports that can accommodate these vessels, the Southeast and Gulf Coast may be economically justified in expanding port projects to accommodate post-Panamax vessels. The Port of New Orleans being the dominant port for the export of grains from the U.S. will likely play a key role in meeting these future needs if they are ready with a post-Panamax channel.
- b. **SMART Planning.** The study is expected to progress immediately to the Alternatives Milestone. The next step will be to conduct an economic evaluation on the No Action and two future action alternatives for this study (Alt. 1: 48ft depth) and (Alt. 2: 50ft depth) to determine if the next project increment is still justified and feasible. In order to make that determination, data acquisition is needed and will be acquired from:
 - Economic Analysis
 - H&H Consideration (dredging, salinity intrusion, RSLR)

- Conceptual Design (Relocations, Engineering, dredge crossings)
- Cost Estimates (Construction, O&M)
- Mitigation (modification/frequencies, determine GDM location, develop supplemental EIS)

The Tentatively Selected Plan (TSP) Milestone meeting will be held with the vertical team upon completion of these efforts.

Based on two alternative plans to deepen the channel, the PDT will evaluate both increments up to the -50 ft depth; compare the alternatives based on above data results, and screen to select the TSP. The GRR will document the results of these efforts. Work will be completed by using in-house labor and/or contracts. The Louisiana Department of Transportation and Development (LaDOTD) has expressed no interest in performing any study efforts as work-in-kind credit.

Management Measures

Management measures will be developed to support the phased approach to the authorized project. Evaluation of weirs or additional sills that might be needed to minimize or manage shoaling or salt water intrusion in, or through, the channel will only be addressed qualitatively in the GRR. Cost risk analysis will account for the potential additional cost associated with future changes in salinity mitigation requirements. Prior evaluation has indicated that current mitigation measures should be effective for a channel depth of 55 feet. Subject to verification of economic justification, management features to improve operations and maintenance will be evaluated in PED.

Evaluation and Comparison of Final Array of Alternatives

The alternatives will be evaluated based on their ability to meet project objectives in increasing net benefits and avoiding operational constraints. This will be achieved by using the estimated transportation cost savings for each alternative (48' or 50') and comparing the results to their respective project costs. The plan with the highest net benefits (the difference between transportation cost savings and project costs) will be selected as the NED plan.

Costs will be determined through design of a channel cross-section to determine excavation requirements and quantities and the use of hydraulic modeling to assess maintenance and mitigation requirements. The hydraulic modeling will include one-dimensional, two-dimensional, and three-dimensional models, each providing specific insight into the project function and operational costs.

The one-dimensional sedimentation model provides a means to evaluate long-term (50 year) responses of the Lower Mississippi River (LMR) to alterations in the channel depth. Specifically, these models use physics-based, numerical descriptions of hydraulic and sedimentation processes to estimate longitudinal (reach-scale) variations in sediment delivery, scour and deposition, and bed material gradation.

The two-dimensional sediment model will provide information concerning the spatial and temporal variability of sediment transport and morphology change in the river. The two-dimensional model provides a shorter simulation (5-years) but provided valuable insight to the locations of sediment delivery, scour and deposition.

The three-dimensional salinity model will provide information on the salt-wedge toe location under the existing conditions for the current channel and deepened channel conditions. It will illustrate changes to the relationship of the toe location and Mississippi River discharge between existing and

deepened channel conditions. Any changes in this relationship will be used to estimate the potential of an increased need to construct the salt water barrier sill.

Additional evaluation and comparison criteria will include assessments of the National Economic Development (NED), Regional Economic Development (RED), Environmental Quality (EQ), and Other Social Effects (OSE) impacts in the region. For sediment modeling, the PDT will rely on one-dimensional and two-dimensional modeling and use intermediate sea level rise.

Study Assumptions

- In coordination with the Vertical Team, two alternative channel depths (48ft depth and 50ft depth) will be evaluated.
 - The evaluations will be performed with the assumption that current maintenance practices (dredging and disposal placement methods, shoaling controls, etc.) at any given location will continue to be the Standard Operating Practices.
 - The evaluations will be performed with the assumption that the current salinity mitigation plan and features will continue to be effective. Mitigation practice for salinity intrusion has been, and continues to be, the placement of the underwater sill. Consistent with prior evaluations, the underwater sill continues to be effective in its performance. The EIS will be formally supplemented by including the prior salinity evaluation information along with additional validation derived from the proposed modeling.
 - There is significant existing data, prior investigation documentation, and current mitigation and maintenance practice evaluations that will be utilized in supplementing the 1981 EIS.
- c. **Factors Affecting the Scope and Level of Review:** The proposed construction components of the project are typical of hydrologic, geotechnical, mechanical, electrical, civil, operational, and real estate components of a navigation channel. There are no known risks to the proposed channel modification. All technical areas have methods to identify and mitigate inherent risks. Information in the decision document is unlikely to be based on novel methods, involve the use of innovative materials or techniques, contain precedent-setting methods or models, or present conclusions that are likely to change prevailing practices. The project does not contain influential scientific information and will not include any highly influential scientific assessments. Preliminary analysis indicates that impacts to fish and wildlife, including threatened and endangered species, are expected to be less than significant. To the extent practicable, environmental concerns can be addressed through mitigation measures of avoidance, minimization, or compensation, and through public education and outreach efforts. A SEIS will be completed to document the environmental effects of the proposed plan. The study will likely not have significant interagency interest. There are not challenging aspects of this study. It consists of deepening a segment of the existing Federal navigation project to improve efficiency of vessel operations. Accordingly, the project does not have any significant technical, institutional, or social challenges. The project will not be justified by life safety and does not involve significant threat to human life/safety assurance. The project is anticipated to have negligible adverse impacts on scarce or unique tribal, cultural or historic resources. The estimated cost of construction is in excess of \$45M. The GRR study is not highly controversial as it consists of deepening a segment of the existing navigation project. It is not anticipated that there will be a significant public dispute as to the size, nature, or effects of the project. Disposal of dredged material will include placement in existing approved disposal sites. The total project cost is expected to be in excess of \$200M.

The study area is located in the southeastern portion of Louisiana and consists of the Mississippi River below Baton Rouge and its major outlet to the Gulf of Mexico, Southwest Pass. The area includes the 45 foot channel of the Mississippi River which services 4 of the top 15 ports in the

United States including the largest port, the Port of South Louisiana. The Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana project authorized the construction of the channel to a depth of 55 feet. The project has been constructed and maintained to dimensions of 45' x 750' from New Orleans to Mile 18 BHP and 45' x 600' from Mile 18 BHP to Gulf of Mexico allowing for transfer of over 400,000,000 tons of cargo each year.

Other than access and coordination concerns and physical risks typical of construction sites, other project risks include the potential for schedule delays if a weather system (fronts, tropical systems, etc.) impacts the area.

It will be important to conduct reviews with internal district quality review teams and agency technical review teams concurrent with planning, economic, environmental, and engineering activities. This approach is intended to provide a shorter feedback loop to the PDT. These shorter loops will result in more near real-time input to design by reviewers and faster design throughout. The risk to this approach is the dependence on regular and efficient communications between the reviewers and the PDT. Should a divergent conflict arise between the DQC and ATR and the PDT, the issue will be raised to the Mississippi Valley Division office for resolution.



Figure 1: Mississippi River Ship Channel River Crossings

- d. **In-Kind Contributions.** No Work-In-Kind contributions are expected. It is anticipated that the local sponsor, the LaDOTD, will provide cash as their 50% cost share up to a maximum of \$1.5M.

4. DISTRICT QUALITY CONTROL (DQC)

All decision and implementation documents (including supporting data, analyses, environmental compliance documents, etc.) shall undergo DQC. DQC is an internal review process of basic science and engineering work products focused on fulfilling the project quality requirements defined in the Project Management Plan (PMP). The home district shall manage DQC. Documentation of DQC activities is required and should be in accordance with the Quality Manual of the District and the home MSC.

- a. **Documentation of DQC.** In accordance with District Quality Management Plan's, internal reviews or design checks will constitute quality control for each deliverable product. It is the responsibility of each product development team member, their supervisors, and the project manager to ensure that every product receives an internal quality control review. It is the responsibility of the supervisor or section chief for each team member to ensure that a qualified DQC reviewer that has not been involved with the preparation of the technical product under review is selected and conducts a review of their product prior to delivery to the project manager, or prior to completion. In accordance with District QMP procedures, the management of the review process will be coordinated by a designated Quality Control Review Leader (QCRL). The QCRL will compile all technical, grammatical, and editorial comments and will ensure DQC standards are met prior to submission of the implementation document to the Vertical Team. Dr. Checks will be used to document all DQC comments, responses, and associated resolution accomplished throughout the review process. Once the DQC process is complete, a Certificate of Quality Control Review will be provided to the ATR team lead that includes a copy of the comment report prior to ATR.
- b. **Products to Undergo DQC.** District Quality Reviews will evaluate the sufficiency of designs presented and the quality of studies used to select alternatives. Technical products that will be reviewed include:
 - (1) Engineering (surveys; climatology report; hydrologic records report; HEC-RAS model input and output for base conditions, future without and alternative plans WQ report and 404(b)(1) report input; H&H input to the draft and final GRR; quantity take-off for channels; preliminary geotech design; soil foundation analysis; geology section; design of alternative plans; design of tentatively selected plan; relocations report and relocations cost estimate of the alternatives and the tentatively selected plan; construction cost estimates of the alternative plans, tentatively selected plan, and recommended plan; risk analysis of the tentatively selected plan and the recommended plan; and value engineering study).
 - (2) Economics (commercial traffic data; transportation rate study; traffic forecast; elasticity of demand for water transportation; externality study; reliability analysis; HarborSym run for baseline condition; HarborSym run for with project alternatives; benefits sensitivity analysis).
 - (3) Environmental (scoping report; environmental setting and significant resources; description of alternatives; most probable future condition; WVA models; alternative plans impacts; mitigation plan; 404(b)(1) evaluation and public notice; WQC applications; coastal zone consistency determination documents; air quality determination documents; preliminary draft Supplemental Environmental Impact Statement (SEIS); preliminary draft GRR; draft SEIS,

draft GRR document; public review transmittal letters; initial cultural resources evaluations; cultural resources scope of work; cultural resources input to the GRR; recreational input to the GRR; evaluation of aesthetics report; HTRW initial assessment and investigations documents; final SEIS; final GRR document; and draft Record of Decision).

- (4) Real estate (real estate appraisal; gross appraisal report; Real Estate Plan for the draft GRR, and final GRR).
- (5) Where practicable, the technical products that support subsequent analyses should be reviewed prior to being used in the study. Additionally, the PDT will be responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before the approval by the District Commander.
- (6) Attorney's Preliminary Opinion of Compensability.
- (7) Draft and Final Reports.

Where practicable, the technical products that support subsequent analyses should be reviewed prior to being used in the study. Additionally, the PDT will be responsible for a complete reading of the report to assure the overall integrity of the report, technical appendices and the recommendations before the approval by the District Commander.

5. AGENCY TECHNICAL REVIEW (ATR)

a. Products to Undergo ATR. Specific products to undergo ATR include the following:

- (1) Geotechnical Design Report
- (2) H&H HEC-RAS modeling
- (3) Construction Cost Estimates
- (4) Operation & Maintenance Cost Estimates
- (5) Economic Analysis
- (6) Real Estate Plan
- (7) Channel Design Documents
- (8) Screening of Alternatives
- (9) Tentatively Selected Plan
- (10) Draft GRR/SEIS with supporting appendices
- (11) Final GRR/SEIS with supporting appendices

- b. Required ATR Team Expertise.** The expertise represented on the ATR team reflects the significant disciplines involved in the work effort and mirrors the expertise on the PDT. The DDNPCX, in cooperation with the PDT and Vertical Team will determine the final make-up of the ATR team (i.e., technical disciplines comprising the ATR team). The RMC will also be involved in the ATR. Based on the disciplines indicated below, the study will require a minimum of 11 reviewers.

ATR Team Members/Disciplines	Expertise Required
Plan Formulation Reviewer	The ATR Lead/Planning reviewer should have 10 – 15 years experience as a plan formulator who has worked with project teams to identify and evaluate navigation (dredging) measures and alternatives using appropriate planning methodologies to address navigation studies in accordance with ER 1105-2-100, the Planning Guidance Notebook. Must have extensive plan formulation experience reviewing the analysis with which the measures and alternatives were evaluated and determining that they are sufficiently comprehensive and complete to result in approval of a recommended alternative. Review the documentation of the selection of a recommended plan and ensure the team used an approved plan selection methodology.
Hydrology/Hydraulic Engineering	The H&H Engineering reviewer should have 10 years H&H experience or equivalent education. Should have extensive H&H experience on a design or construction team that worked on navigation (dredging) and flood risk reduction projects. Must be experienced in computer modeling techniques such as HEC-HMS, HEC-RAS, etc.
Economics	The Economics reviewer should have 5-10 years USACE economics experience or equivalent education. Should have extensive experience in analyzing navigation and flood risk management projects in accordance with ER 1105-2-100, the Planning Guidance Notebook. Should have economics experience working with the USACE risk informed approach to decision making, risk models, including HarborSym, and disaster scenarios with regard to economic impact. Should also have at least two years direct experience in the areas of forecasting, externalities, capacity, navigation performance, system reliability, and transportation rates.
Environmental Resources	The Environmental Resources reviewer should have 5-10 years environmental resources experience or equivalent education. Should have extensive experience working with the assessment of construction impacts in marsh and rural areas and related ecosystem species and habitat. Should have environmental resources experience working on design or construction teams that worked on navigation projects in or around coastal inland waterway systems. Should have detailed knowledge of the National Environmental Protection Act, Endangered Species Act with regional knowledge of south Louisiana specific regulatory requirements, and Federal services regulations.
Geotechnical Engineering	The Geotechnical Engineering reviewer should have at least 10 years geotechnical engineering experience and graduate study in engineering or a related field. Should have several years of direct

	geotechnical experience on design or construction teams that worked on navigation (dredging) projects in a coastal inland waterway system.
Civil Engineering	The Civil Engineering reviewer should have at least 10 years civil engineering experience or equivalent education. Should have extensive civil engineering experience on design or construction teams related to navigation (dredging) projects elements such as channels in a coastal inland waterway system.
Structural Engineering	The Structural Engineering reviewer should have at least 10 years structural engineering experience or equivalent education. Should have extensive structural engineering experience on design or construction teams that worked on navigation (dredging) projects elements such as channels in a coastal inland waterway system.
Cost Engineering	The Cost Engineering reviewer should have 5-10 years experience working with estimating complex and phased costing of multi-year civil construction projects. Should have direct experience working with navigation (dredging) projects in a design or construction management capacity.
Construction/Operations	The reviewer should have 10 years construction experience or equivalent education assessing navigation (lock replacement) projects. Should have extensive construction management experience on design or construction teams that worked on navigation (dredging) projects in the coastal inland waterway system.
Real Estate	Team member must be experienced in civil work real estate laws, policies and guidance and experience working with real estate issues and property rights, especially on controversial projects.

c. Documentation of ATR. DrChecks review software will be used to document all ATR comments, responses and associated resolutions accomplished throughout the review process. Comments should be limited to those that are required to ensure adequacy of the product. The four key parts of a quality review comment will include:

- The review concern – identify the product’s information deficiency or incorrect application of policy, guidance, or procedures;
- The basis for the concern – cite the appropriate law, policy, guidance, or procedure that has not been properly followed;
- The significance of the concern – indicate the importance of the concern with regard to its potential impact on the plan selection, recommended plan components, efficiency (cost), effectiveness (function/outputs), implementation responsibilities, safety, Federal interest, or public acceptability; and
- The probable specific action needed to resolve the concern – identify the action(s) that the reporting officers must take to resolve the concern.

In some situations, especially addressing incomplete or unclear information, comments may seek clarification in order to then assess whether further specific concerns may exist.

The ATR documentation in DrChecks will include the text of each ATR concern, the PDT response, a brief summary of the pertinent points in any discussion, including any vertical team coordination (the vertical team includes the district, RMO, MSC, and HQUSACE), and the agreed upon resolution. If

an ATR concern cannot be satisfactorily resolved between the ATR team and the PDT, it will be elevated to the vertical team for further resolution in accordance with the policy issue resolution process described in either ER 1110-1-12 or ER 1105-2-100, Appendix H, as appropriate. Unresolved concerns can be closed in DrChecks with a notation that the concern has been elevated to the vertical team for resolution.

At the conclusion of each ATR effort, the ATR team will prepare a Review Report summarizing the review. Review Reports will be considered an integral part of the ATR documentation and shall:

- Identify the document(s) reviewed and the purpose of the review
- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer
- Include the charge to the reviewers
- Describe the nature of their review and their findings and conclusions
- Identify and summarize each unresolved issue (if any)
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views

ATR may be certified when all ATR concerns are either resolved or referred to the vertical team for resolution and the ATR documentation is complete. The ATR Lead will prepare a Statement of Technical Review certifying that the issues raised by the ATR team have been resolved (or elevated to the vertical team). A Statement of Technical Review should be completed, based on work reviewed to date. A sample Statement of Technical Review is included in Attachment 2.

6. INDEPENDENT EXTERNAL PEER REVIEW (IEPR)

- a. **Decision on IEPR.** In accordance with EC 1165-2-214, Paragraph 11, using a Type I IEPR will be mandatory for the MRSC Deepening GRR as the cost of the project will exceed the \$200 million threshold. Additionally, the EIS will need to be supplemented and is over 30 years old.
- a. **Products to Undergo Type I IEPR.** Products to undergo the Type I IEPR include:
 - Draft GRR and SEIS with supporting documentation.
 - Public comments will be provided to the IEPR Panel.
- b. **Required Type I IEPR Panel Expertise.** Additional team members for expertise in other disciplines may be added by the RMO as the review progresses.

IEPR Panel Members/Disciplines	Expertise Required
Planning	The Planning panel member should be from academia, a public agency, a non-governmental entity, or an Architect-Engineer or Consulting Firm with at least a Bachelors degree and have 15 years demonstrated experience as a senior water resources planner who has worked with project teams to identify and evaluate measures and alternatives using appropriate planning methodologies to address navigation (dredging) projects in a coastal inland waterway system. Must have extensive experience reviewing the analysis with which the measures and alternatives were evaluated and determining that they are sufficiently

IEPR Panel Members/Disciplines	Expertise Required
	comprehensive and complete to result in approval of a recommended alternative. Review the documentation of the selection of a recommended plan and ensure the team used an approved plan selection methodology. Five years experience directly dealing with USACE planning process as outlined in ER 1105-2-100, Planning Guidance Notebook, is highly recommended.
Economics	The Economics panel member should 15 years demonstrated experience or combined equivalent of education and experience. Should have MS degree or higher in economics and be a recognized expert in applied economics related to transportation economics including experience with financing transportation infrastructure and national and international logistics and transportation requirements. Should have experience working with risk informed approaches to decision making, risk models and disaster scenarios with regard to economic impact.
Environmental	The Environmental panel member should be a scientist from academia, a public agency, a non-government entity, or an Architect-Engineer or Consulting Firm with a minimum 15 years demonstrated experience working with the NEPA impact assessment of public works projects. The panel member should have a minimum MS degree or higher in an appropriate field of study. Experience should encompass determining the scope and appropriate methodologies for environmental impact analyses for projects and programs with high public and interagency interests and having project impacts to nearby sensitive habitats along the Mississippi River or similar systems. Should have detailed knowledge of the National Environmental Protection Act, Endangered Species Act with regional knowledge of south Louisiana specific regulatory requirements, and Federal services regulations. Active participation in related professional societies is encouraged.
Hydrology and Hydraulic (H&H) Engineering	The H&H Engineering panel member should have 15 years demonstrated experience or combined equivalent of education and experience assessing navigation (dredging) projects in an inland waterway system. Member should be a Registered Professional Engineer from academia, a public agency, or an Architect-Engineer or Consulting Firm with at least a Bachelors degree. Should have direct H&H design or construction management experience centered on navigation design and construction along the coastal inland waterway system. Should also have 5-10 years experience working with numerical modeling applications for navigation projects. Should be familiar with USACE applications of risk and uncertainty analysis in navigation transportation projects. Active participation in related professional societies is encouraged.
Geotechnical Engineering	The Geotechnical Engineering panel member should have a minimum 20 years demonstrated experience and graduate study in soils engineering or related field. Member should be a Registered

IEPR Panel Members/Disciplines	Expertise Required
	Professional Engineer from academia, a public agency, or an Architect-Engineer or Consulting Firm with at least a MS degree. Must have lock and dam design and construction experience. Should have several years of direct experience with regard to navigation as either a designer or construction project engineer. Must be skillful with the USACE risk informed approach to navigation transportation and flood risk reduction projects. Active participation in related professional societies is encouraged.
Structural Engineering	The Structural Engineering panel member should have a minimum 15 years demonstrated civil engineering experience or combined equivalent of education and experience assessing navigation (dredging) projects. Member should be a Registered Professional Engineer from academia, a public agency, or an Architect-Engineer or Consulting Firm with at least a Bachelors degree. Should have direct civil engineering design or construction management experience with regard to salt water sills, levees, weirs, and other navigation elements. Active participation in related professional societies is encouraged.

c. **Documentation of Type I IEPR.** The IEPR panel will be selected and managed by an Outside Eligible Organization (OEO) per EC 1165-2-214, Appendix D. DrChecks will be utilized to document this review. Panel comments will be compiled by the OEO and should address the adequacy and acceptability of the economic, engineering and environmental methods, models, and analyses used. IEPR comments should generally include the same four key parts as described for ATR comments in Section 4.d above. Panel members will not be nominated by the Corps or the public, including scientific or professional societies. The OEO will prepare a final Review Report that will accompany the publication of the final decision document and shall:

- Disclose the names of the reviewers, their organizational affiliations, and include a short paragraph on both the credentials and relevant experiences of each reviewer;
- Include the charge to the reviewers;
- Describe the nature of their review and their findings and conclusions; and,
- Include a verbatim copy of each reviewer's comments (either with or without specific attributions), or represent the views of the group as a whole, including any disparate and dissenting views.

d. The final Review Report will be submitted by the OEO no later than 60 days following the close of the public comment period for the draft decision document. USACE shall consider all recommendations contained in the Review Report and prepare a written response for all recommendations adopted or not adopted. The final decision document will summarize the Review Report and USACE response. The Review Report and USACE response will be made available to the public, including through electronic means on the internet.

7. POLICY AND LEGAL COMPLIANCE REVIEW

All decision documents will be reviewed throughout the GRR process for their compliance with law and policy. Guidance for policy and legal compliance reviews is addressed in Appendix H, ER 1105-2-100. These reviews culminate in determinations that the recommendations in the reports and the

supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the home MSC Commander. DQC and ATR augment and complement the policy review processes by addressing compliance with pertinent published Army policies, particularly policies on analytical methods and the presentation of findings in decision documents.

8. COST ENGINEERING AGENCY TECHNICAL REVIEW AND MANDATORY CENTER OF EXPERTISE (MCX) REVIEW AND CERTIFICATION

All decision documents shall be coordinated with the Cost Engineering ATR and MCX, located in the Walla Walla District. The MCX will assist in determining the expertise needed on the ATR team and in the development of the review charge(s). The MCX will also provide the Cost Engineering MCX certification. The RMO is responsible for coordination with the Cost Engineering MCX.

9. MODEL CERTIFICATION AND APPROVAL

EC 1105-2-412 mandates the use of certified or approved models for all planning activities to ensure the models are technically and theoretically sound, compliant with USACE policy, computationally accurate, and based on reasonable assumptions. Planning models, for the purposes of the EC, are defined as any models and analytical tools that planners use to define water resources management problems and opportunities, to formulate potential alternatives to address the problems and take advantage of the opportunities, to evaluate potential effects of alternatives and to support decision making. The use of a certified/approved planning model does not constitute technical review of the planning product. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

EC 1105-2-412 does not cover engineering models used in planning. The responsible use of well-known and proven USACE developed and commercial engineering software will continue and the professional practice of documenting the application of the software and modeling results will be followed. As part of the USACE Scientific and Engineering Technology (SET) Initiative, many engineering models have been identified as preferred or acceptable for use on Corps studies and these models should be used whenever appropriate. The selection and application of the model and the input and output data is still the responsibility of the users and is subject to DQC, ATR, and IEPR (if required).

- a. Planning Models.** The following planning models are anticipated to be used in the development of the decision document.

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Certification / Approval Status
Harbor Simulation Model (HarborSym)	HarborSym is a discrete event Monte-Carlo simulation model designed to facilitate economic analyses of proposed navigation improvement projects in coastal harbors. The model captures fleet and loading changes, incorporates calculations for both within harbor costs and costs associated with ocean voyage costs. It was developed by the Institute for Water Resources (IWR) as a planning-level tool for the U.S. Army Corps of Engineers planners. As a USACE certified model it facilitates analyses of channel deepening projects as well as widening projects at coastal ports.	Certified

Wetland Value Assessment (WVA)	The United States Fish and Wildlife Service Habitat Evaluation Procedure (HEP) (USFWS, 1980) (certified) is used to evaluate habitat conditions that would result from alternative plans. A habitat suitability index (HSI) for indicator species is derived by aggregating suitability indices (SIs) critical for habitat variables. These SIs are based on field measurements for existing conditions and on professional judgment for future conditions under alternative plans. The index ranges from 0.0 to 1.0, with 1.0 representing the highest habitat quality possible. A habitat unit (HU) is the product of the HSI multiplied by an area (acre) of available habitat. HSIs and Hus were developed for different times during the period of analysis (at year 1, 15, 25, and 50), and HUs are annualized to estimate an average annual habitat unit (AAHU).	Certified
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- b. Engineering Models.** The following engineering models are anticipated to be used in the development of the decision document:

Model Name and Version	Brief Description of the Model and How It Will Be Applied in the Study	Approval Status
HEC-RAS 6T (River Analysis System)	The Hydrologic Engineering Center's River Analysis System (HEC-RAS) program provides the capability to perform one-dimensional steady and unsteady flow river hydraulics calculations. The program will be used for steady flow analysis to evaluate the future without- and with-project conditions along the Mississippi River Chip Channel Gulf to Baton Rouge corridor.	USACE Approved Model
ADH (Adaptive Hydraulics Modeling)	The two-dimensional sediment model will provide information concerning the spatial and temporal variability of sediment transport and morphology change in the river. The two-dimensional model provides a shorter simulation (5-years) but provided valuable insight to the locations of sediment delivery, scour and deposition.	USACE Approved Model
Delft 3D	The three-dimensional salinity model will provide information on the salt-wedge toe location under the existing conditions and deepened conditions. It will illustrate changes to the relationship of the toe location and Mississippi River discharge between existing and deepened channel conditions. Any changes in this relationship will be used to estimate the potential of an increased need to construct the salt water barrier sill.	USACE Approved Model

- c. Model Certification/Approval.** The HEC-RAS model is widely accepted by the engineering community and does not need any special allowances or certification for its use.

10. REVIEW SCHEDULES AND COSTS

A full accounting of review costs is based on SMART Planning principles but is also dependent upon the frequency of reviews and the amount of time required per review. Coordination with the RMO is necessary to accurately capture how often and for how long the ATR team will be engaged with the decision document process. Initial estimates to carry out Review Plan tasks during the GRR effort include:

<u>Activity</u>	<u>Cost</u>	<u>Schedule</u>
- MVN DQC:	\$70,000	
- ATR (Draft):	\$70,000	Sep 16-Mar17
- ATR (Final)	\$50,000	TBD
- IEPR:	\$150,000	Sep 16-Sep 17

A schedule has been developed and is contained in the PMP. All technical, policy, and external peer reviews will take place during the public review period which occurs between the TSP milestone and the Agency Decision Milestone. The timing and cost of interim reviews, if necessary, will be addressed in Review Plan updates when that information becomes available.

11. PUBLIC PARTICIPATION

The public will have several opportunities to comment on the GRR documents through a public involvement plan implemented through a notice of study initiation, public meetings, and public workshops. This will allow the USACE the opportunity to exchange information with the public and ensure that individuals with an interest in the study are identified and contacted allowing them to voice their views and concerns relative to the study process.

Public meetings and workshops will be conducted to gather and provide feedback from the public, formulate a consensus, and generally keep interested parties informed. A public meeting will be scheduled subsequent to the public release of the draft GRR and SEIS to present the study conclusions. Throughout the study other public meetings and workshops will be held as necessary.

12. REVIEW PLAN APPROVAL AND UPDATES

The Mississippi Valley Division Commander is responsible for approving this Review Plan. The Commander's approval reflects vertical team input (involving district, MSC, RMO, and HQUSACE members) as to the appropriate scope and level of review for the decision document. Like the PMP, the Review Plan is a living document and may change as the study progresses. The home district is responsible for keeping the Review Plan up to date. Minor changes to the review plan since the last MSC Commander approval are documented in Attachment 3. Significant changes to the Review Plan (such as changes to the scope and/or level of review) should be re-approved by the MSC Commander following the process used for initially approving the plan. The latest version of the Review Plan, along with the Commanders' approval memorandum, should be posted on the Home District's webpage. The latest Review Plan should also be provided to the RMO and home MSC.

13. REVIEW PLAN POINTS OF CONTACT

Public questions and/or comments on this review plan can be directed to the following points of contact:

- Tim Axtman – MVN Senior Planner; (504) 862-1921; Timothy.J.Axtman@usace.army.mil
- Steven Keen – MVN Project Manager; (504) 862-2915; steven.e.keen@usace.army.mil
- Kimberly Otto – DDNPCX Review Manager; (251) 694-3842; Kimberly.p.otto@usace.army.mil

ATTACHMENT 1: TEAM ROSTERS

Project Delivery Team			
Name	Discipline	Phone	Email
Marti Lucore	Sr. Proj. Manager	504 862-2057	marti.m.lucore@usace.army.mil
Steven Keen	Project Manager	504 862-2915	steven.e.keen@usace.army.mil
Tim Axtman	Sr. Planner	504 862-1921	timothy.j.axtman@usace.army.mil
Travis Creel	Planner	504 862-1071	travis.j.creel@usace.army.mil
Mark Haab	Sr. Economist	504 862-2497	mark.e.haab@usace.army.mil
Matt Napolitano	Economist	504 862-2445	matthew.p.napolitano@usace.army.mil
Richard Boe	Sr. Environmentalist	504 862-1505	richard.e.boe@usace.army.mil
Steve Roberts	Environmentalist	504 862-2517	steve.w.roberts@usace.army.mil
Pam Fischer	Realty Spec.	504 862-1157	pamela.fischer@usace.army.mil
Judy Gutierrez	Sr. Realty Spec.	504 862-2575	judith.y.gutierrez@usace.army.mil
Pam Deloach	Project Engineer	504 862-2621	pamela.a.deloach@usace.army.mil
Richard Broussard	Civil Engineer	504 862-2402	richard.w.broussard@usace.army.mil
Keith O'Cain	Sr. Civil Engineer	504 862-2746	keith.j.o'cain@usace.army.mil
Eric Salamone	Cost Engineer	504 862-1676	benjamin.e.salamone@usace.army.mil
Keely Crowder	H&H Engineer	504 862-2114	keely.crowder@usace.army.mil
Valerie Desselles	Geotech Engineer	504 862-2254	valerie.j.desselles@usace.army.mil
Shauniqua Thomas	Project Engineer	504-862-1335	shauniqua.l.thomas@usace.army.mil
Ed Creef	Environmentalist	504 862-2521	edward.d.creef@usace.army.mil
Michelle Kornick	Operations Manager	504 862-1842	michelle.s.kornick@usace.army.mil
Gary Leblanc	Construction Mgr.	504 862-2751	Gary.R.Leblanc@usace.army.mil
Noel Grego-Delgado	Relocations Engr.	504 862-1078	noel.grego-delgado@usace.army.mil
Mary Kinsey	Counsel	504 862-2828	mary.v.kinsey@usace.army.mil
Karen Roselli	Counsel	504-862-2137	karen.e.roselli@usace.army.mil
DQC Team (to be determined)			
Name	Office	Phone	Email
Plan Formulator			
Economics Rep.			
Environmental Rep.			
Hydraulics Rep.			
Cost Estimator			
Relocations Rep.			
Structures Rep.			
Geotechnical Rep.			
Construction Rep.			
Real Estate Rep.			

ATR Team (to be determined)			
Name	Office	Phone	Email
See table above for disciplines.			
RMO Contacts (to be determined)			
Name	Office	Phone	Email

**ATTACHMENT 2: SAMPLE STATEMENT OF TECHNICAL REVIEW FOR DECISION
DOCUMENTS
COMPLETION OF AGENCY TECHNICAL REVIEW**

The Agency Technical Review (ATR) has been completed for the *General Re-evaluation Report* for Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrCheckssm.

SIGNATURE

Name

ATR Team Leader

Office Symbol/Company

Date

SIGNATURE

Name

Project Manager

Office Symbol

Date

SIGNATURE

Name

Architect Engineer Project Manager¹

Company, location

Date

SIGNATURE

Name

Review Management Office Representative

Office Symbol

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows: Describe the major technical concerns and their resolution.

As noted above, all concerns resulting from the ATR of the project have been fully resolved.

SIGNATURE

Name

Chief, Engineering Division

Office Symbol

Date

SIGNATURE

Name

Chief, Planning Division

Office Symbol

Date

¹ Only needed if some portion of the ATR was contracted

ATTACHMENT 3: REVIEW PLAN REVISIONS

Revision Date	Description of Change	Page / Paragraph Number

ATTACHMENT 4: ACRONYMS AND ABBREVIATIONS

Term	Definition	Term	Definition
ASA(CW)	Assistant Secretary of the Army for Civil Works	O&M	Operation and maintenance
ATR	Agency Technical Review	OMB	Office and Management and Budget
DPR	Detailed Project Report	OMRR&R	Operation, Maintenance, Repair, Replacement and Rehabilitation
DQC	District Quality Control/Quality Assurance	OEO	Outside Eligible Organization
DX	Directory of Expertise	OSE	Other Social Effects
EA	Environmental Assessment	PCX	Planning Center of Expertise
EC	Engineer Circular	PDT	Project Delivery Team
EIS	Environmental Impact Statement	PMP	Project Management Plan
EO	Executive Order	PL	Public Law
FEMA	Federal Emergency Management Agency	QMP	Quality Management Plan
GRR	General Reevaluation Report	QA	Quality Assurance
Home District/MSD	The District or MSD responsible for the preparation of the decision document	QC	Quality Control
HQUSACE	Headquarters, U.S. Army Corps of Engineers	RED	Regional Economic Development
IEPR	Independent External Peer Review	RMC	Risk Management Center
		RMO	Review Management Organization
ITR	Independent Technical Review		
LRR	Limited Reevaluation Report	SAR	Safety Assurance Review
MSD	Major Subordinate Command	USACE	U.S. Army Corps of Engineers
MVD	Mississippi Valley Division	WRDA	Water Resources Development Act
NED	National Economic Development	SEIS	Supplemental Environmental Impact Statement
NEPA	National Environmental Policy Act		

Review Plan Checklist For Decision Documents

Date: 12 MAY 2015

Originating District: MVN

Project/Study Title: Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, GRR

PWI #:

District POC: Steven Keen (504) 862-2915

PCX Reviewer: Kim Otto

Please fill out this checklist and submit with the draft Review Plan when coordinating with the appropriate PCX. Any evaluation boxes checked 'No' indicate the RP may not comply with ER 1105-2-410 (22 Aug 2008) and should be explained. Additional coordination and issue resolution may be required prior to MSC approval of the Review Plan.

REQUIREMENT	REFERENCE	EVALUATION
1. Is the Review Plan (RP) a stand alone document?	EC 1105-2-410, Para 8a	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
a. Does it include a cover page identifying it as a RP and listing the project/study title, originating district or office, and date of the plan? b. Does it include a table of contents? c. Is the purpose of the RP clearly stated and EC 1105-2-410 referenced? d. Does it reference the Project Management Plan (PMP) of which the RP is a component? e. Does it succinctly describe the three levels of peer review: District Quality Control (DQC), Agency Technical Review (ATR), and Independent External Peer Review (IEPR)? f. Does it include a paragraph stating the title, subject, and purpose of the decision document to be reviewed? g. Does it list the names and disciplines of the Project Delivery Team (PDT)?*	EC 1105-2-410, Appendix B, Para 4a	a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> e. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> f. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> g. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Comments: Item c: EC 1105-2-410 has expired; therefore RP references current guidance, EC 1165-2-214.
<i>*Note: It is highly recommended to put all team member names and contact information in an appendix for easy updating as team members change or the RP is updated.</i>		

2. Is the RP detailed enough to assess the necessary level and focus of peer review?	EC 1105-2-410, Appendix B, Para 3a	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<p>a. Does it indicate which parts of the study will likely be challenging?</p> <p>b. Does it provide a preliminary assessment of where the project risks are likely to occur and what the magnitude of those risks might be?</p> <p>c. Does it indicate if the project/study will require preparation of an environmental impact statement (EIS)?</p> <p><i>Will an EIS be prepared? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></i> <i>If yes, IEPR is required.</i></p> <p>d. Does it address if the project report is likely to contain influential scientific information or be a highly influential scientific assessment?</p> <p><i>Is it likely? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></i> <i>If yes, IEPR is required.</i></p> <p>e. Does it address if the project is likely to have significant economic, environmental, and social affects to the nation, such as (but not limited to):</p> <ul style="list-style-type: none"> • more than negligible adverse impacts on scarce or unique cultural, historic, or tribal resources? • substantial adverse impacts on fish and wildlife species or their habitat, prior to implementation of mitigation? • more than negligible adverse impact on species listed as endangered or threatened, or to the designated critical habitat of such species, under the Endangered Species Act, prior to implementation of mitigation? <p><i>Is it likely? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></i> <i>If yes, IEPR is required.</i></p>	<p>EC 1105-2-410, Appendix B, Para 3a</p> <p>EC 1105-2-410, Appendix B, Para 3a</p> <p>EC 1105-2-410 Para 7c & 8f</p> <p>EC 1105-2-410, Appendix B, Para 4b</p> <p>EC 1105-2-410, Para 6c</p> <p>EC 1105-2-410 Para 8f</p> <p>EC 1105-2-410 Para 8f</p> <p>EC 1105-2-410 Para 8f</p>	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>e. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments: A Supplemental EIS will be prepared.</p>

<p>b. Does it state that ATR will be conducted or managed by the lead PCX?</p> <p>c. Does it state whether IEPR will be performed?</p> <p><i>Will IEPR be performed?</i> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>d. Does it provide a defensible rationale for the decision on IEPR?</p> <p>e. Does it state that IEPR will be managed by an Outside Eligible Organization, external to the Corps of Engineers?</p>	<p>EC 1105-2-410, Appendix D, Para 3a</p> <p>EC 1105-2-410, Appendix B, Para 4b</p> <p>EC 1105-2-410, Para 7c</p>	<p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>e. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/></p> <p>Comments:</p>
<p>4. Does the RP explain how ATR will be accomplished?</p>	<p>EC 1105-2-410, Appendix B, Para 4l</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>a. Does it identify the anticipated number of reviewers?</p> <p>b. Does it provide a succinct description of the primary disciplines or expertise needed for the review (not simply a list of disciplines)?</p> <p>c. Does it indicate that ATR team members will be from outside the home district?</p> <p>d. Does it indicate that the ATR team leader will be from outside the home MSC?</p> <p>e. Does the RP state that the lead PCX is responsible for identifying the ATR team members and indicate if candidates will be nominated by the home district/MS?</p> <p>f. If the reviewers are listed by name, does the RP describe the qualifications and years of relevant experience of the ATR team members?*</p> <p><i>*Note: It is highly recommended to put all team member names and contact information in an appendix for easy updating as team members change or the RP is updated.</i></p>	<p>EC 1105-2-410, Appendix B, Para 4f</p> <p>EC 1105-2-410, Appendix B, Para 4g</p> <p>EC 1105-2-410, Para 7b</p> <p>EC 1105-2-410, Para 7b</p> <p>EC 1105-2-410, Appendix B, Para 4k(1)</p> <p>EC 1105-2-410, Appendix B, Para 4k(1)</p>	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>e. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>f. Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/></p> <p>Comments:</p>

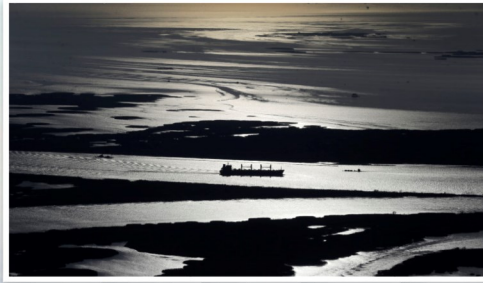
5. Does the RP explain how IEPR will be accomplished?	EC 1105-2-410, Appendix B, Para 4k & Appendix D	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/>
a. Does it identify the anticipated number of reviewers? b. Does it provide a succinct description of the primary disciplines or expertise needed for the review (not simply a list of disciplines)? c. Does it indicate that the IEPR reviewers will be selected by an Outside Eligible Organization and if candidates will be nominated by the Corps of Engineers? d. Does it indicate the IEPR will address all the underlying planning, safety assurance, engineering, economic, and environmental analyses, not just one aspect of the project?	EC 1105-2-410, Appendix B, Para 4f EC 1105-2-410, Appendix B, Para 4g EC 1105-2-410, Appendix B, Para 4k(1) & Appendix D, Para 2a EC 1105-2-410, Para 7c	a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Comments:
6. Does the RP address peer review of sponsor in-kind contributions?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
a. Does the RP list the expected in-kind contributions to be provided by the sponsor? b. Does it explain how peer review will be accomplished for those in-kind contributions?	EC 1105-2-410, Appendix B, Para 4j	a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> b. Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/> Comments: NFS will not provide WIK contributions.
7. Does the RP address how the peer review will be documented?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
a. Does the RP address the requirement to document ATR and IEPR comments using DrChecks? b. Does the RP explain how the IEPR will be documented in a Review Report? c. Does the RP document how written responses to the IEPR Review Report will be prepared?	EC 1105-2-410, Para 8g(1) EC1105-2-410, Appendix B, Para 4k(13)(b) EC 1105-2-410, Appendix B, Para 4l	a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/> c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/>

<p>d. Does the RP detail how the district/PCX will disseminate the final IEPR Review Report, USACE response, and all other materials related to the IEPR on the internet and include them in the applicable decision document?</p>	<p>EC 1105-2-410, Para 8g(2) & Appendix B, Para 4l</p>	<p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/></p> <p>Comments:</p>
<p>8. Does the RP address Policy Compliance and Legal Review?</p>	<p>EC 1105-2-410, Para 7d</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments:</p>
<p>9. Does the RP present the tasks, timing and sequence (including deferrals), and costs of reviews?</p>	<p>EC 1105-2-410, Appendix B, Para 4c & Appendix C, Para 3d</p>	<p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>
<p>a. Does it provide a schedule for ATR including review of the Feasibility Scoping Meeting (FSM) materials, Alternative Formulation Briefing (AFB) materials, draft report, and final report?</p> <p>b. Does it include interim ATR reviews for key technical products?</p> <p>c. Does it present the timing and sequencing for IEPR?</p> <p>d. Does it include cost estimates for the peer reviews?</p>	<p>EC 1105-2-410, Appendix C, Para 3g</p> <p>EC 1105-2-410, Appendix C, Para 3g</p>	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input type="checkbox"/> No <input checked="" type="checkbox"/></p> <p>c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> n/a <input type="checkbox"/></p> <p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments: RP notes that timing and cost of interim reviews, if needed, will be addressed in RP updates.</p>
<p>10. Does the RP indicate the study will address Safety Assurance factors?</p> <p>Factors to be considered include:</p> <ul style="list-style-type: none"> • Where failure leads to significant threat to human life • Novel methods\complexity\ precedent-setting models\policy changing conclusions • Innovative materials or techniques • Design lacks redundancy, resiliency of robustness • Unique construction sequence or acquisition plans • Reduced\overlapping design construction schedule 	<p>EC 1105-2-410, Para 2 & Appendix D, Para 1c</p>	<p>Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/></p> <p>Comments: RP notes that issues related to the safety assurance factors noted are not anticipated.</p>

11. Does the RP address model certification requirements?	EC 1105-2-407	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<p>a. Does it list the models and data anticipated to be used in developing recommendations (including mitigation models)?</p> <p>b. Does it indicate the certification/approval status of those models and if certification or approval of any model(s) will be needed?</p> <p>c. If needed, does the RP propose the appropriate level of certification/approval for the model(s) and how it will be accomplished?</p>	EC 1105-2-410, Appendix B, Para 4i	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/></p> <p>Comments: only certified models will be used</p>
12. Does the RP address opportunities for public participation?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<p>a. Does it indicate how and when there will be opportunities for public comment on the decision document?</p> <p>b. Does it indicate when significant and relevant public comments will be provided to reviewers before they conduct their review?</p> <p>c. Does it address whether the public, including scientific or professional societies, will be asked to nominate potential external peer reviewers?</p> <p>d. Does the RP list points of contact at the home district and the lead PCX for inquiries about the RP?</p>	<p>EC 1105-2-410, Appendix B, Para 4d</p> <p>EC 1105-2-410, Appendix B, Para 4e</p> <p>EC 1105-2-410, Appendix B, Para 4h</p> <p>EC 1105-2-410, Appendix B, Para 4a</p>	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>d. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Comments:</p>
13. Does the RP address coordination with the appropriate Planning Centers of Expertise?	EC 1105-2-410, Para 8a	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<p>a. Does it state if the project is single or multi-purpose? Single <input checked="" type="checkbox"/> Multi <input type="checkbox"/></p> <p>List purposes: Navigation: Channel Deepening</p> <p>b. Does it identify the lead PCX for peer review? Lead PCX: DD</p> <p>c. If multi-purpose, has the lead PCX coordinated the review of the RP with the other PCXs as appropriate?</p>	EC 1105-2-410, Appendix D, Para 3c	<p>a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>b. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>c. Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/></p> <p>Comments:</p>

14. Does the RP address coordination with the Cost Engineering Directory of Expertise (DX) in Walla Walla District for ATR of cost estimates, construction schedules and contingencies for all documents requiring Congressional authorization?	EC 1105-2-410, Appendix D, Para 3	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
a. Does it state if the decision document will require Congressional authorization? b. If Congressional authorization is required, does the state that coordination will occur with the Cost Engineering DX?		a. Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> b. Yes <input type="checkbox"/> No <input type="checkbox"/> n/a <input checked="" type="checkbox"/> Comments: Congressional authorization is not required.
15. Other Considerations: This checklist highlights the minimum requirements for an RP based on EC 1105-2-410. Additional factors to consider in preparation of the RP include, but may not be limited to: a. Is a request from a State Governor or the head of a Federal or state agency to conduct IEPR likely? b. Is the home district expecting to submit a waiver to exclude the project study from IEPR? c. Are there additional Peer Review requirements specific to the home MSC or district (as described in the Quality Management Plan for the MSC or district)? d. Are there additional Peer Review needs unique to the project study?	EC 1105-2-410, Appendix D, Para 1b EC 1105-2-410, Appendix D, Para 1d	Comments:
Detailed Comments and Backcheck: KPO 12 May 2015		

Mississippi River Ship Channel, Gulf to Baton Rouge, LA



Draft Integrated General Reevaluation Report & Supplemental Environmental Impact Statement



**US Army Corps
of Engineers®**

**U.S. Army Corps of Engineers
Mississippi Valley Division
New Orleans District
November 2016**



ABSTRACT

The U.S. Army Corps of Engineers (USACE), in partnership with the non-Federal sponsor (NFS), the Louisiana Department of Transportation and Development (LaDOTD), propose construction to deepen the existing Mississippi River Ship Channel (MRSC), Gulf to Baton Rouge, Louisiana, project (sometimes referenced as the Baton Rouge, Louisiana to the Gulf of Mexico project). Currently, the project provides deep draft navigation along the lower portion of the Mississippi River from the Gulf of Mexico to the city of Baton Rouge, LA. Specifically, the MRSC allows for deep draft access to the Louisiana ports of Plaquemines, New Orleans, South Louisiana, and Baton Rouge. In 1985, the Supplemental Appropriations Act of 1985, Public Law 99-88 authorized the deepening of the existing channel (with the exception of that portion of the channel within the limits of the Port of New Orleans from its original depth of 40 feet (ft) to a depth of 55 ft in accordance with the Report of the Chief of Engineers dated April 9, 1983, SUBJECT: “Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana” (1983 Report). Construction of the channel was planned in three phases. Among other things, the first phase deepened the channel to 45 ft from the Gulf of Mexico to Donaldsonville, LA, and the second phase deepened the channel to 45 ft from Donaldsonville, LA to Baton Rouge, LA. The third phase planned to deepen the entire channel from the Gulf to Baton Rouge, LA to 55 ft. At the time of this report, the third phase has not been constructed.

The current depth of the MRSC results in the need for vessels such as bulk carriers and tankers to light load to navigate the channel and reach the ports. This results in increased transportation cost. High shoaling rates also result in an increase in sediment deposition, which creates maintenance inefficiencies, and increases dredge cycles. There is an opportunity to reduce transportation costs by increasing the channel depth and minimizing the need for light loading of vessels. There is also the opportunity to increase efficiencies of operation and maintenance.

This integrated draft general reevaluation report (GRR) and supplemental environmental impact statement (SEIS) was prepared in accordance with the requirements of the National Environmental Policy Act (NEPA). The purpose of the reevaluation study and accompanying GRR and SEIS is to evaluate alternative plans (including the no-action plan) to examine whether navigation improvements to deepen the existing MRSC from the current depth of 45 ft up to a depth of 50 ft are warranted and in the Federal. The report details the planning process by describing the existing problems and opportunities, the development and evaluation of alternatives, and the selection of the National Economic Development (NED) plan. Additionally, the report describes the environmental resources in the project area; evaluates the potential adverse and beneficial direct, indirect, and cumulative environmental effects of the alternative plans; and identifies avoidance, minimization, and mitigation measures. The draft report concludes by identifying the Tentatively Selected Plan (TSP) and a plan for implementing the TSP.



The TSP for the next phase of construction is to deepen the MRSC to a depth of 50 ft in the lower Mississippi from river mile (RM) 13.4, above head of passes (AHP), to RM 22, below head of passes (BHP), and to deepen the three crossings, Richbend, Belmont, and Fairview located within the Port of South Louisiana to a depth of 50 ft. This is also the NED plan, which maximizes net benefits to the nation.

Upon completion of the public review period and consideration of all comments received from the public, other agencies (both Federal and non-Federal), Agency Technical Review, and Independent External Peer Review, the report will be finalized with incorporation of pertinent comments.

Please send comments or questions on this draft report to the U.S. Army Corps of Engineers, New Orleans District, Attention: Sandra Stiles, P.O. Box 60267, New Orleans, LA 70160-0267, by e-mail: MSRCAdmin@usace.army.mil or by Fax: (504) 862-1892. Please direct questions by telephone: (504) 862-1583. Notice of Availability of this draft GRR and SEIS appeared in the *Federal Register* (<http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR>). An electronic version of this GRR and SEIS can be found on the USACE New Orleans District website at <http://www.mvn.usace.army.mil/About/Mississippi-River-Ship-Channel/>.



EXECUTIVE SUMMARY

Description of Report: This report is an integrated draft general reevaluation report (GRR) and supplemental environmental impact statement (SEIS). This report updates the 1981 feasibility study and environmental impact statement (EIS) entitled “Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana” prepared for the Mississippi River Ship Channel (MRSC), Gulf to Baton Rouge, LA, dated July 1981, and as approved by a Chief of Engineers Report dated April 9 1983, SUBJECT: “Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana” (1983 Chief’s Report). The GRR and SEIS describe the formulation and evaluation of alternatives plans considered to address the navigation needs of the MRSC; economic and environmental conditions and potential effects of the alternative plans; environmental mitigation; and project costs and implementation information.

Description of Project: MRSC, Gulf to Baton Rouge, LA, project is a deep draft navigation channel, providing deep draft navigation access to ports located along the Mississippi River in Southeast Louisiana. The project area begins near Baton Rouge, Louisiana beginning at river mile (RM) 232.4 Above Head of Passes (AHP) and extends to the Gulf of Mexico ending at RM 22 Below Head of Passes (BHP) (Figure ES-1). The channel services four of the top ten ports in the United States: the Port of Greater Baton Rouge (Port of Baton Rouge), the Port of South Louisiana, the Port of New Orleans, and the Plaquemines Port, Harbor and Terminal District (Port of Plaquemines). The Port of South Louisiana is the largest port in the nation in terms of tonnage. The non-Federal sponsor (NFS) is the Louisiana Department of Transportation and Development (LaDOTD).

Problems and Need: The 1983 Chief’s Report identified the navigation problems resulting from inadequate channel depths and widths to accommodate deep draft vessels. The 1983 Chief’s Report identified the need for dry bulk carriers and tankers to light load in order to navigate the channel and reach the ports along the Mississippi, “as smaller, obsolete vessels are replaced with larger and more efficient ships, the percentage of light-loaded traffic will increase under the existing channel dimensions. There is a need to achieve higher economic efficiencies and savings in transportation costs by providing larger navigation channels to the Port of Baton Rouge and the New Orleans.” That report serves as the basis for the 1985 authorization to deepen the channel (with the exception of the portion of the channel within the Port of New Orleans which is limited to a 40 ft depth) to 55 ft, and the implementation of the first and second phase of construction to 45 ft. The projection of future vessels and fleet size has continued to grow; therefore, the problems and needs identified in the 1983 Chief’s Report still apply today.

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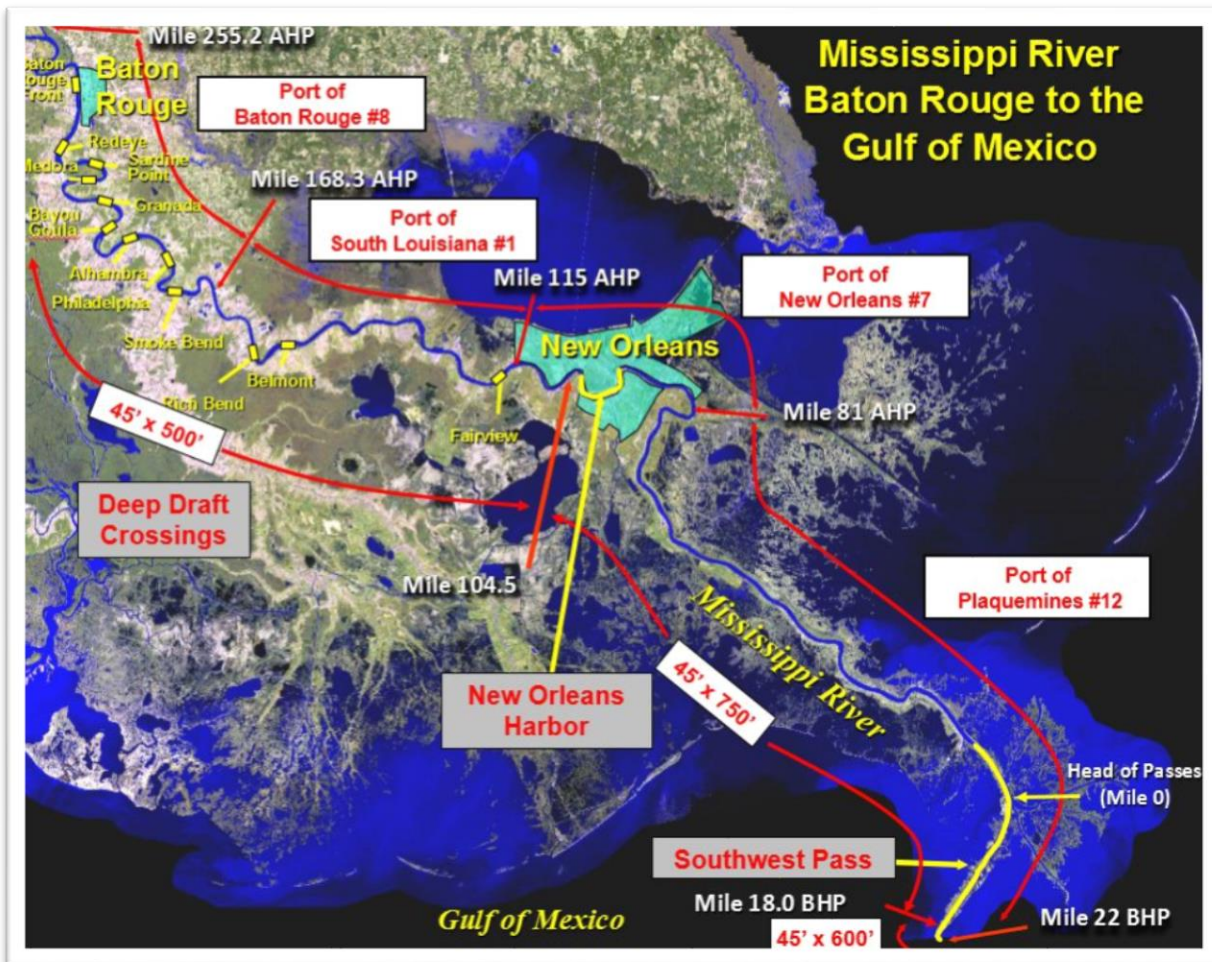


Figure ES-1 Project location

The current depths of the MRSC cannot fully accommodate shipping traffic resulting in ships light loading. High shoaling rates result in an increase in sediment deposition, which creates maintenance inefficiencies and more frequent dredge cycles.

The opportunities in the MRSC (mainly to benefit bulk vessels carrying grain and coal, tanker vessels carrying liquid petroleum, and the expanding container ship industry) are: more efficient navigation to reduce light loading; allow for easier maneuvering; and increase efficiencies of operation and maintenance dredging intervals.

Purpose and Scope: The general reevaluation study will examine whether navigation improvements to deepen the existing Federal project for the MRSC are warranted and in the Federal interest. This will be accomplished by assessing existing and future conditions; evaluating related problems and opportunities; developing potential alternatives and evaluating/comparing

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the costs, benefits, and feasibility of those alternatives; writing a supplemental environmental impact statement; and identifying a recommended plan. Prior to proceeding with the next phase of construction, a general reevaluation study and an accompanying GRR, and supplemental environmental impact statement (SEIS) is required due to potential changed conditions and assumptions related to the MRSC depth, economic development, and environmental assessments since the 1983 Chief's Report. The study will consider the effects of the alternative plans, including the no action plan, on the natural system and human environment, including economic development.

History, Authority, Prior Studies: The Feasibility Report titled Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, dated July 1981 (1981 feasibility report) and Environmental Impact Statement (EIS) recommended that the depth of the Mississippi River navigation channel be increased from 40 ft to 55 ft from Baton Rouge, Louisiana to the Gulf of Mexico, except within the limits of the New Orleans Harbor. The Report of the Chief of Engineers, titled Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, dated April 9, 1983 for the project was signed and the project was authorized for construction by the 1985 Supplemental Appropriations Act. At the time of the 1983 Chief's Report and the 1985 authorization of the project, the cost sharing requirements for the construction and operation, maintenance, repair, rehabilitation and replacement (OMRR&R) of the project was not specified. Section 101 of the Water Resources and Development Act (WRDA) of 1986 (PL 99-662) specified the cost sharing for this and other similar projects. The cost sharing provisions of Section 101(b)1 of WRDA 1986 were amended by Section 2102(b) of the Water Resources Reform and Development Act of 2014, Public Law 113-121.

During pre-construction planning of the authorized project, a sequence was developed that would implement three construction phases to obtain the fully authorized project. Construction of Phase I was completed in December of 1987 and, among other things, provided a depth of 45 ft from Donaldsonville, LA, RM 181.0 AHP, to the Gulf of Mexico, at approximate RM 22 BHP. During Phase I the Port of New Orleans was deepened to a depth of 35 ft up to 100 ft from the wharf. Construction of Phase II, completed in December 1994, provided a depth of 45 ft from Donaldsonville, LA, (RM 181.0 AHP) to Baton Rouge and included dredging eight river crossings to an equivalent depth, as well as other items of work. Phase III, which has not been constructed as of publication of this report, was originally defined as deepening of the MRSC from the Gulf to Baton Rouge from a depth of 45 ft to a depth of 55 ft.

To proceed with the evaluation of alternatives, the general reevaluation of the current MRSC project was initiated with the issuance of Federal funds, following execution of the Feasibility and Cost Sharing Agreement (FCSA), signed on the 2nd of April 2015 by USACE and LaDOTD, as the NFS.

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Within the general reevaluation study at the request of the NFS, the alternative depths are limited to a depth not to exceed 50 ft. If it is determined that deepening of the channel beyond its presently constructed and maintained depth is justified and in the Federal interest, then the GRR will identify and define the recommended plan for construction of Phase III of the project and will identify the need for future construction phases required to achieve the fully authorized 55 ft channel depth.

Affected Environment: The study area, which is located in southeastern Louisiana, is the Mississippi River corridor below Baton Rouge, LA, and the river's major outlet to the Gulf of Mexico, Southwest Pass. This 254.4 mile river corridor runs from RM 232.4, AHP, to RM 22, BHP. The study area includes portions of Baton Rouge, Iberville, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, Orleans, St. Bernard, and Plaquemines Parishes and other communities and port facilities adjacent to the lower Mississippi River. Four of the nation's top 10 ports for total tonnage occur within the study area combine for a total of 450 million tons annually.

Land adjacent to the river from Venice, LA, to the Gulf of Mexico is included in the study/project area as opportunities for beneficial use of dredge material to the extent that such beneficial use may be accomplished within the Federal Standard. The Code for Federal Standard 33 CFR 335.7 defines the Federal Standard for dredge disposal material as "the alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria." Also included in the scope of the study, is the municipal water supply for all of Plaquemines Parish (above RM 64), which is put at risk for saltwater intrusion at the water intakes along the river during low water events.

Currently, the river is maintained to a depth of 48 ft Mean Lower Low Water (MLLW) for deep-draft access from RM 22.0 BHP in the Gulf of Mexico to RM 13.4 AHP near Venice, LA. MLLW is the average elevation of the lowest tide recorded at a tide station each day over a 19 year period. There are 11 regularly maintained river crossings between New Orleans, LA, and Baton Rouge, LA. Crossings are maintained at 45 ft Low Water Reference Plane (LWRP) and the material that is dredged is disposed of in deeper parts of the river just downstream from each crossing.

The study area also includes 143,207 acres of previously NEPA cleared beneficial use disposal areas from Venice, LA, to the Gulf of Mexico, where dredged material from operation and maintenance of the Mississippi River is used to create coastal habitat to the extent allowable under the Federal Standard in lieu of open water disposal. To date, the US Army Corps of Engineers New Orleans District (CEMVN) has constructed over 14,819 acres of intermediate marsh in the



lower delta from beneficial use of Dredge Material. The current study includes analyzing an additional 24,054 acres for beneficial use placement within the Federal Standard.

Alternatives Considered: The development of the initial array of alternatives considered alternatives that varied in both depth and width. The alternatives looked at deepening the channel from the existing 45 ft depth to depths of 48 ft and 50 ft, and considered varying widths of the channel between 500 ft and 750 ft. Through the screening process it was determined that the existing channel widths were sufficient, and widening of the channel was not necessary at this time. Therefore, the alternatives in the final array only considered changes in the channel depth.

For the purposes of this study and process of plan formulation and the evaluation of alternatives the MRSC is divided into the following reaches:

The MRSC consists of three routinely dredged reaches to allow for navigation. The first reach is located in the lower Mississippi River reach, and extends from RM 13.4 AHP to RM 22 BHP. This reach includes the portion referred to as Southwest Pass which extends from RM 0 (Head of Passes) to RM 22 BHP (Figure ES-2). This reach is located down river from the jurisdictional limits of the Port of Plaquemines, which jurisdictional limits extend from RM 0 to RM 81.2 AHP.

The second reach, lies within the jurisdictional limits of the Port of New Orleans which extends between RM 81.2 AHP and RM 114.9 AHP (Figure ES-1). This portion of the MRSC is in excess of the authorized depth of 55 ft and does not require routine dredging. The New Orleans Harbor is located within this reach and is maintained and dredged under operation and maintenance of the MRSC. The Rivers and Harbor Act of 1962 included deepening portions of the Port of New Orleans to a depth of 40 ft MLG. However the 1983 Chief's Report and subsequent 1985 Supplemental Appropriations Act did not include authority to deepen the Port of New Orleans beyond the previously authorized 40 ft. Therefore, evaluation of deepening of the Harbor is not included in the alternatives.

The third reach is from RM 115 AHP to RM 232.4 AHP, immediately downstream of the US Highway 190 Bridge in Baton Rouge. The reach consists of crossings (locations where the channel crosses the river between bendways). Of the crossings, 12 require routine maintenance dredging. Three crossings, Fairview, Belmont, and Richbend, lie within the footprint of the Port of South Louisiana, which extends from RM 115 AHP to RM 168.3 AHP, and the remaining 9 crossings are within the footprint the Port of Baton Rouge, which extends from RM 168.3 AHP to RM 232.4 AHP (Figure ES-3).

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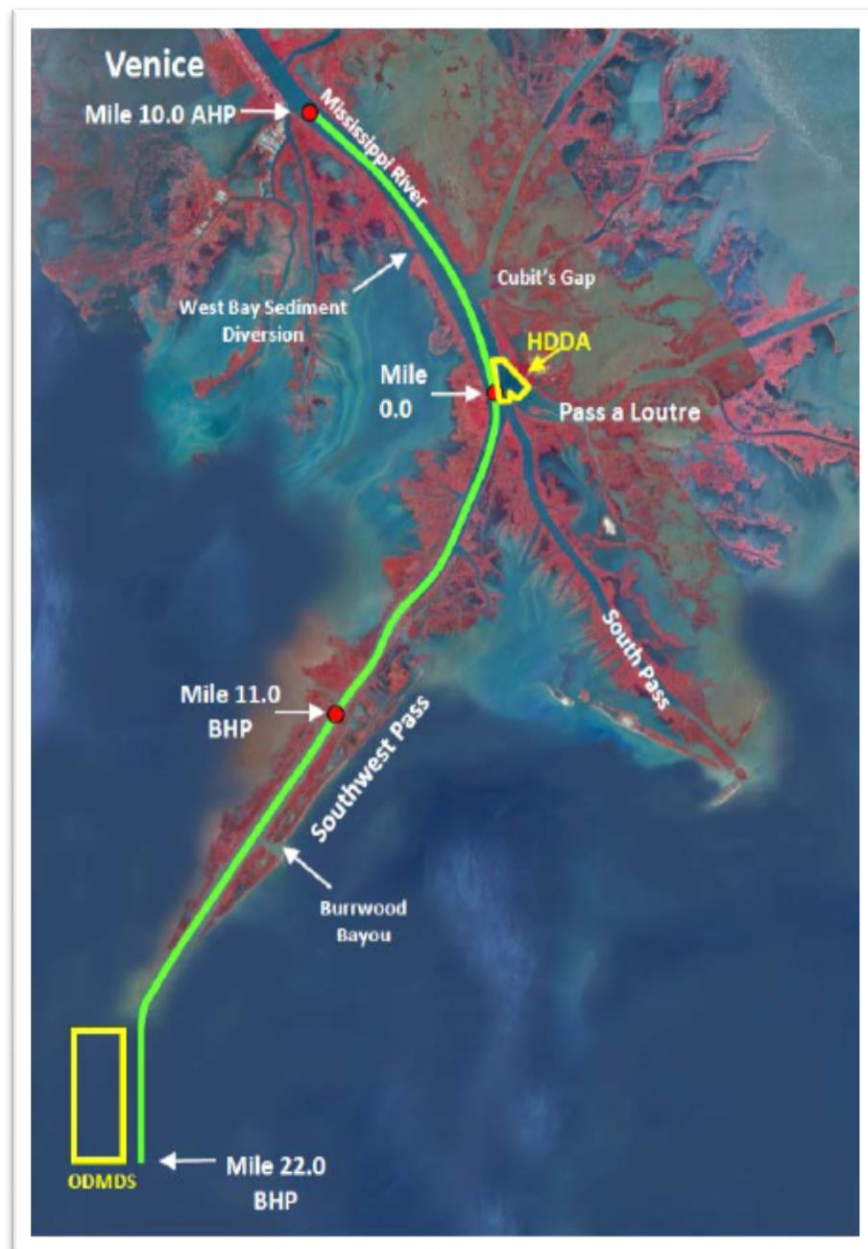


Figure ES-2 RM 22 BHP to RM 13.4 AHP

The three reaches as described above are dredged annually to maintain deep draft navigation. The portions of the river in between RM 13.4 AHP to RM 115 AHP, and in between the crossings historically have depths in excess of 55 ft. Evaluation indicated this will remain the case through the period of analysis. These reaches are not considered in the development and evaluation of alternatives for this general reevaluation study. If future conditions result in changes in this condition, an economic and environmental analysis and reassessment of the project will be needed.

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In the event the navigation industry indicates a need, hydrographic surveys may be required to determine if shoaling will prevent safe passage of ships. However, this is not a routine scheduled activity, and is only performed as needed. If the surveys indicate shoaling is limiting the channel depth or width then dredging may be required, however dredging in these reaches has not been required in the last 10 years.

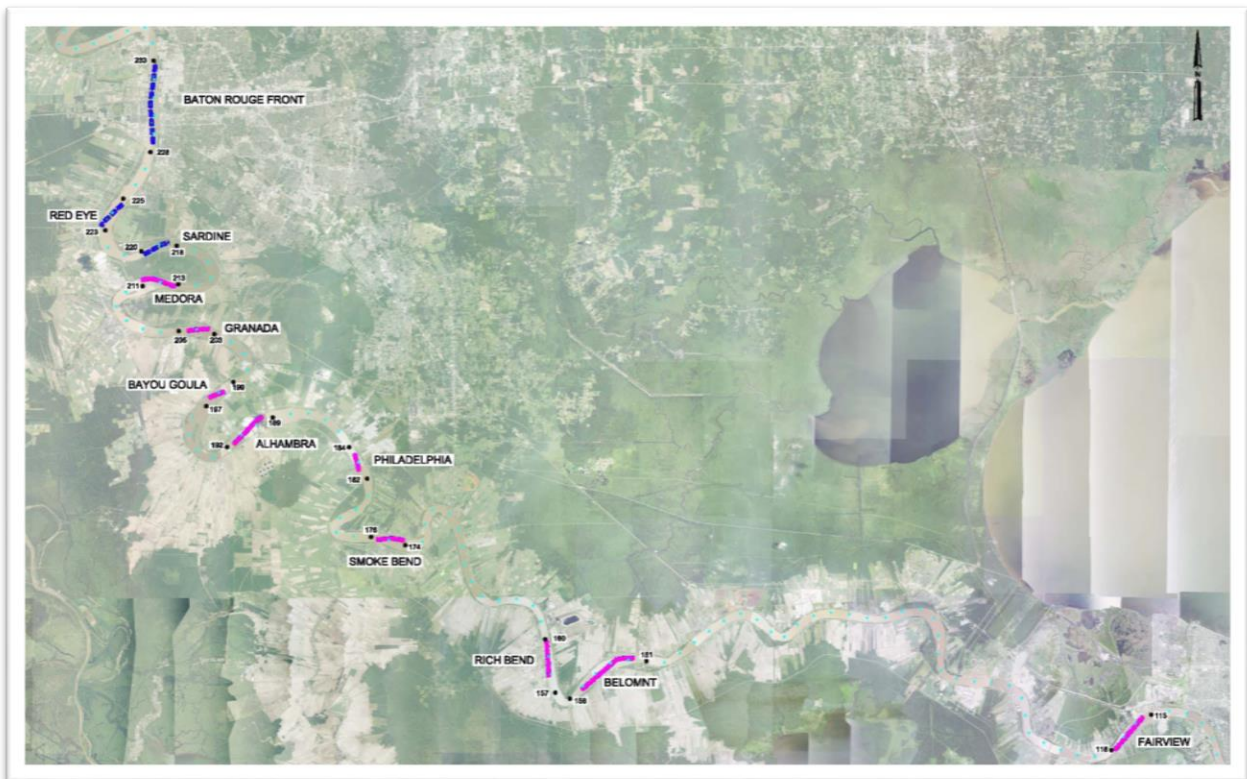


Figure ES-3 Crossings

The final array of alternatives considered for deepening the MRSC considered a combination of depths within these two reaches.

- **Alternative 1 (No action/Future Without Project):** The alternative considers a depth of 45 ft LWRP for the 12 actively maintained crossings and a depth of 48 ft MLLW in the lower Mississippi from RM 13.4 AHP to RM 22 BHP
- **Alternative 2:** The alternative considers a depth of 48 ft LWRP for for the 12 actively maintained crossings and a depth of 48 ft MLLW in Lower Mississippi River from RM 13.4 AHP to RM 22 BHP



- **Alternative 3:** The alternative considers a depth of 50 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in Lower Mississippi River from RM 13.4 AHP to RM 22 BHP
- **Alternative 3a:** This alternative considers a depth of 45 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP;
- **Alternative 3b:** This alternative considers a depth of 48 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP.

During the evaluation of the net excess benefits and benefit to cost ratio, it was recognized that there were benefits to be gained by optimizing the final array of alternatives. Therefore the following additional alternatives were considered during the plan formulation process:

- **Alternative 2a:** The alternative considers a depth of 48 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 48 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.
- **Alternative 3c:** The alternative considers a depth of 48 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.
- **Alternative 3d:** The alternative considers a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.

The National Economic Development (NED) Plan: Through the comparison of first construction cost, the increase in annual incremental operations and maintenance cost, and the total average benefits, the NED Plan was selected based on the alternative that provided the greatest net excess benefits to the nation.

In comparing the alternatives as defined, it was recognized that there are benefits to be gained by further dividing the reaches in the river based on the ports located along the MRSC. Therefore, the net excess benefits were calculated for deepening through the Port of South Louisiana to a depth



of 48 ft and 50 ft compared to deepening the full channel (through the Port of Baton Rouge) to depths of 48 ft and 50 ft.

Based on this comparison of alternatives, the NED Plan is described below under the Tentatively Selected Plan.

Environmental Consequences: The true nature of the environmental consequences cannot be fully assessed at this time as the results of two hydraulics models and sediment (containment) sampling are pending and coordination with the resource agencies is still ongoing. However, based on the results of the 1D hydraulic model (Appendix C), and the benefits accrued from the beneficial use of dredged material (Chapter 4), the project is expected to have net positive environmental impacts. It is anticipated that through the efforts taken to avoid wetlands impacts and the beneficial use of dredged material that functionally compensates for unavoidable remaining impacts, the proposed project would not result in overall adverse cumulative impacts to the aquatic environment and human environment in or near the project area. During construction of the Recommended Plan, the beneficial use of dredged material into open water habitat within the Federal Standard is anticipated to result in approximately 1462.5 acres [576.5 average annual habitat units (AAHUs)] of intermediate marsh.

Tentatively Selected Plan (TSP): The Tentatively Selected Plan (TSP) for the next phase of construction, is Alternative 3d . This alternative is to deepen the MRSC to a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.

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MAP ANNEX

Mississippi River Ship Channel – EGIS Map ID 17-005-001

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LIST OF ACRONYMS, ABBREVIATIONS AND SYMBOLS

AAHUs	Average Annual Habitat Units
ACHP	Advisory Council on Historic Properties
AHP	Above Head of Passes
AM&M	Adaptive Management & Monitoring
ASACW	Assistant Secretary of the Army for Civil Works
ATV	All Terrain Vehicle
BCR	Benefit to Cost Ratio
B/C	Benefit to Cost Ratio
BHP	Below Head of Passes
BLH	Bottomland hardwood
BMP	Best management practices
CAA	Clean Air Act
CEMVN	U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District
CEPD	Comprehensive Evaluation of Project Datums
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CIAP	Coastal Impact Assistance Program
CRMS	Coastwide Reference Monitoring System
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection and Restoration Act
CY	Cubic Yards
DO	Dissolved oxygen
Draft Report	Draft Integrated Feasibility Report and Environmental Impact Statement
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency
EQ	Environmental Quality
ER	Engineering Regulation
ESA	Environmental Site Assessment
ESA	Endangered Species Act
FCSA	Feasibility and Cost Sharing Agreement
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration



Final Report	Final Integrated Feasibility Report and Environmental Impact Statement
FPPA	Farmland Protection Policy Act
FRM	Flood risk management
ft	Feet
FWCA	Fish and Wildlife Coordination Act
FWCAR	Coordination Act Report
GIS	Geographic Information System
GRR	General Reevaluation Report
HDDA	Hopper Dredge Disposal Area
HI	Hydrologic Indices
H.R.	House Record
HSI	Habitat Suitability Index
HSDRRS	Hurricane and Storm Damage Risk Reduction System
HTRW	Hazardous, Toxic and Radioactive Waste
Hwy	Highway
I-10	Interstate 10
I-55	Interstate 55
LA	Louisiana
LaDOTD	Louisiana Department of Transportation and Development
LCA	Louisiana Coastal Area
LDWF	Louisiana Department of Wildlife and Fisheries
	Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas
LERRD	
LIDAR	Light Detection and Ranging data
LNHP	Louisiana Natural Heritage Program
LULC	Land Use/Land Cover
LWRP	Low Water Reference Plan
MBI	Mitigation Banking Instrument
MCY	Million Cubic Yards
MLLW	Mean Lower Low Water
MLG	Mean Low Gulf
MOU	Memorandum of Understanding
MR&T	Mississippi River and Tributaries
MRGO	Mississippi River Gulf Outlet Canal
MRSC	Mississippi River Ship Channel
MRL	Mississippi River Levee
MS	Mississippi
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NED	National Economic Development
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration



NFS	Non-Federal Sponsor
NGO	Non-Governmental Organizations
NGVD29	National Geodetic Vertical Datum of 1929
NOAA	National Oceanic and Atmospheric Administration
NOLA	New Orleans
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWLON	National Water Level Observation Network
OCPR	Office of Coastal Protection and Restoration, Louisiana
OMRR&R	Operation, Maintenance, Repair, Rehabilitation and Replacement
OSE	Other Social Effects
PED	Preconstruction Engineering and Design
PL	Public Law
PMP	Project Management Plan
PPA	Project Partnership Agreement
PPT	Parts Per Thousand
Principles and Guidelines	1983 Economic and Environmental Principles and Guidelines for Water and Related Land Implementation Studies
REC	Recognized Environmental Conditions
RED	Regional Economic Development
REP	Real Estate Plan
RM	River Mile
ROW	Right of way
RSLR	Relative Sea Level Rise
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Office
SLR	Sea Level Rise
SMART	Specific, Measurable, Attainable, Risk Informed, Timely
SWP	South West Pass
SWPPP	Storm Water Pollution Prevention Plan
T&E	Threatened and Endangered
TMDL	Total Maximum Daily Load
TSP	Tentatively Selected Plan
TY	Target Year
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WIK	Work-In-Kind
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WVA	Wetland Value Assessment
USACE	U.S. Army Corps of Engineers

Mississippi River Ship Channel

Gulf to Baton Rouge, LA

General Reevaluation Report



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1.0 INTRODUCTION

1.1 Background

1.1.1 Project Location

The Mississippi River Ship Channel (MRSC), Gulf to Baton Rouge, LA, project is a deep draft navigation channel, providing deep draft navigation access to ports located along the Mississippi River in Southeast Louisiana. The project area begins near Baton Rouge, LA, at river mile (RM) 232.4 above head of passes (AHP) and extends to the Gulf of Mexico, ending at RM 22 below head of passes (BHP) (Figure 1-1). The channel services four of the top ten ports in the United States: the Port of Greater Baton Rouge (Port of Baton Rouge), the Port of South Louisiana, the Port of New Orleans, and the Plaquemines Port, Harbor and Terminal District (Port of Plaquemines). The Port of South Louisiana is the largest port in the nation in terms of tonnage.

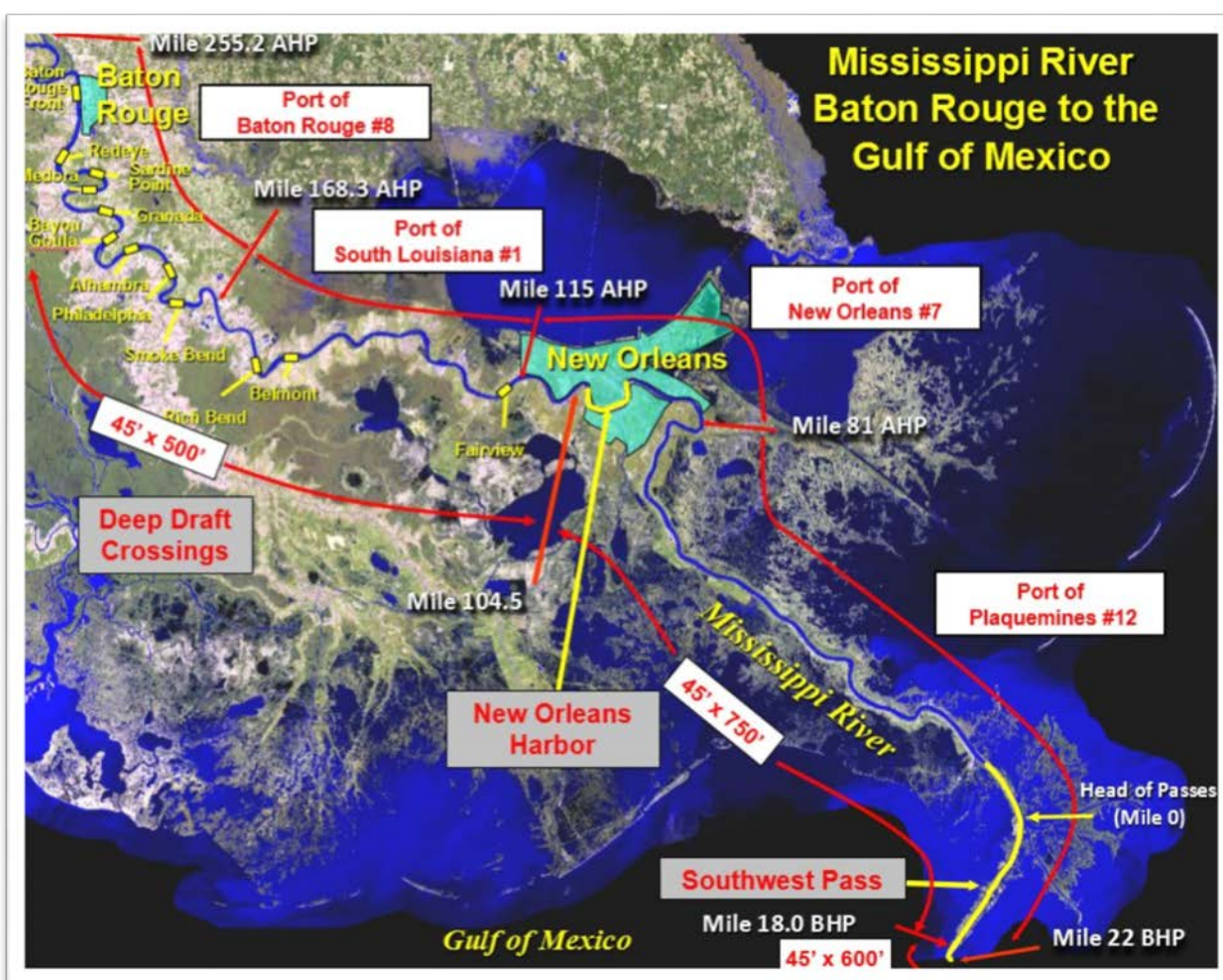


Figure 1-1 Project Location



The MRSC consists of three routinely dredged reaches to allow for navigation. The first reach is located in the lower Mississippi River reach, and extends from RM 13.4 AHP to RM 22 BHP. This reach includes the portion referred to as Southwest Pass which extends from RM 0 (Head of Passes) to RM 22 BHP (Figure 1-2). This reach is located down river from the jurisdictional limits of the Port of Plaquemines, which jurisdictional limits extend from RM 0 to RM 81.2 AHP.

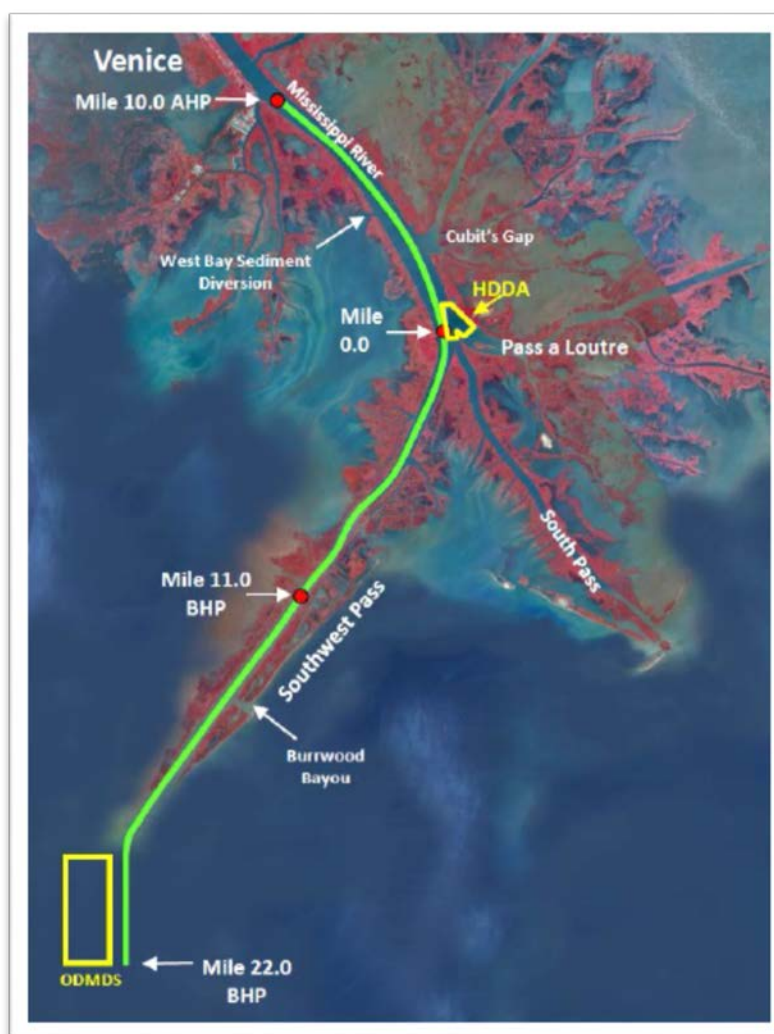


Figure 1-2 Lower Mississippi

The second reach, lies within the jurisdictional limits of the Port of New Orleans which extends between RM 81.2 AHP and RM 114.9 AHP (Figure 1-1). This portion of the MRSC is in excess of the authorized depth of 55 ft and does not require routine dredging. The New Orleans Harbor is located within this reach and is maintained and dredged under operation and maintenance of the MRSC. The Rivers and Harbor Act of 1962 included deepening portions of the Port of New Orleans to a depth of 40 ft MLG. However the 1981 Chief's Report and subsequent 1985



Supplemental Appropriations Act did not include authority to deepen the Port of New Orleans beyond the previously authorized 40 ft. Therefore, evaluation of deepening of the Harbor is not included in the alternatives.

The third reach is from RM 115 AHP to RM 232.4 AHP, immediately downstream of the US Highway 190 Bridge in Baton Rouge. The reach consists of crossings (locations where the channel crosses the river between bendways). Of the crossings, 12 require routine maintenance dredging. Three crossings, Fairview, Belmont, and Richbend, lie within the footprint of the Port of South Louisiana, which extends from RM 115 AHP to RM 168.3 AHP, and the remaining 9 crossings are within the footprint the Port of Baton Rouge, which extends from RM 168.3 AHP to RM 232.4 AHP (Figure 1-3).

While Baton Rouge Harbor Devil Swamp Louisiana, is located near proximity of the upstream limit of this project, it is outside the scope of this study.

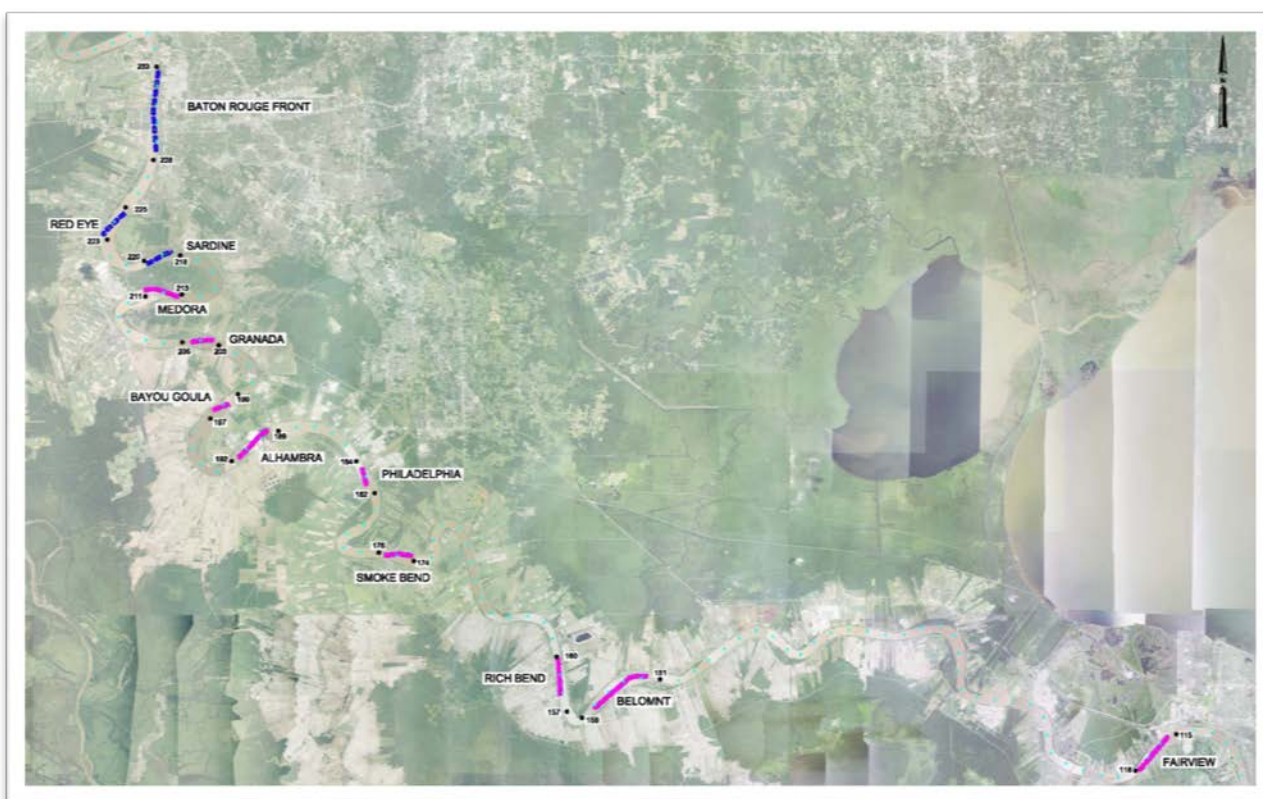


Figure 1-3 Twelve crossings which require regular maintenance

The three reaches as described above are dredged annually to maintain deep draft navigation. The portions of the river in between RM 13.4 AHP to RM 115 AHP, and in between the crossings historically have depths in excess of 55 ft. Evaluation indicated this will remain the case through



the period of analysis. These reaches are not considered in the development and evaluation of alternatives for this general reevaluation study. If future conditions result in changes in this condition, an economic and environmental analysis and reassessment of the project will be needed. In the event the navigation industry indicates a need, hydrographic surveys may be required to determine if shoaling will prevent safe passage of ships. However, this is not a routine scheduled activity, and is only performed as needed. If the surveys indicate shoaling is limiting the channel depth or width then dredging may be required, however dredging in these reaches has not been required in the last 10 years.

The map “Mississippi River Ship Channel” (EGIS Map ID 17-005-001 included in the Map Annex) illustrates the sections of the river which are naturally deep, compared to those that are routinely dredged. The maps are based on the hydrographic surveys taken over a year from September of 2012 to September of 2013. The hydrographic surveys reflect the thalweg, the deepest point, of the MRSC at a discreet point in time. The channel depth, at any given point, may vary throughout the year and may vary across the channel depending on the existing side slopes.

1.1.1 Project Authority

The following provides a summary of pertinent project authority and decision documents.

River and Harbor Act of 1925: The project, “Mississippi River, Louisiana Between Baton Rouge and New Orleans,” described in the report of the Chief of Engineers published as House Document No. 105, Sixty-Ninth Congress was authorized by the River and Harbor Act of 1925. The act provided for a 35 foot by 300 foot channel in the river below Baton Rouge, Louisiana.

The River and Harbor Act of 1937: This act authorized the project entitled “Mississippi River at and Near New Orleans, Louisiana,” as described in the report of the Chief of Engineers, published as House Document No 597, 75th Congress. The act provided for a 35 foot by 1000 foot channel between the lower limits of the Port of New Orleans and Head of Passes on the Mississippi River; a 35 foot by 1,500 foot channel through the Port of New Orleans; and a 35 foot by 500 foot channel between Baton Rouge and New Orleans.

The River and Harbor Act of 2 March 1945, 76th Congress, 1st Session: This act authorized the Mississippi River Baton Rouge to the Gulf of Mexico, Louisiana project. The act provided for: the construction of a 35 ft LWRP (Low Water Reference Plane) by 500 foot channel between Baton Rouge and New Orleans; a 35 foot MLG (Mean Low Gulf) by 1,500 channel within the Port of New Orleans; a 40 foot MLG by 1,000 foot channel from the lower limits of the Port of New Orleans to Head of Passes; a 40 foot MLG by 800 foot wide channel in Southwest Pass; a 40 foot M.L.G. by 600 foot channel in Southwest Pass Lower Jetty and Bar Channel; a 30 foot MLG by



450 foot channel in South Pass; and a 30 foot MLG. by 500 foot channel in South Pass Bar Channel.

The River and Harbor Act of 1962, Public Law 87-874: This act authorized the channel from Baton Rouge to the upper limits of the Port of New Orleans to a depth to 40 ft and construction of a 40 ft by 500 ft channel within the existing 35 ft by 1,500 ft channel within the limits of the Port of New Orleans and through the upper limit of the project located at Devil's Swamp, La (Baton rouge Harbor).

The Feasibility Report titled Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, dated July 1981: This feasibility report re-evaluated the existing Mississippi River navigation channel between Baton Rouge, Louisiana and the Gulf of Mexico. The report recommended deepening the Mississippi River navigation channel to a 55 ft depth from Baton Rouge to the Gulf of Mexico, with the exception of that portion of the project within the Port of New Orleans.

The Report of the Chief of Engineers, titled Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, dated April 9, 1983 (herein referred to as 1983 Chief's Report) identified the following key features of the project:

- enlarging the existing 40 ft channel in the Mississippi River from Head of Passes (mile 0) to the Port of Baton Rouge (mile 233.0) to a project depth of 55 ft over a bottom width of 750 ft;
- constructing a turning basin at the upstream end of the enlarged channel in Baton Rouge with a project depth of 55 ft over a bottom width of 1,600 ft and a length of 4,000 ft;
- constructing training works in South Pass and Pass a Loutre to redistribute flows to Southwest Pass to reduce its maintenance dredging requirements (Note, that this feature has been extensively revised as a result of post-authorization studies);
- enlarging the existing 35-foot channel along the left descending bank of the Mississippi River in the New Orleans Harbor, between mile 86. 7 and 104.5, to a project depth of 40 feet over a varying bottom width; and
- constructing various measures to mitigate for increased saltwater intrusion, including but not limited to, the construction of a sill on the river bottom during periods of low water, a water intake extension and various other improvements in the water supply system in Plaquemines Parish, Louisiana.



The 1985 Supplemental Appropriations Act: authorized the project for construction as follows:

“...the Secretary of the Army acting through the Chief of Engineers is authorized and directed to proceed with planning, design, engineering, and construction of the following projects substantially in accordance with the individual report describing such project as reflected in the Joint Explanatory Statement of the Committee of Conference accompanying the Conference Report for H.R. 2577...Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana...*Provided further*, That the funds appropriated herein shall lapse on June 30, 1986, if the agreement required herein for that project has not been executed...”

As recommended in the 1983 Chief’s Report and as authorized in the 1985 Act, no provision was made for the required cost-sharing of the project.

The Water Resources and Development Act of 1986 (PL 99-662): Section 101 specified the cost sharing attributable to the construction, operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of general navigation projects, such as the MSRC.

Cost Sharing Construction:

“Payments During Construction: The non-Federal interests for a navigation project for a harbor or inland harbor, or any separable element thereof, on which a contract for physical construction has not been awarded before the date of enactment of this Act shall pay, during the period of construction of the project the following costs associated with general navigation features...(c) 50 percent of the cost of construction of the portion of the project which has a depth in excess of 45 feet.”

Cost Sharing of Operation and Maintenance:

“The Federal share of the cost of operation and maintenance of each navigation project for a harbor or inland harbor constructed pursuant to this Act shall be 100 percent, except that in the case of deep-draft harbor, the non-Federal interest shall be responsible for an amount equal to 50 percent of the excess of the cost of the operation and maintenance of such project over the cost which the Secretary determines would be incurred for operation and maintenance of such project if such project had a depth of 45 feet.”

Although the Department of the Army did timely execute an Agreement for Local Cooperation with the State of Louisiana on June 30, 1986 for Phase I (Depth enhancement of 45 feet to Mile 181) of the Mississippi River Ship Channel Project From Baton Rouge, Louisiana to the Gulf of Mexico, Congress re-authorized the project.



Section 201(a) of the Water Resources Development Act of 1986 provided reauthorization of the project as :

Section 201_-- Harbor Development, Deep Draft Harbor Projects, Authorization for Construction:

“(a) The following projects for harbors are authorized to be prosecuted by the Secretary substantially in accordance with the plans and subject to the conditions recommended in the respective reports designated in this subsection, except as otherwise provided in this subsection:...

MISSISSIPPI RIVER SHIP CHANNEL, GULF TO BATON ROUGE, LOUISIANA. The project for navigation, Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana: Report of the Chief of Engineers, dated April 9, 1983, at a total cost of \$471,000,000 with an estimated first Federal cost of \$178,000,000 and an estimated first non-Federal cost of \$293,000,000.”

Section 2102(b) of the Water Resource Reform and Development Act of 2014, Public Law 113-121: This Public Law amended the cost-sharing requirements of Section 101(b)(1) of WRDA 1985 by increasing the depth at which operation and maintenance of a navigation requires a non-Federal cost share from 45 feet to 50 feet.

A general reevaluation study was conducted under the existing construction authorities and the results are presented in this integrated general reevaluation report (GRR) and supplemental environmental impact statement (SEIS). A GRR supports a post authorization change, and may be necessary if a significant period has elapsed or conditions have changed significantly since the feasibility study was completed. A general reevaluation study is a reanalysis of previously completed study, using current planning criteria and policies, which is required due to changed conditions and/or assumptions. The results may affirm the previous plan, reformulate and modify it, or find that no plan is currently justified.

1.1.2 Project Implementation

The 1983 Chief’s Report recommended staged construction of the project:

“Staged Construction of the project would provide a sensible and affordable approach to implementation and earlier realization of the benefits. Such a construction sequence would also minimize disruption of navigation and allow for a gradual increase in the dredging program.”

During the pre-construction planning, a construction sequence was developed that would implement the authorized project in three construction phases, to obtain the fully authorized



project. Construction of Phase I was completed in December of 1987 and provided a depth of 45 ft from Donaldsonville, LA, (RM 181.0) to the Gulf of Mexico. Construction of Phase II completed in December 1994, involved deepening of the MRSC to a depth of 45 ft between Donaldsonville, LA, (RM 181.0) to Baton Rouge, LA (RM 232.2), and included dredging eight river crossings to an equivalent depth.

Phase III, which as of publication of this report is not constructed, was originally defined as deepening of the MRSC from Baton Rouge to the Gulf of Mexico from a depth of 45 ft to a depth of 55 ft.

1.2 Purpose and Scope

Prior to proceeding with construction of Phase III, a general reevaluation study and an accompanying GRR, and supplemental environmental impact statement (SEIS) is required due to potential changed conditions and assumptions related to the MRSC depth, economic development, and environmental assessments since the 1981 report. The GRR presents the results of the general reevaluation study conducted as a reanalysis of the previously completed study using current planning criteria and policies. An evaluation of population growth trends and trade forecasts and examination of the current port capacities is required to determine if there is continued economic justification for deepening the channel. The general reevaluation study may affirm the project as previously authorized, may result in reformulation or modification of the project, or find that no plan is currently justified.

The general reevaluation study will examine whether navigation improvements to deepen the existing Federal project for the MRSC are warranted and in the Federal interest. This will be accomplished by assessing existing and future conditions; evaluating related problems and opportunities; developing potential alternatives and evaluating/comparing the costs, benefits, and feasibility of those alternatives; writing a supplemental environmental impact statement; and identifying a recommended plan. This GRR documents the results of the study and will serve as both the U.S. Army Corps of Engineers (USACE) Decision Document for the project and as the supplemental environmental impact statement (SEIS) for the proposed action. The GRR and SEIS updates the 1981 feasibility report and EIS, and associated Environmental Assessments (EA) prepared for the project “Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana” (the project was subsequently renamed to Mississippi River Ship Channel, Gulf to Baton, Louisiana, but sometimes also referred to as Mississippi River Ship Channel, Baton Rouge, Louisiana to the Gulf of Mexico project).

The scope of the study includes evaluation of alternatives to deepen the MRSC between depths of 45 ft and 50 ft. for the next phase of construction. The evaluation of alternatives was limited to a depth of 50 ft at the request of the non-Federal Sponsor. Per USACE Engineering Regulations



(ER-1105-2-100) “For harbor and channel deepening studies where the non-Federal sponsor has identified constraints on channel depths it is not required to analyze project plans greater (deeper) than the plan desired by the sponsor.” Implementation of the next construction phase is driven by the need to safely pass Post Panamax deep draft ships (ships with a draft deeper than 39 ft, which was the limiting depth of the Panama Canal at the time of initial construction.) As of publication of this report approximately 0.5% of the vessels calling on the ports located within the MRSC have design drafts of 50 ft or greater. Consideration of implementing construction to a depth greater than 50 ft is not warranted at this time

In June 2012, the Institute of Water Resources released a report evaluating U.S. ports and discussed the ability/preparedness of these ports to accommodate deeper traffic upon completion of the Panama Canal expansion project. A key conclusion was that the ports along the Gulf of Mexico are least prepared. This confirmed what the navigation industry had been postulating. However, the LaDOTD did not immediately react due to the potential high cost of maintenance. Once WRRDA 2014 passed, relieving the NFS of the incremental cost of maintenance for a 50 ft deep channel, they sought to sign an agreement with the Corps to initiate a study regarding the next phase of construction. The Corps and the state signed an agreement that limited evaluations of alternatives and thereby any selected plan to depths not to exceed 50 ft. This depth represents a constraint upon the alternatives examined in this GRR.

Currently, the crossings in the Mississippi River are at depths of 45 ft, based on a depth below the Low Water Reference Plane (LWRP),, and the lower Mississippi River is at a depth of 48.5 ft Mean Lower Low Water (MLLW). The general reevaluation study will identify the depth that creates the greatest net benefits, up to a depth of 50 ft MLLW. At initiation, the study recognized there was a need to reevaluate the construction phasing of the project. Within the general reevaluation study, the alternative depths are limited to a depth not to exceed 50 ft. Therefore, future construction phases beyond the 3 phases originally planned are required to fully implement the authorized project.

All depths identified in the report are based on a depth below the identified hydraulic datum, and are identified as the depth followed by the reference plane. For example the nomenclature 45 ft MLLW or 45 ft LWRP, represents a depth of 45 below the MLLW or a depth of 45 ft below the LWRP. This nomenclature is applied throughout the report. A full discussion of the datums, MLLW and LWRP, and the currents depths within the MRSC is provided in Chapter 3 and in Appendix H.

1.3 Problems, Need, and Opportunities

The 1983 Chief’s Report identified the navigation problems resulting from inadequate channel depths and widths to accommodate deep draft vessels. The 1983 Chief’s report identified the need



for dry bulk carriers and tankers to light load in order to navigate the channel and reach the ports along the Mississippi, “as smaller, obsolete vessels are replaced with larger and more efficient ships; the percentage of light-loaded traffic will increase under the existing channel dimensions. There is a need to achieve higher economic efficiencies and savings in transportation costs by providing larger navigation channels to the Port of Baton Rouge and the New Orleans.” That report led to the authorization to deepen the majority of the channel to 55 ft, and the implementation of the first and second phase of construction to deepen to 45 ft, with the exception of the New Orleans Harbor where the authorized depth remained at 40 ft. to the extent that depth authorized by Congress. The Chief’s Report identified the MRSC as only servicing the Port of Baton Rouge and the Port of New Orleans. However, as of 1990, data provided by the Waterborne Commerce Statistics Center (WCSC), refined the ports along the MRSC to also include the Port of South Louisiana and the Port of Plaquemines. Based on change the general reevaluation study considers all four ports.

Since the completion of the 1983 Chief’s Report, projections of future vessels and fleet size indicate that fleet and future vessels will continue to grow larger; therefore, the problems and needs identified in the 1983 Chief’s Report still apply today. The current depths of the MRSC will not efficiently support the newest fleet of deep draft navigation traffic. The current depths of the MRSC result in the need for ships to light load. This will be further exacerbated as the fleet and vessel size continues to grow. The 1981 Feasibility Study identified the opportunity, “for a substantial savings in the transportation costs of the oceangoing cargo moving over the Mississippi River by the provision of larger access channels to the facilities in the river.” As future vessel and fleet size continue to grow, the same opportunity exists today.

In addition, the general reevaluation study considers several additional problems and opportunities. During times of high shoaling in the river, the channel width in the river may decrease from >750 ft to 500 ft, resulting in additional traffic regulations due to safety concerns. High shoaling rates result in an increase in the sediment deposition, which creates maintenance inefficiencies and more frequent dredge cycles

The opportunities in the MRSC (mainly to benefit bulk vessels carrying grain and coal, tanker vessels carrying liquid petroleum, and the expanding container ship industry) include: allowing for easier maneuvering; and increasing efficiencies of operation and maintenance dredging intervals.

1.4 Purpose for Action

The MRSC project serves the only deep-draft ports on the Mississippi River, including four of the Nation’s top ten ports. The channel is one of the few projects linking the heartland of the US to the coasts (Figure 1-4). The channel handles 450 million tons per year in bulk export and accounts



for 18 percent of U.S. waterborne commerce. Forecasts indicate that the U.S. will remain the single largest participant in the global grain trade and U.S. coal producers will continue to hold a marginal position in the global market. Grain producer forecasts shipping most of their exports from the center Gulf of Mexico region around New Orleans, with about one-half of the increase in grain exports transiting the Panama Canal. The Gulf Intracoastal Waterway and the Lower Mississippi River serve ports that accounted for 72 percent of inland waterborne exports in 2010. One-half of the growth in the center Gulf of Mexico bulk exports expect to use the Panama Canal. Projections indicate that the share of exports will increase over the next 10 years. Deepening the MRSC will improve national economic development benefits associated with these increases.

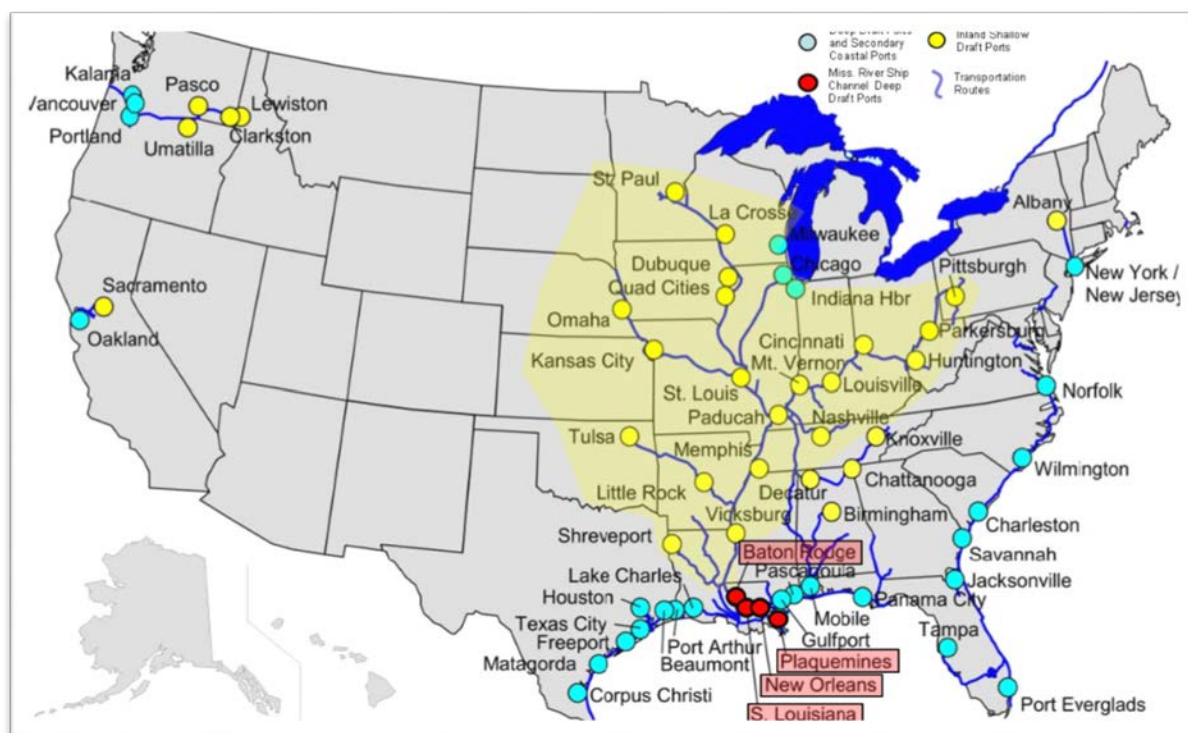


Figure 1-4 Linking the Heartland of the Coast

1.5 USACE Civil Works Guidance and Initiatives

The USACE planning process follows the six-step process defined in the Principles and Guidelines (P&G) for Water and Related Land Resources Implementation Studies. This process, used for all planning studies conducted by USACE, provides a structured approach to problem solving, and provides a rational framework for sound decision-making. The six steps are:

Step 1: Identify problems and opportunities

Step 2: Inventory and forecast conditions



Step 3: Formulate alternative plans

Step 4: Evaluate alternative plans

Step 5: Compare alternative plans

Step 6: Select a plan

This general reevaluation study started with the issuance of Federal funds to initiate a GRR, following execution of the Feasibility and Cost Sharing Agreement (FCSA), signed on the 2 April 2015. The study will terminate upon submission of the GRR to the Office of Management and Budget (OMB) by the Assistant Secretary of the Army for Civil Works (ASA (CW)) for review of consistency with the policies and programs of the President. The products of the feasibility phase include the GRR, integrated National Environmental Policy Act (NEPA) documentation, and a Chief of Engineers Report.

Incorporation of 3x3x3x SMART planning (a USACE initiative to streamline the planning process) modified the six-step planning process. On 27 October 2014, the Mississippi Valley Division (MVD) submitted guidance to Headquarters USACE (HQUSACE) documenting the concurrence of the Planning Bulletin, PB 2014-01, “Application and Compliance of SMART Planning and the 3x3x3 Rule,” published 14 March 2014. On 22 October 2014, the Mississippi Valley New Orleans District (MVN), MVD, and HQUSACE discussed the MRSC, Gulf to Baton Rouge, Louisiana GRR and agreed that the Project Management Plan (PMP) for the study is compliant with the 3x3x3 rule of Planning Bulletin 2014-01.

1.6 Non-Federal Sponsor

The Louisiana Department of Transportation and Development (LaDOTD) is the non-Federal sponsor (NFS) for the project. They were an active participant in the development of the scope of the GRR and the PMP, and the Feasibility Cost Share Agreement (FCSA) executed in April 2015.

The PMP defined the scope of this general reevaluation study to consider alternatives up to a depth of 50 ft. The evaluation will consider whether Federal interest exists in implementing additional phases of construction up to a maximum depth of 50 ft. Alternatively, the study may find that the presently constructed depth of 45 ft (as constructed and maintained in Phase I and II of the project), referred to as the “no action” plan, remains the plan which best meets the Federal interest. If it is determined that deepening of the channel beyond its presently constructed and maintained depth is justified and in the Federal interest, then the GRR will identify and define the recommended plan for construction of Phase III of the project and will identify the need for future construction phases required to achieve the fully authorized 55 ft channel depth.



2.0 AFFECTED ENVIRONMENT (*NEPA Required)

2.1 Introduction

Three Alternatives were reviewed and approved by the CEMVN vertical team (i.e., Division and HQ) and local sponsor at the designated Alternatives Milestone meeting on July 6, 2016 at CEMVN. Alternative 1, Alternative 2, and Alternative 3 (as defined in Chapter 3) were finalized so that the analysis of impacts described in this Draft SEIS could commence and be completed on schedule for a 2016 release. Those 3 original alternatives were carried forward for evaluation in this Draft SEIS while economics and cost/benefits analysis for this study were also being developed concurrently. Based on the findings of those economic analysis, additional alternatives identified and evaluated, and resulted in the identification of the Tentatively Selected Plan (TSP), Alternative 3d (refer to Chapter 3 for a description of the TSP). The TSP was a subset of plans that were evaluated under Alternative 3, and did not increase the overall environmental footprint as previously identified under Alternative 3.

This chapter evaluates existing conditions and the direct, indirect and cumulative effects on important resources associated with the no action alternative (Alternative 1). Impacts associated with other alternatives are evaluated in Chapter 4. Although the future without-project implies taking no action, Alternative 1 includes maintaining the current Operation and Maintenance (O&M) practices to keep the river at its current dimensions. Topics in this chapter coincide with the topics of Chapter 4 in which the “future with-project” conditions are considered. Prime and unique farmlands, federally-designated scenic rivers, state designated scenic streams, and environmental justice were assessed and determined to not be significantly affected by the proposed action. These resources will not be further discussed in this report.

The study area, which is located in southeastern Louisiana, is the Mississippi River corridor below Baton Rouge, LA, and the river’s major outlet to the Gulf of Mexico, Southwest Pass (Figure 2-1). This 254.4 mile river corridor runs from river mile Baton Rouge, LA to RM 22, Below Head of Passes (BHP). The original study area includes portions of East Baton Rouge, Iberville, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, Orleans, St. Bernard, and Plaquemines Parishes and other communities and port facilities adjacent to the lower Mississippi River.

This analysis will not discuss stages or datums in areas where work is not proposed or ongoing. Currently, the area of work in the lower river where work is proposed is maintained to a depth of 48.5 ft Mean Lower Low Water (MLLW). For purposes of the engineering and economic evaluation of existing conditions a depth of 48 ft was considered for deep-draft access from river mile (RM) 22.0 BHP in the bar channel reach up to RM 13.4 near Venice, LA. MLLW is the average height of the lowest tide recorded at a tide station each day during a 19 year period. There



are 12 regularly maintained river crossings between New Orleans, LA, and Baton Rouge, LA, (Figure 2-1). Crossings (above New Orleans, LA) are maintained at 45 ft Low Water Reference Plane (LWRP). The dredged material that is dredged is disposed of in deeper parts of the river just downstream from each crossing. The Mississippi River LWRP is a hydraulic datum reference plane represented by a zero foot low water elevation established from long-term observations of the river's stages, discharge rates, and flow duration periods.



Figure 2-1 Study area corridor: Mississippi River to Gulf of Mexico via Southwest Pass

Land adjacent to the river from Venice, LA to the Gulf of Mexico is included in the study/project area as opportunities for beneficial use of dredge material to the extent such use can be performed within the limits of the federal standard (Figure 2-2). Engineering Regulation 1105-2-100 states the following in terms of the federal standard for dredged material. “Construction and maintenance dredging of Federal navigation projects shall be accomplished in the least costly manner possible. Also included in the scope of the study is the mitigation for increased saltwater intrusion, including, but not limited to the municipal water supply for all of Plaquemines Parish (above RM 64), which is put at risk for saltwater intrusion at the water intakes along the river during low water events. The study area includes the areas within the river that are currently affected by maintenance



practices (dredging and disposal placement methods, shoaling controls, etc.), including major ports (Table 2-1) as well as the proposed expansion of available disposal areas.

Table 2-1 Location of Major Ports and their national rank for annual tonnage

<u>Port / National Rank</u>	<u>Location</u>
Baton Rouge (#9)	Mile 168.5 to 253
South Louisiana (#1)	Mile 114.9 to 168.5
New Orleans (#4)	Mile 81.2 to 114.9
Plaquemines (#10)	Mile 0 to 81.2

The study area also includes 143,264 acres of beneficial use disposal areas from Venice, LA, to the Gulf of Mexico that were previously cleared under NEPA. The associated NEPA documents are identified in Appendix A-1 and are incorporated here by reference. This analysis also address an additional 24,054 acres of potential beneficial use sites. Dredged material from O&M is used, up to the limit of the federal standard, to create coastal habitat in lieu of open water disposal area. The Code for Federal Standard 33 CFR 335.7 defines the Federal Standard for dredge disposal material as “the alternative or alternatives identified by the Corps which represent the least costly alternatives consistent with sound engineering practices and meeting the environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria.” (33 CFR 335.7). To date, the CEMVN has constructed over 14,819 acres of intermediate marsh in the lower delta through beneficial use of dredge material (Figure 2-2, Appendix A-1). During the final feasibility design phase of the study USACE will consider whether additional dredge material placement and access lands are needed for the construction and OMRR&R of the project. In the event it is determined that such additional lands are necessary, USACE has identified and has analyzed the impacts to an area consisting of approxaimatly 24,054 acres,made up of a patchwork of predominantly shallow open water areas located amongst areas of intermittent and fragmented intermediate mash (Figure 2-2).

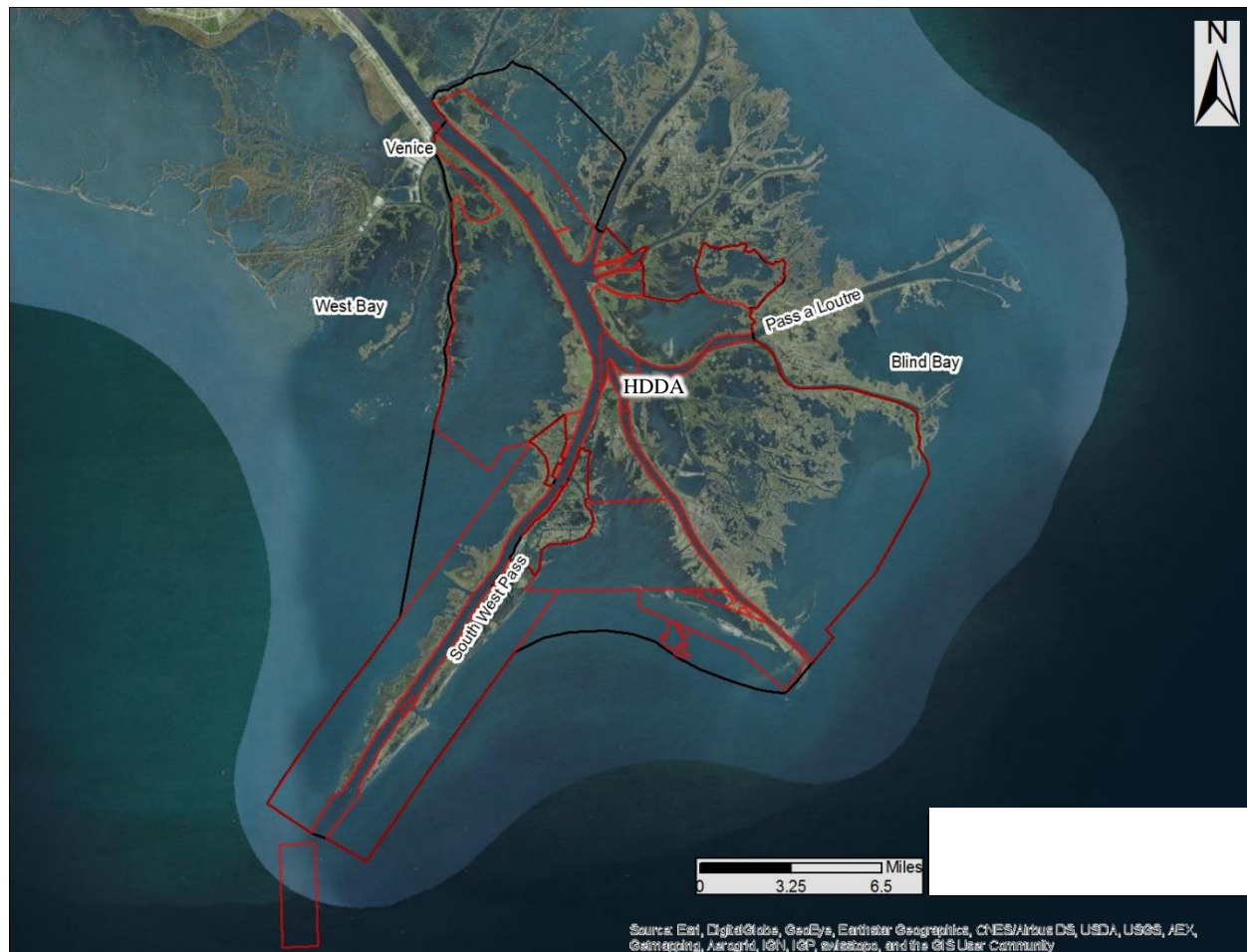


Figure 2-2 Previously cleared beneficial use disposal areas in the study are delineated in red. The proposed long-term plan includes these areas, and expands the total area by approximately 24,054 acres (delineated in black).

Figure 2-2 shows the expanded long term plan disposal area, and two open water Hopper dredge disposal areas, the Ocean Marine Dredge Disposal Area (OMDDS, in the Gulf of Mexico) and Hopper Dredge Disposal Area (HDDA, at the Head of Passes) area are also delineated. The multiple delineations in red identify portions of disposal areas that have been added to the project via multiple NEPA documents since the original study.

Climate

The climate of the study area is humid, subtropical with a slightly stronger maritime character south of New Orleans, LA. Warm, moist southeasterly winds from the Gulf of Mexico prevail throughout most of the year, with occasional cool, dry fronts dominated by northeast high pressure systems. The influx of cold air occurs less frequently in autumn and rarely occurs in summer. Tropical storms and hurricanes are likely to affect the area 3 out of every 10 years, with severe



storm damage approximately once every 2 or 3 decades. The majority of these occur between early June and November. Summer thunderstorms are common, and tornadoes strike occasionally. Average annual temperature in the area is 67 °F, with mean monthly temperatures ranging from 82 °F in August to 52 °F in January. Average annual precipitation is 57.0 inches, varying from a monthly average of 7.5 inches in July, to an average of 3.5 inches in October.

Land Use/Land Cover (LULC)

The only terrestrial environments directly affected by the project occur within the beneficial use disposal areas. The most recent available data for land use within the disposal area are from 2011 and are displayed in Figure 2-3. For comparison purposes, Table 2-2 display land use changes within the disposal area from 2001, 2006, and 2011 (source: National Land Cover Database). While National Land Cover Database (NLCD) 1992 data are used in discussions and comparisons of LULC change, direct comparisons with subsequent years of NLCD data is not recommended due to differences between legends and mapping methods that may not reflect real changes on the ground. For this reason, NLCD 1992 data was not used in this discussion and comparison of LULC in the Mississippi River Delta.

Louisiana's land use governance system is largely the same today as when its governing statutes were adopted some seventy years ago (Costonis 2008). Post Hurricane Katrina (2005) developments signal that the state's policymakers now appreciate that planning conducted within the framework of a well-conceived system of land use law is one of the missing links in the state's recovery program (Costonis 2008).

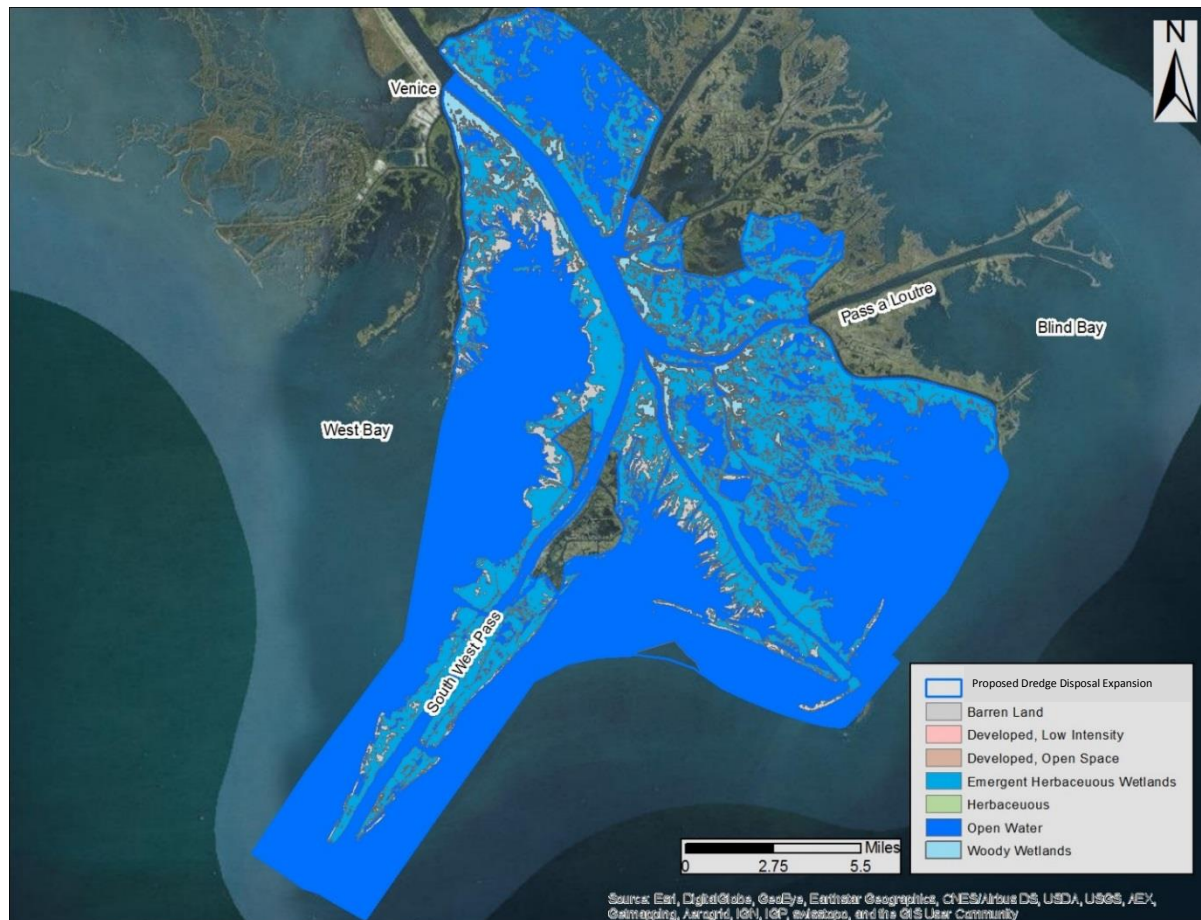


Figure 2-3 2011 land use classifications within the beneficial use disposal area long-term plan.

Table 2-2 Land Use/Land Cover Change in the Mississippi River Delta - 2001, 2006, and 2011

Land Cover/Use Type	2001 (acres)	2006 (acres)	2011 (acres)
Barren Land	7,617	7,864	6,513
Developed, Low Intensity	7	7	8
Developed, Open Space	18	18	19
Emergent Herbaceous Wetlands	46,947	46,359	43,149
Herbaceous	31	30	23
Open Water	117,725	118,156	118,782
Woody Wetlands	4,644	4,555	4,631



The vast majority of the disposal areas in the study area, approximately 118,782 acres, are open water, which increased by 1,057-acres between 2001 and 2011. Table 2-2 illustrates the land loss trend occurring in the Mississippi River Delta and throughout the rest of coastal Louisiana. This land loss trend has been occurring since the early 1900s with commensurate negative effects on Louisiana's coastal ecosystem (USACE 2004). Many factors contribute to land loss along coastal Louisiana, including natural and anthropogenic processes such as subsidence, sea level rise, and tropical storm activity. The study area continues to experience land loss at a steady rate due to subsidence of the land surface and rising sea levels. This process is expected to continue into the future resulting in a loss of surface elevation of the geomorphic features, changes in vegetation types and land cover that characterize the study area, and increased land loss resulting in more open water areas. Between 1932 and 2010, the study area experienced a land loss of approximately 48,110.5 acres and a gain of 8,835.17 acres during the same period. Based on land loss trajectories from USGS aerial photography between 1932 and 2010, the expanded disposal area is projected to continue to lose approximately 32,960 acres over the next 50 years, or approximately 57 percent of existing land in the disposal areas (Couvillion et al. 2011). To further illustrate this trend, Figure 2-4 shows land area change in the study area from 1932 to 2010.



MRDS LAND LOSS 1932 - 2010

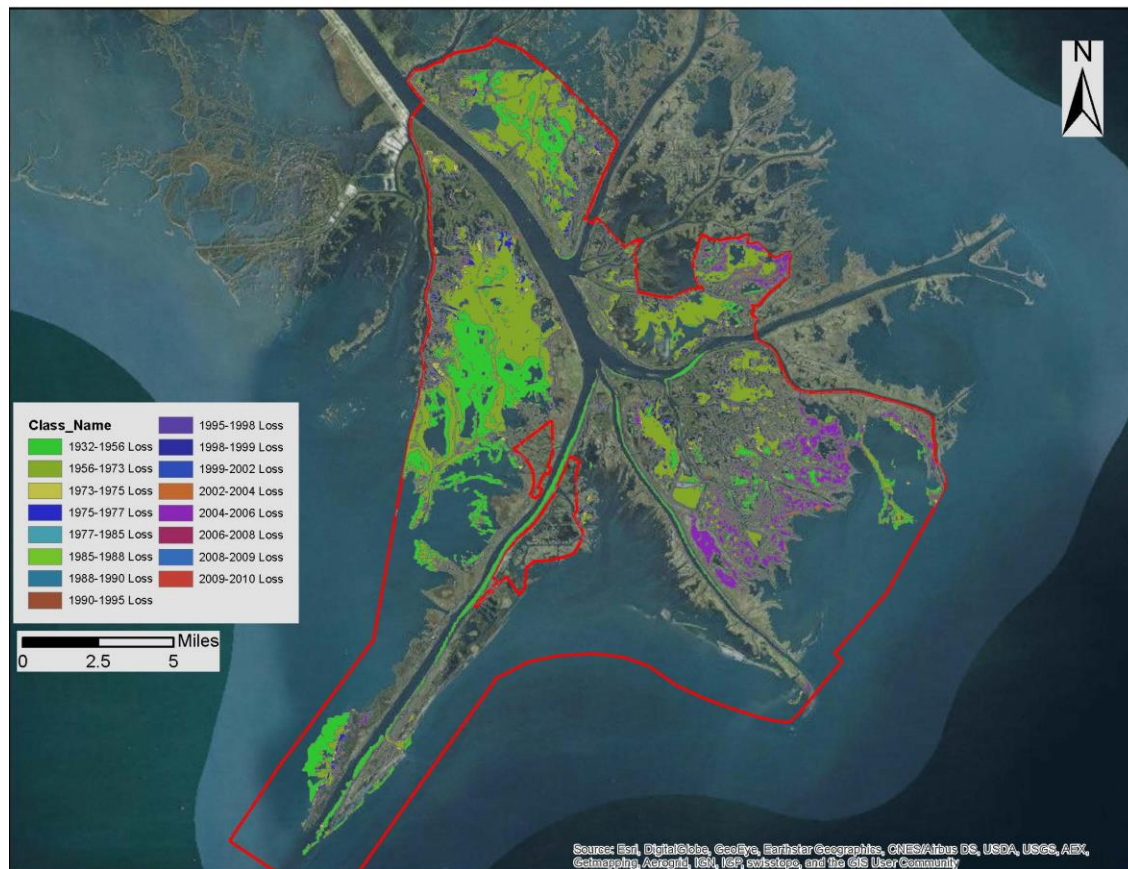


Figure 2-4 Mississippi River Deepening Study land loss 1932-2010

2.2 Water Environment

The Mississippi River has the third largest drainage basin in the world, exceeded in size only by the watersheds of the Amazon and Congo Rivers. It drains 41 percent of the 48 contiguous states of the United States. The basin covers more than 1,245,000 square miles, includes all or parts of 31 states and 2 Canadian provinces, and roughly resembles a funnel, which has its spout at the Gulf of Mexico. Waters from as far east as New York and as far west as Montana contribute to flows in the lower river (Figure 2-5). The lower alluvial valley of the Mississippi River is a relatively flat plain of about 35,000 square miles bordering on the river, which would be overflow during time of high water if it were not for human-made protective works. This valley begins just below Cape Girardeau, Missouri, is roughly 600 miles in length, varies in width from 25 to 125 miles, and includes parts of seven states (Missouri, Illinois, Tennessee, Kentucky, Arkansas, Mississippi, and Louisiana).



Figure 2-5 Mississippi River Basin, primary tributaries, large main-channel dams, and selected cities along main-stem channels. (USGS 2012)

Normal astronomical tides in Louisiana are diurnal (one high tide and one low tide per day) and can have a spring range of as much as 2 ft. The mean tidal range is approximately 0.51 ft (NOAA 2013a). Amplitudes are influenced by tides, but are generally controlled by meteorological events. Tidal influence has registered as far upstream as the Old River Complex (RM 315) during low water conditions (as in 2012). During flood stage, the operation of the Bonnet Carré Spillway dampens the tidal signal upstream of the structure and the tidal influence is not registered upstream of the Spillway at Reserve, LA, (RM 139).

2.2.1 Mississippi River

Historic and Existing Conditions

The Mississippi River, the largest river system in North America, is the main stem of a 12,350-mile long network of inland navigable waterways and is one of the most engineered and regulated



ivers in the world (Walker and Davis 2002; Meade 2004; Finkl et al. 2006; Hudson et al. 2008; Rossi et al. 2008; Horowitz 2010; Allison et al. 2012; Camillo 2013). From the confluence of the Ohio River and Upper Mississippi River at Cairo, Illinois, the Lower Mississippi River has been channelized and shortened by about 143 miles (Baker et al. 1991). The reach of the river in Louisiana is one of the world's most commercially important and intensively managed rivers for navigation.

The Mississippi River, in combination with its largest distributary, the Atchafalaya River, discharges an average of 64,933,400,000 cubic yards (cy) of water into the Gulf of Mexico (Figure 2-6, USGS 2012). About half of the total annual discharge is contributed by the Ohio River alone, which drains the more humid regions of the basin but only constitutes one-sixth of the total basin area (Meade, 1995). Alternatively, the Missouri River drains approximately 43 percent of the MRB, but contributes only about 12 percent of the total annual water discharge. In the Mississippi River basin, the primary sources of sediment and water are decoupled. At its headwaters in Lake Itasca, MN, the average flow rate is 6 cfs. At Upper St. Anthony Falls, MN, the northern most lock and dam, the average flow rate is 12,000 cfs or 89,869 gallons per second. At New Orleans, LA, the average flow rate is 600,000 cfs (<https://www.nps.gov/miss/riverfacts.htm>).

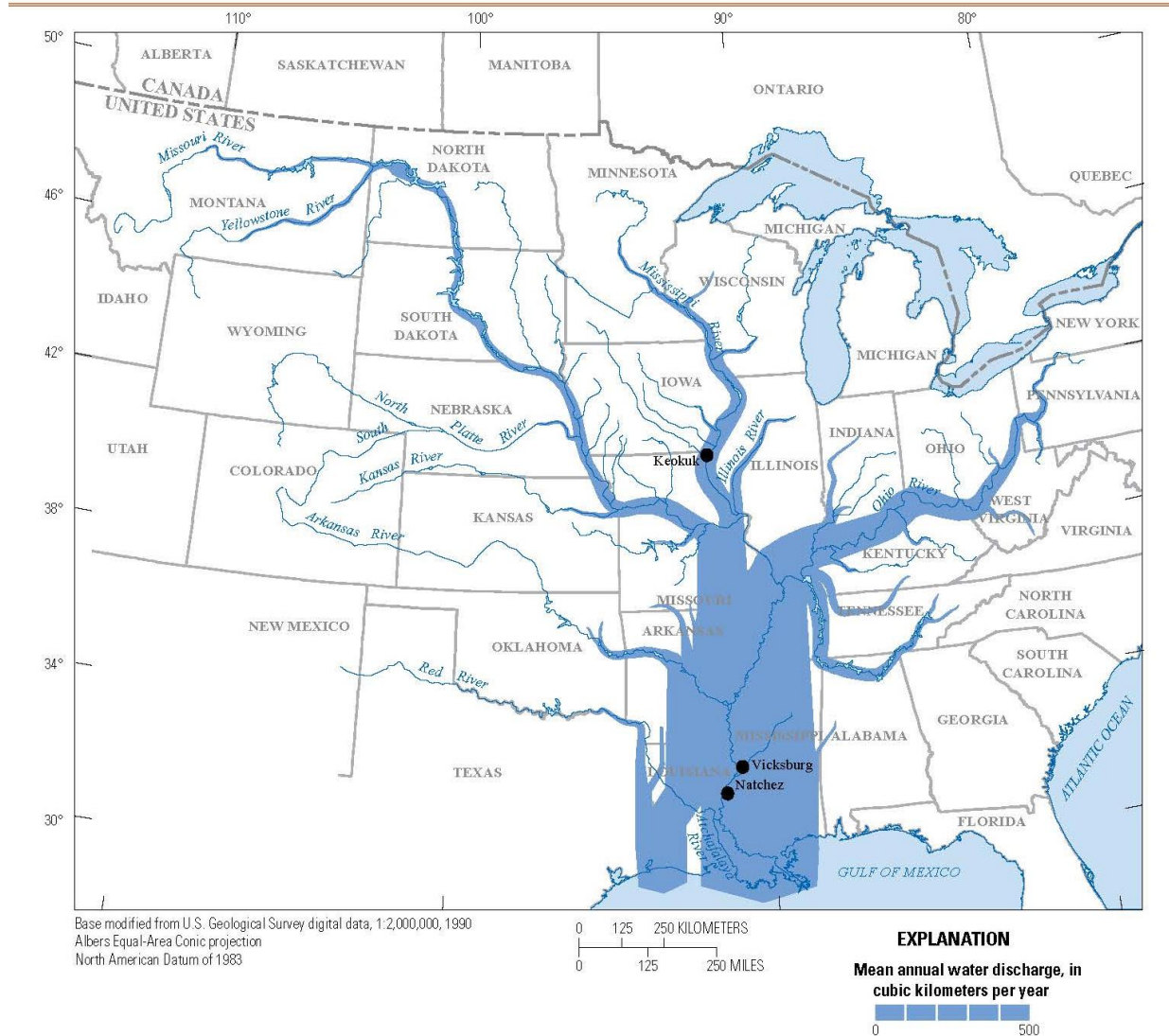


Figure 2-6 Mean annual discharge of Mississippi River and tributaries (USGS 2012)

The “Engineered Section” of the Mississippi River, the reach in Louisiana between Old River and New Orleans, LA, is an elaborate plumbing system of levees augmented by a series of floodways/spillways projects (Camillo 2013). Operation of the Old River Control Complex ensures distribution of 30 percent of the combined Mississippi River and Red Rivers pass through to the Atchafalaya Basin (Figure 2-7).

Per "Title 33 - Navigation and Navigable Waters, § 110.195 Mississippi River below Baton Rouge, LA, including South and Southwest Passes, <https://www.gpo.gov/fdsys/pkg/CFR-2010-title33-vol1/pdf/CFR-2010-title33-vol1-chapI-subchapI.pdf> " there are various US Coast Guard (USCG) designated anchorage areas along the authorized navigable ship channel. These anchorage areas



are naturally deep areas that the USCG has designated to aid in the safe navigation of the MS River.

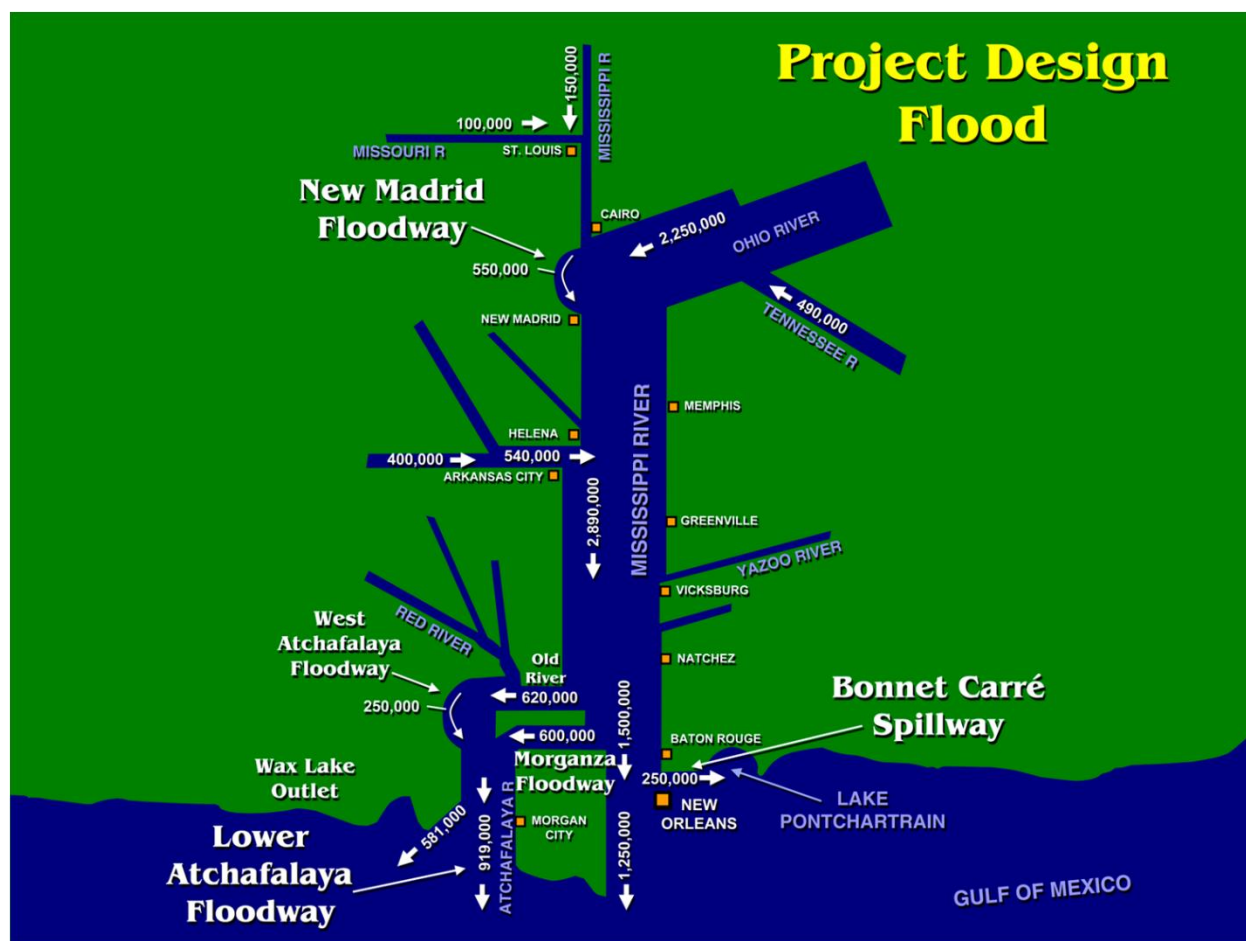


Figure 2-7 The “Engineered Section” of the Mississippi River designed to pass the project flood of 1.25 million cfs past New Orleans, LA

CEMVN O&M

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) has the largest annual channel O&M program in the nation and dredges an average of 77 million cubic yards (mcy) of material annually during maintenance dredging of federal navigation channels, most of which occurs in the Mississippi River, the Calcasieu River, and the Atchafalaya River. Since 1996, river maintenance within the project area has averaged 35,778,303 cy (Appendix A-2).

Due to either the physical characteristics or the location of the dredged material, not all of the material dredged by the Corps is available for beneficial placement in the coastal ecosystem



because of the previously cited federal standard. Currently, CEMVN Operations Divisions estimates approximately 38 percent of the suitable/available material dredged under the O&M program is used beneficially under the federal standard (vs. open water disposal), equating to the creation of approximately 528 acres of intermediate marsh on average. Most recently, the Louisiana Department of Natural Resources, Office of Coastal Management, in a letter dated 21 December 2015, determined that the Gulf to Baton Rouge project was consistent with the Louisiana Coastal Resources Program in accordance with Section 307 (c) of the Coastal Zone Management Act of 1972.

Another Corps project also uses dredged material beneficially across the state, including the study area, but beyond the federal standard. To date, a total of 80 acres of wetlands were created by placing HDDA dredged material in shallow open water areas of West Bay under the LCA BUDMAT program in FY 2015 (discussed further in Section 2.4). By comparison, a total of 3,194 acres of wetlands have been created by placing HDDA dredged material in shallow open water areas of the Delta National Wildlife Refuge under the Miss River Southwest Pass O&M program.

Deep Draft Crossings

Historically, maintenance dredging to 45 ft LWRP (plus 2 ft advance maintenance and 2 ft of allowable over depth) has been performed at 14 deep water crossings in the Mississippi River channel between Baton Rouge, LA, and New Orleans, LA, (Figure 2-8, Appendix A-3). Since 1980, 65 miles within 14 crossings have been dredged, as needed, at a combined annual average of 19,419,180 CY (Appendix 4).



Figure 2-8 Locations of deep draft crossings between New Orleans, LA and Baton Rouge, La

There are 12 crossings that are annually maintained, three of which only require occasional maintenance. Table 2-3 list the deep draft crossings. Of the crossings listed, 81 Mile Point, Richbend and Fairview only require occasional maintenance dredging. There are two deep water crossings that are mentioned in prior NEPA documents, but no actual dredging records for these crossings can be found: Brilliant Point (mile 162.6-162.9 AHP) and Phoenix (mile 57.0-58.3 AHP). Two of these crossings, Redeye and Medora, also contain two fields of soft dikes (sand-filled geotextile material) in order to reduce additional maintenance dredging needs.

Table 2-3 List of historical deepwater crossings requiring maintenance and their locations

B.R. Front	River Mile 234-229 AHP
Redeye	River Mile 226-221 AHP
Missouri Bend	River Mile 222-221 AHP
Sardine Point	River Mile 221-216 AHP
Medora	River Mile 214-208 AHP
Granada	River Mile 207-202 AHP
Bayou Goula	River Mile 199-196 AHP
Alhambra	River Mile 193-188 AHP
Philadelphia	River Mile 185-181 AHP
81 Mile Point	River Mile 180-178 AHP



Smoke Bend

Richbend

Belmont

Fairview

River Mile 179-172 AHP

River Mile 160-155 AHP

River Mile 156-151 AHP

River Mile 117-111 AHP

Although a combination of dustpan dredges and hopper dredges are typically utilized for this maintenance effort, it is possible that cutterhead dredges or water injection dredges may also be utilized for emergencies. The dredging work within the crossings consists of the removal and disposal of shoal material above the plane of 45 ft LWRP over a width of 500 ft from Baton Rouge (mile 233.8 Above Head of Passes (AHP) to New Orleans (mile 104.5 AHP), plus removal of an additional 2 ft of shoal material as advance maintenance dredging, and removal of an additional 2 ft of shoal material as allowable overdepth dredging.

Annual maintenance of crossings averages 19,419,180 cy. The crossings are too far from potential beneficial use disposal sites to be economically acceptable by the federal standard. Shoal material removed from the deep water crossings is discharged unconfined into the open water of the Mississippi River either downriver of the dredging site or shoreward of the channel. The currents of the Mississippi River transport this shoal material downriver such that there is little to no accumulation of sediments at the discharge sites. Dredging is performed annually, typically from April through November, but schedule is dependent on the occurrence of high water stages in the river. The crossings require dredging during low water after shoaling has occurred. The crossings have a greater amount of water available during high water so shoaling can accumulate on the bottom of the river and vessels still have enough water to pass.

Lower River / Delta

Maintenance dredging is performed annually south of Venice, LA, and Southwest Pass by a combination of hopper dredges and hydraulic cutterhead dredges. Annual maintenance averages 18,500,000 cy for Southwest Pass and 3,750,000 cy for the Bar Channel. Dustpan dredges are occasionally utilized for emergency dredging situations in Southwest Pass. Dredging typically begins in January and is completed by August because Southwest Pass requires dredging during high water season while shoaling is occurring.

However, this is dependent on the timing of the Mississippi River high water season. The dredging work consists of the removal and disposal of shoal material above the plane of 48 ft MLLW approximately from Venice (RM.13.4 AHP) to the -48-foot contour in the Gulf of Mexico (RM 22.0 BHP).¹ The removal of an additional 6 ft of shoal material as advance maintenance dredging, and removal of an additional 2 ft of shoal material as allowable overdepth dredging has been previously cleared under NEPA from RM 12 AHP to RM 22 BHP (Appendix A-3, Figure 2-9). All other areas in the study area allow for 2 feet of advance maintenance and 2 feet of allowable overdepth.

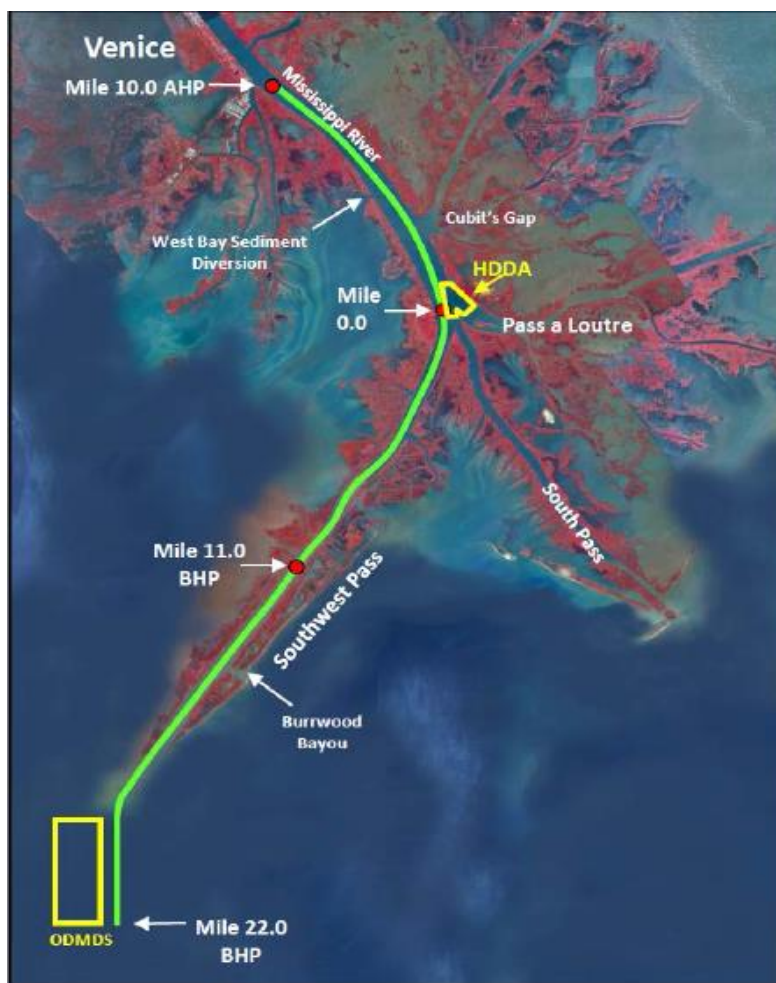


Figure 2-9 Reach of active dredging in the lower Mississippi from Venice to the Gulf of Mexico

Annual dredging typically occurs up to Mile 6.0 AHP. Shoaling in the lower river has shown a trend of migrating upriver towards Venice, LA, approximately 2.5 miles - 6.5 miles over the last 20 years. From about RM 6.0AHP to RM 13.4AHP dredging occurs as needed, but less frequently. However, the uppermost limits of dredging reach has gradually crept upriver over time. For example, as recently as 1986, dredging only went upriver to RM 3.5AHP (Cubit's Gap vicinity). Since then, dredging needs have gradually extended upriver over time as shoaling has dictated. Based on 1D modeling conducted during this study, this is believed to be at least partly due to sea level rise and the deepening of the lower river to its current dimensions (Appendix C).

Hydraulic cutterhead dredges are restricted in their use for Southwest Pass maintenance dredging work because their spudding systems, swing anchors, cables, and discharge pipelines, are considered safety hazards in some areas due to their inability to move quickly out of the channel. For these reasons, cutterhead dredges are only used to perform work in the RM 13.4 AHP to RM 1.0 AHP reach, and in the RM 1.0 BHP to RM 18.8 BHP reach. Cutterhead dredges utilize shallow, open water dredged material placement areas located on either side of the Southwest Pass



navigation channel for coastal habitat creation and/or bankline stabilization and restoration within the federal standard.

Retention/closure features are not typically constructed for any placement areas, but could be built should they become necessary to prevent dredged material from entering property or waterways located adjacent to disposal sites. The exact locations and dimensions of these features would be determined in the field. All earthen retention/closure material would be obtained from within the placement site. From 2009 through 2015, approximately 40,234,782 cubic yards of shoal material (an annual average of approximately 5.8 million cubic yards) were removed from the Southwest Pass navigation channel (RM 13.4 AHP to RM 1.0 AHP reach, and in the RM 1.0 BHP to RM 18.8 BHP reach) by cutterhead dredges. A total of 2,401 acres of wetland habitat were created by placement of this material within the federal standard in shallow open water areas adjacent to the channel (Appendix A-5).

Hopper dredges, which are not considered safety hazards while working in the Southwest Pass navigation channel, are utilized for maintenance dredging throughout the entire Southwest Pass navigation channel. Hopper dredges provide the mobility and response time that is required during high shoaling periods. During these high shoaling periods, shoals develop in various unpredictable locations from RM 13.4 AHP to RM 22.0 BHP. As the shoals develop, hopper dredges are moved quickly to various assignment locations along the channel in order to restore project dimensions. Cutterhead dredges are incapable of similar rapid mobilization between different dredging assignment locations.

The HDDA is dredged about every 1 to 2 years. Approximately 1-8 mcy of dredged material could be placed in the proposed disposal area during each maintenance dredging event for the HDDA. The material placed at the HDDA is subsequently dredged through a separate cutterhead contract and is used beneficially to create and/or restore coastal habitat to the extent possible under the limitations of the Federal Standard. Coordination with the navigation industry is required for the Head of Passes Hopper Dredge Disposal Area dredging if dredged material disposal requires a discharge pipeline to cross the river, which necessitates a river closure. The first HDDA maintenance dredging effort occurred in 1998. Since that initial effort, the HDDA has been maintenance dredged 6 additional times, with the latest occurring in 2015. A total of approximately 39,458,015 cubic yards of material have been removed from the HDDA under these 7 maintenance dredging contracts. During this same period (1998 – 2015), approximately 104,157,460 cubic yards of dredged material (an annual average of approximately 7.1 million cubic yards) have been placed at the HDDA by hopper dredges working in Southwest Pass. Under the federal standard, a total of 3,194 acres of wetlands have been created by placing HDDA dredged material in shallow open water areas of the Delta National Wildlife Refuge and in West Bay.



Hopper dredges working between RM 11.0 BHP and RM 22.0 BHP dredge-and-haul to the designated ocean dredged material disposal site (ODMDS) located adjacent to, and west of, the bar channel. On rare occasions, hopper dredges working upriver of RM 11.0 BHP may utilize the Southwest Pass ODMDS for disposal. From 2009 through 2015, a total of approximately 31,569,449 cubic yards of shoal material (an annual average of approximately 4.5 million cubic yards) have been placed in the Southwest Pass ODMDS by hopper dredges. The volume of dredged material placed within the Southwest Pass ODMDS in any given year is highly variable, and fluctuates with river conditions and unpredictable shoaling patterns.

Hopper dredges working in the jetty channel and the bar channel (RM 19.5 BHP to RM 22.0 BHP) may also perform work in the agitation dredging mode. Agitation dredging involves filling a hopper dredge to capacity and allowing it to overflow. Fine sediments released into surface waters are carried out of the mouth of river to the Gulf of Mexico. Coarser/heavier sediments collect in the hopper and are ultimately hauled to the ODMDS for disposal. From 2009 through 2015, hopper dredges have only performed agitation dredging in this reach during 2015.

Open Water Disposal in Lower River

There are four designated open water (Hopper) dredge disposal sites in the lower river south of Venice, LA. The ODMDS is 2975 acres and is located west of and parallel to the SWP bar channel beginning at about RM 20.3 BHP. This area typically receives material from the RM 11.0 BHP to RM 22.0 BHP dredging reach. The HDDA is 867 acres and is situated at the Head of Passes at RM 0.0 and extends to about RM 1.0 in Pass a Loutre, RM 1.0 BHP in Southwest Pass, and RM 2.0 in South Pass. This area typically receives material from the RM 13.4 AHP to RM 11.0 BHP dredging reach. Coordination with the Navigation industry is required for the Head of Passes Hopper Dredge Disposal Area dredging if dredged material disposal requires a discharge pipeline to cross the river which necessitates a river closure. Additionally, there is a 309-acre expansion of the HDDA that extends down to about RM 2.0 in South Pass. This South Pass hopper dredge disposal site has not been used since the early 1990s (Figures 2-9, 2-10).

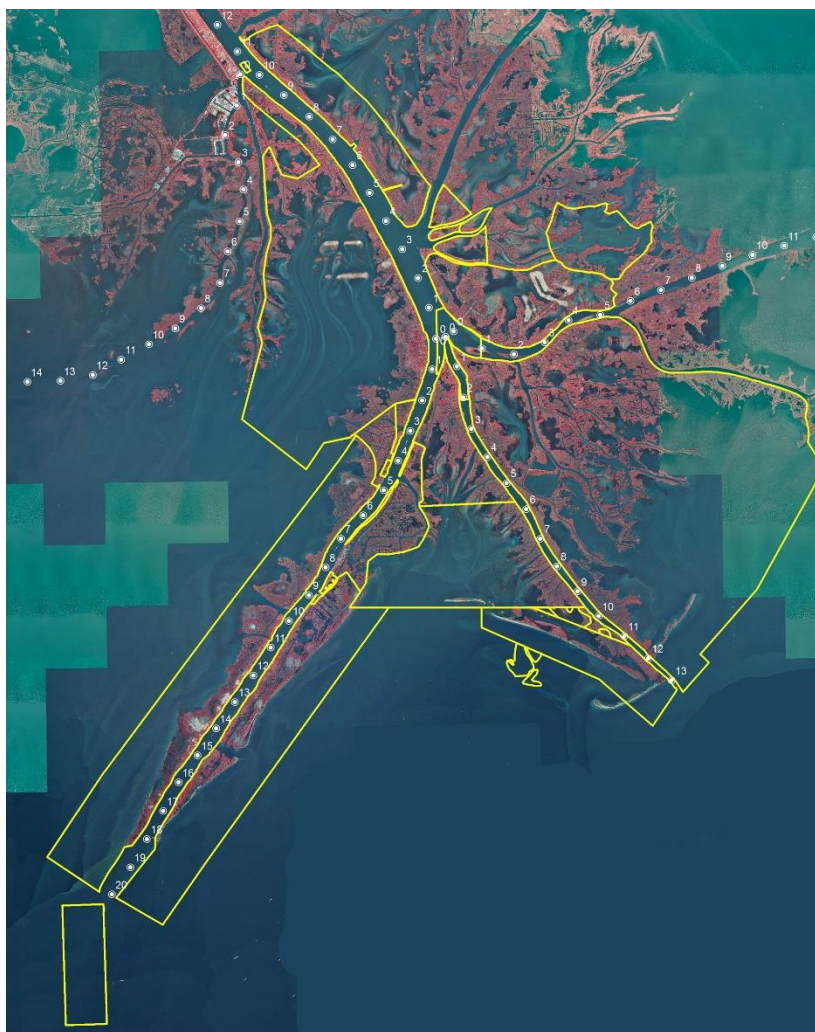


Figure 2-10 Previously cleared disposal areas along the lower river include approximately 4,028 combined acres of open water disposal and approximately 143,264 acres of beneficial use placement

Beneficial Use of Dredged Material

Approximately 143,264 acres of beneficial use disposal areas have been previously cleared via prior NEPA documents (Appendix A-1). Contingent upon river conditions and funding limitations, an average of 528 acres of marsh creation is expected to establish each year from annual O&M. The exact site placement is contingent on river conditions and dredging need, and identification by CEMVN of the federal standard. Although placement within the federal standard may result in the creation of valuable coastal habitat during annual maintenance in lieu of open water disposal, it is important to distinguish this (navigation) project is not classified an ecosystem restoration project. It is a construction and maintenance of a deep draft navigation channel project. Any ecosystem restoration that occurs as a result of placement of dredged material is considered and incidental benefit to the objective/goal of the project, which is to maintain a deep draft navigation channel.



Currently, approximately 38 percent of the available material dredged under the O&M program is used beneficially. Due to either the physical characteristics or the location of the dredged material, not all of the material dredged by the Corps is available for beneficial placement in the coastal ecosystem. Based on the refinement of dredge material placement techniques and subsequent beneficial use monitoring between 2009-2016, a ratio of 80 acres of marsh (with a final target elevation of 2 ft or less) per 1,000,000 cubic yards of material dredged from the river (i.e., 80acres/1mcy) has been achieved. Current dredging in the lower river averages 18,500,000 cy. Since 2010, approximately 6,600,000 cy (or 35.68 percent) has been used beneficially. As such, an average of 528 acres of marsh creation is expected to establish each year via beneficial use under the Federal Standard (Figure 2-11, Appendix A-5).

Beneficial Use Monitoring

CEMVN maintains 13 major navigation channels in Louisiana that require regular maintenance dredging. More than 90 million cubic yards of sediment is dredged annually and CEMVN coordinates with state and federal natural resource agencies to determine the most appropriate methods for the disposal of dredged material and, where possible, within the limitations of the Federal Standard, to beneficially use this material to create or enhance wetlands and other habitats. CEMVN has developed long-term disposal plans, subject to the Federal Standard limitations, incorporating beneficial use for each of these navigation channels.

In 1994, the CEMVN, working in cooperation with Louisiana State University, implemented a large-scale monitoring program to quantify the amount of new habitat created and to improve dredged material placement techniques to maximize beneficial use within the Federal Standard limits. From 1995-2002, vertical photography was acquired and digital mosaics are produced for each of the study sites. GIS habitat analysis and field surveys were conducted on only those sites specified by CEMVN. The work products for the sites selected for full monitoring included dredging history maps, habitat maps for the base year, habitat maps for the selected monitoring years, and habitat change maps. From this analysis, coastal change data quantifies the creation of new coastal lands and other habitats at selected navigation channel locations. The field program included ground truthing operations to verify and update the habitat maps and field surveys to collect information about vegetation, and elevations. While CEMVN no longer performs field surveys and habitat analysis due to funding constraints, CEMVN acquires aerial photography each year to measure/track land change at beneficial use sites.

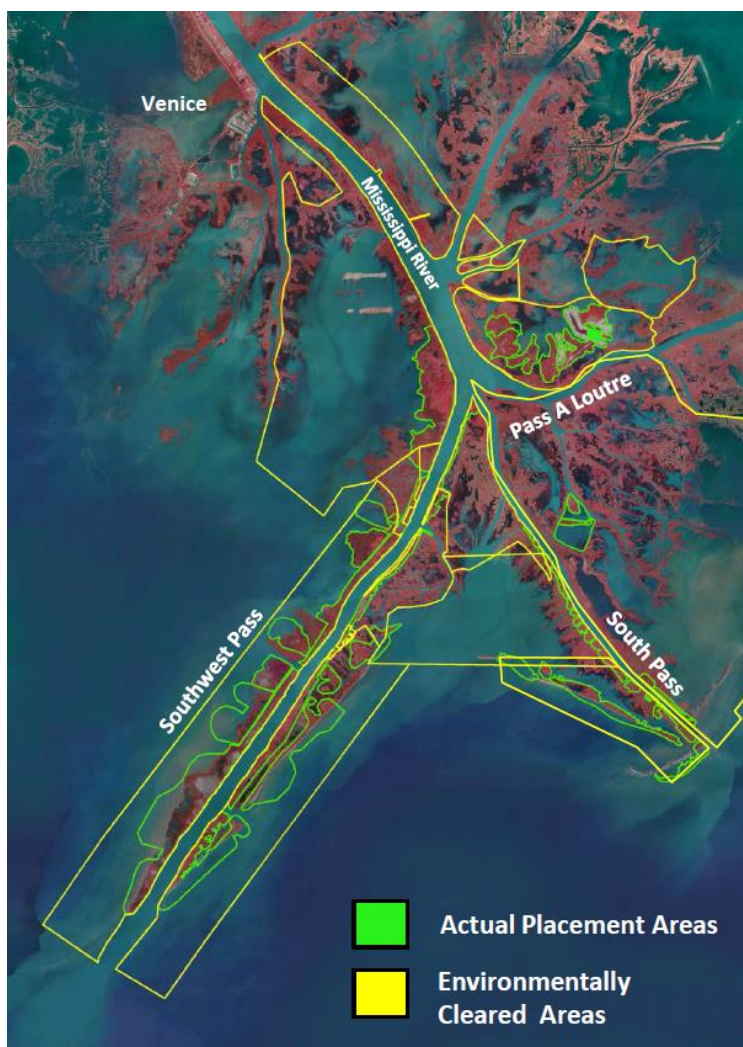


Figure 2-11 environmentally (i.e., NEPA) cleared beneficial use disposal and actual placement areas (2014)

Saltwater Wedge

The congressionally authorized enlargement of the Mississippi River's deep-draft channel from 40 ft to 45 ft (MLLW), according to USACE (2015a), causes an increase in the duration and extent of annual saltwater intrusion. The bottom profile of the Mississippi River navigation channel is deeper than the Gulf of Mexico water surface level up to RM 350 AHP. Salt water in the Gulf of Mexico is denser than the fresh water flowing in the Mississippi. Therefore, at low river flows, the Gulf's salt water moves upstream along the bottom of the River underneath less dense river fresh water. This poses a problem for the municipal water intakes along the lower Mississippi River. Water plants in Plaquemines Parish must shut down operations as saltwater reaches their water intake facilities. For communities at the lower reaches of the river, this shutdown could last longer than their storage reserves can accommodate.



To correct this problem, among other mitigation measures, a sand sill is constructed to a depth between 45.66 ft and 50.66 ft NAVD88(2004.65) near Carlisles, LA, to reduce saltwater flow and artificially arrest the saltwater wedge when conditions necessitate (Figure 2-12, Appendix A-6). Since completion of the 45-ft channel, a sand sill has been constructed three times (in 1988, in 1999, and in 2012) in order to mitigate for the increased duration and extent of saltwater intrusion above RM 64 AHP. Sill construction requires close coordination with the U.S. Coast Guard and the navigation industry because it typically requires several temporary river closures (USACE 2015a).



Figure 2-12 Location of emergency saltwater barrier sill south of Belle Chasse, LA

Other features are also included in the saltwater wedge mitigation plan and are described in detail in Chapter 3.

Future Without-Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the Mississippi River would continue, however, there would be no direct impacts under the no action alternative. Annual O&M dredging of the project area would continue at an average 35,318,498 cy per year and would establish approximately 528 acres of intermediate marsh annually. Existing conditions and trajectories of ecological change to aquatic resources would persist, as described in section 2.4. The area would



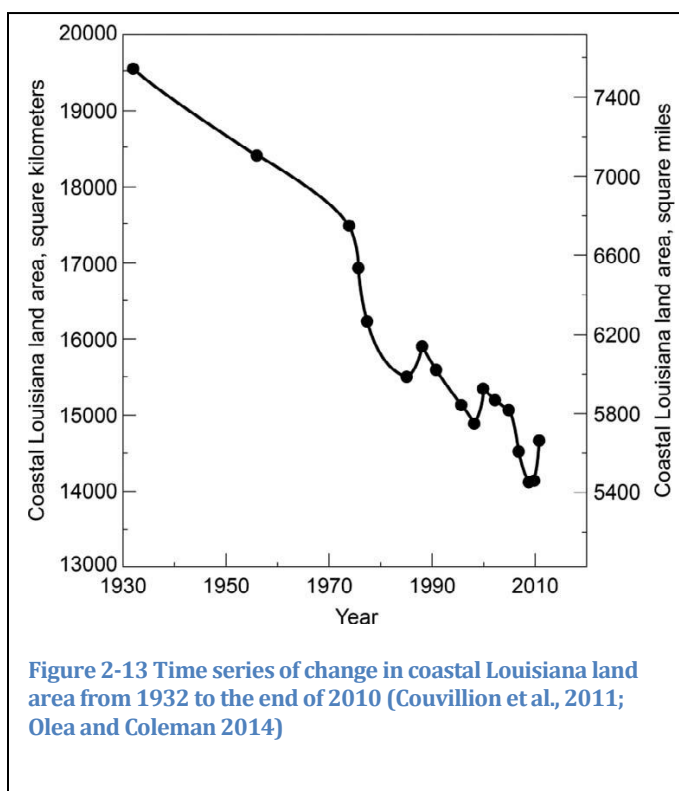
be subjected to increases in relative sea level rise which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of adjacent marsh to open water. Much of the area, could be permanently inundated under both the intermediate and high RSLR scenarios. There could be a shift from fresh water dominant species to those species that can tolerate higher salinity.

The saltwater barrier sill would continue to be constructed at the same location, as necessary, during extended low water conditions (Appendix A-6). Although there may be a potential for the sediment source of the sill to be shared with outside parties, CEMVN Regulatory permits would be required, and those permits would require special conditions and limit use of the sediment source to allow the construction of the sill when necessary. Enforcement of the permit conditions are the responsibility of the Regulatory Branch of CEMVN.

2.2.2 Mississippi River Delta

Historic and Existing Conditions

The U.S. Geological Survey (Couvillion et al. 2011; Olea and Coleman 2014) provide updated estimates of persistent land change and historical land change trends from the 1932 to 2010 period of record for the entire coastal Louisiana area (Figures 2-13, 2-14). Coastal Louisiana has experienced a net decrease of -1,205,120 acres or about 25 percent of the 1932 coastal land area lost. Persistent losses account for 95% of this land area decrease. The average rate of loss from 1932 to 2010 was 15,360 acres /yr. Trend analysis from 1985 to 2010 show a wetland loss rate of 10,604.8 acres /yr, which equates to losing about one football field per hour if this loss were to occur at a constant rate.



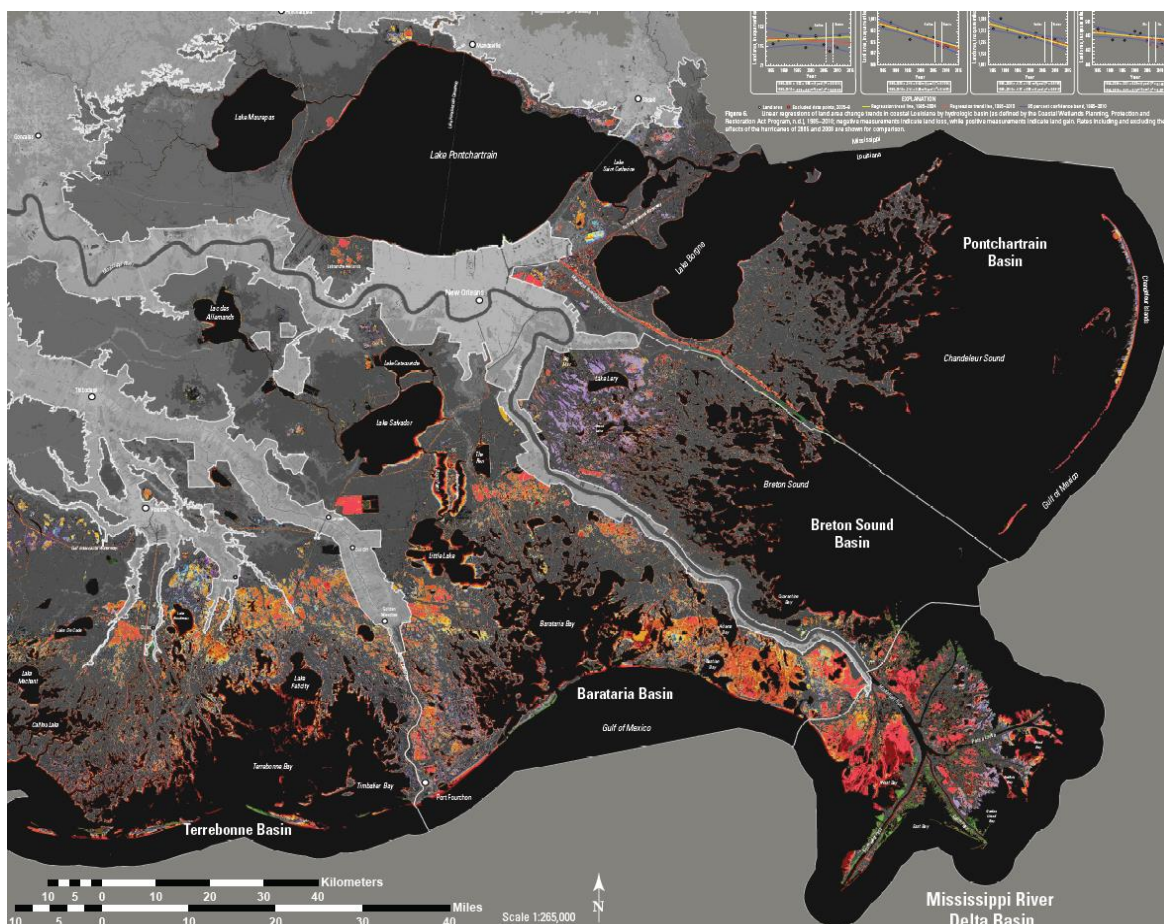


Figure 2-14 Couvillion et al., (2011) determined land area change within the Mississippi River basin experienced a net decrease of -79,385 acres or about 52% of the 1932 area

Coastal Land Loss

Coastal Louisiana has undergone drastic habitat modification during the last century, including major conversion of wetlands to open water (Barras et al. 2008; Mitsch et al. 2009; Tobin et al. 2014). Driving factors behind these changes include water-level increase, salinity alterations, grazing behavior by native and invasive species, lack of particulate deposition, and oil and gas extraction activities (Gosselink et al. 1998, Penland et al. 2001, Tobin et al. 2014). Most of the present Mississippi River fresh water, with its nutrients and sediment, flows directly into the Gulf of Mexico, largely bypassing the coastal wetlands. Levees have reduced the area of seasonally flooded wetlands along the river. Deprived of land building sediment, the wetlands are damaged by saltwater intrusion and other causative factors associated with sea level change and land subsidence, and will eventually convert to open water. Deprived of the nutrients, the plants that define the surface of the coastal wetlands die off. Once the coastal wetlands are denuded of vegetation, the fragile substrate is left exposed to the erosive forces of waves and currents, especially during tropical storm events.



Couvillion et al. (2013) models for a 2010 to 2060 simulation period under a “future-without-action” condition, determined that coastal Louisiana is at risk of losing between 523,369.2 acres and 1,155,712 acres of land over the next 50 years. The vast majority of the disposal areas in the study area is open water (approximately 85,611 acres), which has increased by 1,057-acres since 2001. This illustrates the land loss trend occurring in the Mississippi River Delta and throughout the rest of coastal Louisiana. This land loss trend has been occurring since the early 1900s with commensurate negative effects on Louisiana’s coastal ecosystem (USACE 2004). In the last 80 years, coastal Louisiana has lost approximately 1,203,156 acres of land, and another estimated 1,125,071 acres are at risk of being lost over the next 50 years (CPRA, 2012; Bethel et al., 2014). Many factors contribute to land loss along coastal Louisiana, including natural and anthropogenic processes such as subsidence, sea level rise, and tropical storm activity. The study area continues to experience land loss at a steady rate due to subsidence of the land surface and rising sea levels. This process is expected to continue into the future resulting in a loss of surface elevation of the geomorphic features, changes in vegetation types and land cover that characterize the study area, and increased land loss resulting in more open water areas. Between 1932 and 2010, the disposal study area experienced a land loss of approximately 48,110.5 acres and a gain of 8,835.17 acres during the same period (Figure 2-15).



MRDS LAND LOSS 1932 - 2010

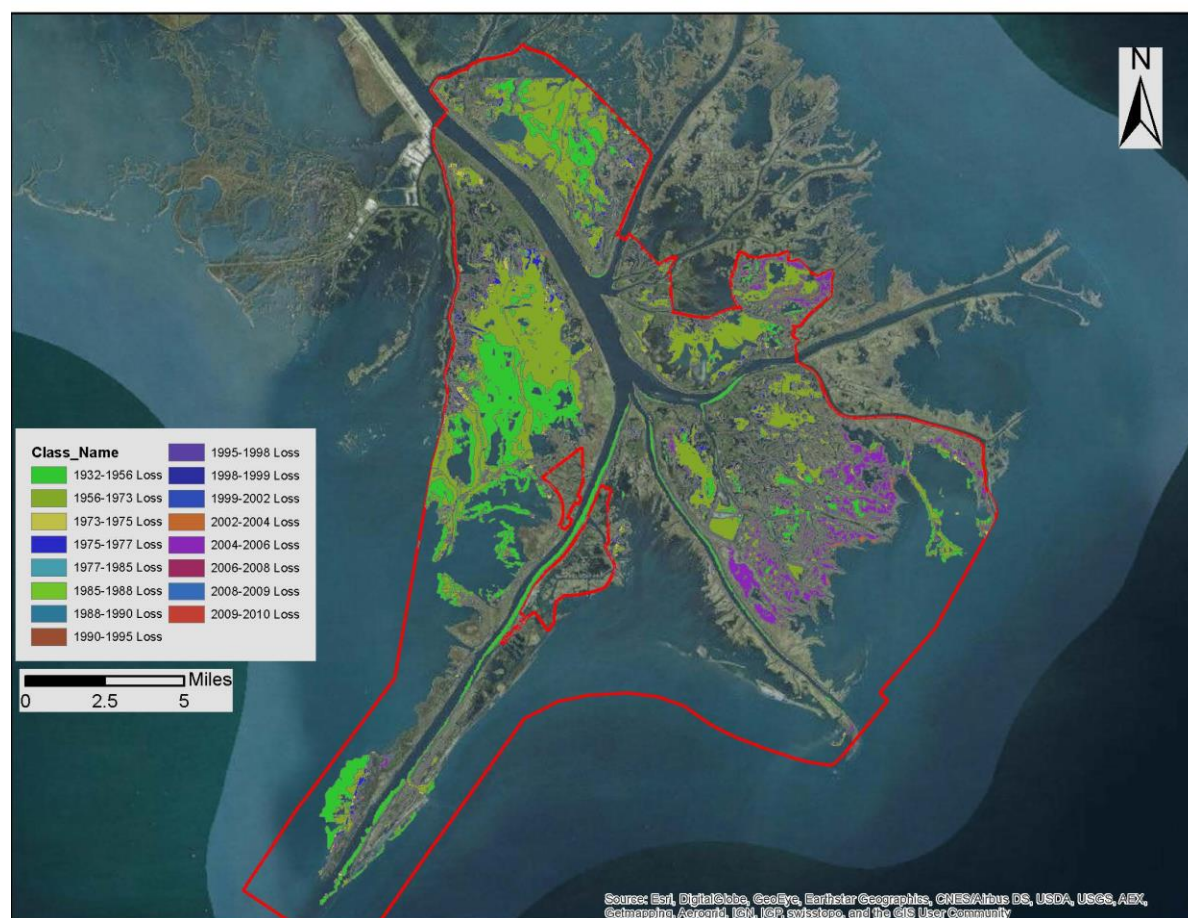


Figure 2-15 Between 1932 and 2010, the disposal study area experienced a land loss of approximately 48,110.5 acres and a gain of 8,835.17 acres during the same period

Some natural factors related to Louisiana's present day coastal land loss area include:

- land-surface subsidence and erosion have recently been considered the two primary physical processes responsible for the historical wetland loss in coastal Louisiana (USGS 2014);
- delta-plain subsidence and a deficit of terrigenous wetland sediment are the primary factors driving the rapid deterioration of the Louisiana coastal zone (Penland and Ramsey 1990);
- increasing sea-levels (Walker et al. 1987, Day and Templet 1989, Boesch et al. 1994, Thomson et al. 2001, Burkett et al. 2002, Gonzalez and Tornqvist 2006, FittzGerald et al. 2008);



- land surface subsidence and compaction (Walker 1987, Britsch and Dunbar 1993, Dokka 2006, Gonzalez and Tornqvist 2006, USGS 2014);
- changes in location of delta deposition area and natural decay of abandoned river deltas (Craig et al. 1979a,b; Walker et al. 1987; Britsch and Dunbar 1993);
- erosion by waves and other factors (Penland et al. 1990, Britsch and Dunbar 1993, Boesch et al. 1994, USGS 2014);
- storms and hurricanes (Craig et al. 1979a,b; Reed 1989; Stone et al. 1997; Day et al. 2000; Day et al. 2007; Barras 2009);
- decrease in plant vertical accretion (DeLaune et al. 1981, Reed and Cahoon 1992, Nyman et al. 1993)
- wetland grazing by native species such as muskrat and geese (Nyman 1983); and
- sedimentary loading and normal tectonic activities such as faulting, folding, and fracturing (Craig et al. 1979a,b; Dokka 2006; Dokka et al. 2006).

Human modifications over the past century have greatly accelerated coastal marsh deterioration and shoreline retreat, not only in the study area, but also in many coastal regions worldwide (Kennish 2001). Effects of human modifications on land loss in coastal Louisiana have been investigated by many researchers:

- flood risk reduction structures such as levees, dams and reservoirs, and maintenance dredging of the Mississippi River for navigation have excluded sediments, freshwater, and nutrients from much of the Louisiana coastal zone thereby eliminating a major land building and maintenance mechanism (Craig 1979; Gagliano et al. 1981; Walker 1987; Kesel 1988, 1989, 2003; Templet and Meyer-Arendt 1988; and others);
- construction of dams and reservoirs and better farming practices for soil erosion control have caused major declines of suspended sediments in the Mississippi River necessary to build and/or nourish coastal wetlands (Walker 1987; Kesel 1988, 1989; Day et al. 2003; Meade and Moody 2010);
- altered wetland hydrology, due to construction of highways, pipelines, canals, spoil banks, and access channels has disrupted natural patterns of sediment transport, facilitated saltwater intrusion and eutrophication (Craig et al. 1979a,b; Gagliano et al. 1981; Scaife et al. 1983; Deegan et al. 1984; Walker et al. 1987; Reed and Wilson 2004);



- introduction of exotic invasive species, such as the nutria, that graze on wetland plants and cause vegetation eat outs and eventual erosion of land (Craig et al. 1979a,b; Walker et al. 1987; Delaune et al. 1994; Ford and Grace 1998; Marx et al. 2004); and invasive plant species like Chinese tallow and water hyacinth which outcompete native plants; and
- tectonic faulting and subsidence due to petroleum extraction (Craig et al. 1979a,b; Walker et al. 1987; Day et al. 2000; Morton et al. 2003; Ericson et al. 2006; Morton et al. 2006).

Subsidence

Subsidence is the most complex and potentially significant biophysical influence on predictions of project outcomes in southeastern Louisiana. This document outlines a proposal for accounting for uncertainty in subsidence predictions in the Study modeling. USACE (2011) assumes that subsidence is a constant function (both past and future) calculated by subtracting the historical global sea level rise rate from the relative rate measured at the nearest tide gauge. There are only two NOAA Co-ops tide gauges, Grand Isle and Sabine Pass North, in coastal Louisiana that meet the 40-year periods of record the 40-year benchmark described in USACE (2011). The locations of these gauges are insufficient to represent the range of conditions in coastal Louisiana (Figure 2-16).

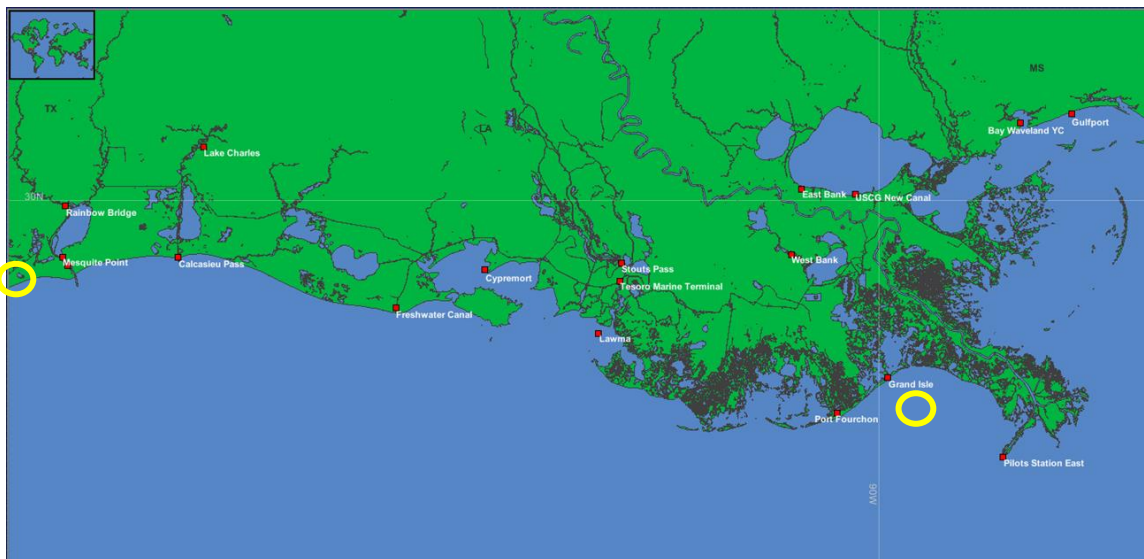


Figure 2-16 NOAA's tide gauge network in Louisiana

Figure 2-16. NOAA’s tide gauge network in Louisiana covers multiple geomorphic settings within the State’s coastal zone. The two NOAA Co-ops stations with a 40-year record are highlighted by the yellow circles, highlighting the paucity of NOAA stations in coastal Louisiana that meet that benchmark. Note that three NOAA stations are not shown on this map: Carrollton, Crescent City



Air Gap, and Huey Long Bridge Air Gap. <http://egisws01.nos.noaa.gov/website/co-ops/stations/viewer.htm>.

Sea Level Rise

Global sea level change (GSLR), also called eustatic sea level change, is the global change of the oceanic water level. Data indicate that concentrations of greenhouse gases (e.g., carbon dioxide), and global temperatures have increased during the 20th century. As a result, eustatic sea levels are expected to rise in the future at a higher rate than observed during the 20th century. EPA (1995) estimated that climate change is likely to raise global sea levels 5.9 inches (15 cm) by the year 2050 and 13.4 inches by the year 2100 (34 cm). Other experts predict that the level of the world's oceans could rise over 8 inches (20 cm) over the next 50 years.

Relative sea level is defined as the sea level related to the level of the continental crust. Relative sea level changes can thus be caused by absolute changes of the sea level and/or by absolute movements of the continental crust. Potential impacts brought about by various projected rates of relative sea level change must be considered in every USACE coastal activity as far inland as the extent of estimated tidal influence, in the case in the vicinity of New Orleans, La. (ER-1100-2-8162 and ETL 1100-2-1). This will be considered during feasibility level design of the TSP. Fluvial studies that include backwater profiling should also include potential relative sea level change in the starting water surface elevation for such profiles, where appropriate. Planning studies and engineering designs over the project life cycle, for both existing and proposed projects, will consider alternatives that are formulated and evaluated for the entire range of possible future rates of sea level change represented here by three scenarios of “low,” “intermediate,” and “high” sea level change. The historic rate of sea level change represents the “low” rate.

For this navigation study, USACE assumes a historical 1.7 mm/yr linear rate of GSLR based on data reported in the International Panel on Climate Change 2007 Working Group I report (Bindoff et al. 2007). The State's Master Plan sea level rise technical team utilized a historical value of global sea level rise of 3.1 mm/yr, based on a 1993-2003 satellite altimetry dataset cited in IPCC 2007, and DeMarco et al. (2012) outlines the use of 2.4 mm/yr as an estimate for the historical linear trend, based on data through 2011 and on the weight of evidence of both tide gauge and satellite altimetry data.

USACE (2011, 2014) instructs its personnel to model three distinct future scenarios for GSLR: 1) an extension of the linear historical rate at the relevant local tide gauge; 2) NRC (1987) Curve I modified as described in USACE (2011), which equates to 0.5-meters GSLR by 2100, and 3) modified NRC (1987) Curve III, which equates to 1.5-meters GSLR by 2100 (Figure 2-17).

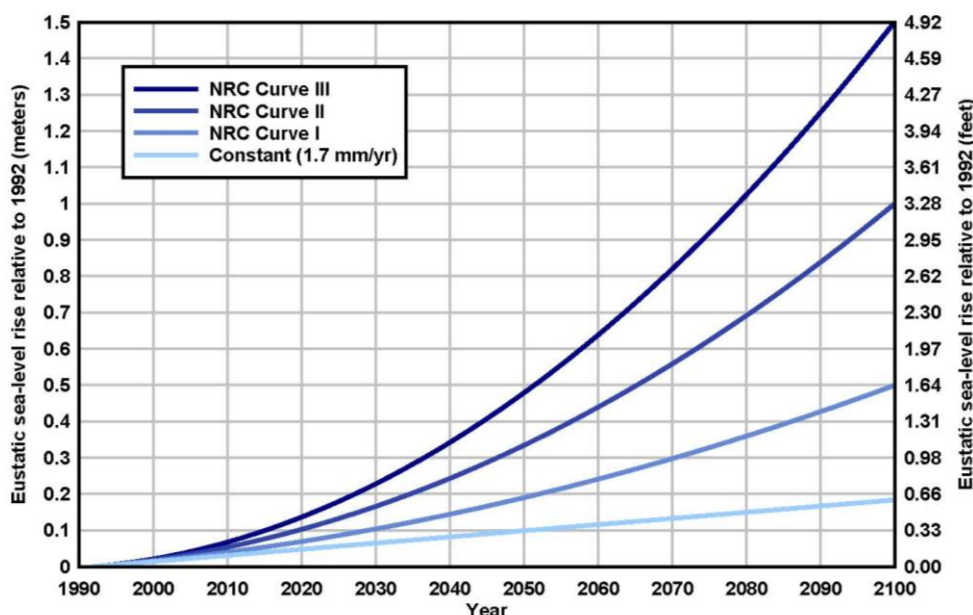


Figure 2-17 Sea level rise scenarios

Environmental Disasters

On April 20, 2010, the Deepwater Horizon mobile drilling unit exploded, caught fire, and eventually sank, resulting in a massive release of oil and other substances from BP's Macondo well (located approximately 50 miles southeast of Head of Passes). Approximately 3.19 million barrels (134 million gallons) of oil were released into the ocean, by far the largest offshore marine oil spill in U.S. history (NOAA 2016). Aquatic and vegetative habitats contained toxic levels of oil which resulted in extensive injuries across the northern Gulf of Mexico ecosystem. Toxicity levels have decreased substantially since 2010 though lingering effects to aquatic resources may be felt for many years.

Large oil slicks also resulted in impacts to aquatic and vegetative resources in and near the Mississippi River Delta. To help prevent surface oil from reaching vegetated areas, large volumes of sand were dredged from the Mississippi River delta and transported to nearby areas for berm construction. The berms served as a barrier between surface oil in Gulf and the vegetated shoreline along the deltaic coast. Dredging for the berms occurred in Pass A Loutre at Head of Passes and in a Mississippi River offshore disposal site.

In February 2016, NOAA and its Federal and state natural resource trustee agencies released the Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement (Final PDARP/PEIS) as part of the Natural Resources Damage



Assessment. Due to the severity of oil spill impacts across such a broad array of ecosystem resources (i.e. habitats, species, and functions), the Final PDARP/PEIS recommends a comprehensive, integrated ecosystem restoration approach to help offset the ecosystem injuries and impacts. These injuries affected corals, fish and shellfish, wetlands, beaches, birds, sea turtles, mammals, and protected marine life due to three months of oil flow that resulted in an oil slick covering 43,300 square miles (an area roughly equivalent to the size of Virginia) which oiled more than 1,300 miles of shoreline (NOAA 2016). Key findings of the Final PDARP/PEIS include: injuries occurred at all trophic levels; injuries occurred to virtually all marine and estuarine habitats that came in contact with oil, from the deep sea to the shoreline; injuries occurred to species, communities, and ecosystem functions; lost recreation use value is estimated at \$693 million dollars.

The preferred restoration alternative primarily focuses on restoring Louisiana coastal marshes. However, a variety of restoration approaches shall be implemented including water quality, nearshore habitats, specific species, and recreation, among others. The preferred alternative is an integrated restoration portfolio that emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem. Restoration will occur over the next several decades (<http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan>).

Future Without-Project Conditions (No Action / Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct impacts under the no action alternative. The area would be subjected to increases in RSLR which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of adjacent marsh to open water. Much of the area, could be permanently inundated under both the intermediate and high RSLR scenarios. There could be a shift from fresh water dominant species to those species that can tolerate higher salinity. O&M, including beneficial use within the federal standard, within the study area would continue as described above. The marshes of Plaquemines parish are anticipated to continue to decline and convert to marsh and open water. However, CEMVN O&M would continue to use material beneficially for coastal habitat creation to the extent authorized under the federal standard. There would be no direct impacts under the no action alternative.

The effects of human activities will continue to exacerbate land loss rates in the Plaquemines-Balize delta. Channel stabilization and levee maintenance along the Mississippi River will continue to restrict seasonal sediment-laden overbank flows that once nourished adjacent wetland areas. The Mississippi River levees to the north, and associated erosion control and channel stabilization measures extending to its mouth, will continue to preclude the possibility of a



naturally occurring crevasses or natural changes in the river's course. The river will continue to be maintained at its current navigational dimensions. As such, crossings would continue to require a combined annual average of approximately 16,403,283 cubic yards of dredging and have minimal effect on the delta since the material is contained within the system. Southwest Pass would continue to require approximately 15,091,427 cubic yards of dredging annually. Approximately 528 acres of coastal marsh habitat is expected to establish each year via beneficial use, however, due to subsidence, erosion, and sea level rise, most of these areas are not expected to exist beyond the 50-year period of analysis⁴. Continued relative sea level rise could also impact the entire area resulting in vast areas of shallow open water as vertical accretion rates fail to keep pace with rising sea levels.

O&M dredging of the project area would continue at an average of 35,318,498 cy per year. Flow and water level trends described above are expected to continue. The gradual trend of shoaling upriver of Head of Passes between RM 6-13.4 is anticipated to continue. This is based on observations of the project indicating the migration of dredge requirements up river of this reach and proportionally fewer demands for dredging down river. Overall increase in dredging quantities in the lower river is not anticipated. Without the proposed project, the area would continue to be affected by the following:

- Federal and state water quality programs – may address land use practices in the Mississippi River basin and could impact the area water quality (Broussard 2008).
- Coastal processes – the marshes of Plaquemines Parish are anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions. However, CEMVN O&M would continue to use material beneficially for coastal habitat creation to the extent possible under the federal standard as described previously.
- Climate change, relative sea-level rise and hurricane/tropical storm surge.

2.2.3 Water Quality

Regulatory Overview

The Clean Water Act (CWA) established a process for states to assess water quality. Section 305(b) requires states to develop a surface water quality monitoring program, and a report describing the water quality status of state waterbodies with respect to support of designated uses. Section 303(d) requires states to develop and list Total Maximum Daily Loads (TMDLs) for impaired waterbodies (waterbodies with water quality unsupportive of one or more designated uses). A TMDL is the maximum amount of the pollutant(s) contributing to impairment that can enter a waterbody from



all sources (including nonpoint sources) and still meet water quality criteria. The Louisiana Department of Environmental Quality (LDEQ) implements a watershed-based approach to reduce pollutant loads in the waterbodies where TMDLs have been established, through the Louisiana Pollutant Discharge Elimination System (LPDES) and Louisiana Nonpoint Source (NPS) programs. For the purpose of state water quality assessment, Louisiana is divided into 12 major basins, which are further divided into waterbodies known as sub segments. The *2014 Louisiana Water Quality Inventory: Integrated Report* is the most recent in the biennial publication prepared by LDEQ on the status of Louisiana waters in accordance with Sections 305(b) and 303(d) (LDEQ 2014).

Historic and Existing Conditions

Groundwater is near the surface throughout most of the Louisiana coastal zone (USACE 2004). The silt and sand rich depositional environments such as point bar, intradelta, natural levee, beach, and nearshore gulf are generally connected hydraulically to the adjacent water body (i.e. river, lake, distributary channel) and the groundwater level in these deposits reflects the level/stage of the adjacent water body (USACE 2004). This is especially true in deposits adjacent to the Mississippi and Atchafalaya Rivers. Any potential connectivity should be investigated to determine its influence on uplift pressures, design of dewatering systems, and groundwater migration (USACE 2004). In addition, it has been proposed that submarine groundwater discharge is an important contributor to geochemical and hydrological fluxes within the deltaic plain (Kolker et al. 2012).

Numerous deep regional aquifers exist in South Louisiana (USGS 2015a). The coastal lowlands aquifer system of Louisiana consists of alternating beds of sand, gravel, silt, and clay deposited under fluvial, deltaic, and marine conditions (USGS 2015a). The aquifer system is comprised of sediment from the late Oligocene age to Holocene that thicken and dip toward the Gulf Coast. The sediments are highly heterogeneous with sand beds that are not traceable for more than a few miles (USGS 2015a). The Chicot aquifer underlies most of southwestern Louisiana and extends from central southwestern Louisiana to the Gulf of Mexico and from Sabine Lake to St. Mary Parish. The Chicot aquifer is up to 800 ft thick at its most northern extent and extends to an unknown depth beneath the Gulf of Mexico. The Southeastern Louisiana aquifer system, also known as the Southern Hills aquifer system, consists of about 30 named aquifers (USACE 2004). The Southeastern aquifer extends approximately from the Mississippi River to the Pearl River in Louisiana. The aquifers range in thickness from 50 to 1,100 ft with thickness increasing toward the south (USGS 2015a).

Mississippi River



River water quality varies due to factors such as seasonality, changing farming practices, and rainfall patterns. As this relates to agricultural runoff and suspended sediment, fertilizer and pesticide concentrations in the river are dependent on their physiochemical properties, timing of application and subsequent rainfall, crop selection, and Federal farm policy, while suspended sediment concentration, load, and grain size distribution are dependent on factors such as river discharge, time between flood events, and water depth (Meade 1995, Allison et al. 2010, Rosen and Xu 2014).

Anthropogenically-induced changes in Mississippi River water quality are primarily related to population increases within the river's watershed and development practices, including the adoption of agricultural soil conservation practices beginning in the 1930s; the construction of major river engineering works during the 20th century; increasing use of fertilizers and pesticides, particularly for industrial farming; and insufficient regulation of point source pollution prior to effective enforcement of the CWA. Table 2-4, adapted from Garrison (1998), includes a water quality summary for three long-term (periods of record ranging from 1905-1995) monitoring stations in the Mississippi River.

Table 2-4 Mississippi River water quality summary, from Garrison (1998) (BDL = Below Detection Limit)

Group	Parameter	Units	Mississippi River at New Orleans, Louisiana (8)			Mississippi River at Violet, Louisiana (9)			Mississippi River at Belle Chasse, Louisiana (10)		
			Percentile			Percentile			Percentile		
			25 th	50 th (Median)	75 th	25 th	50 th (Median)	75 th	25 th	50 th (Median)	75 th
Physical properties	Specific Conductance	µmhos/cm	346	406	462	324	358	450	332	402	461
	pH	SU	7.3	7.6	7.9	7.4	7.6	7.8	7.3	7.6	7.8
	Water Temperature	°C	11.5	19	28	10.5	17.5	26.2	11	19.2	26.5
	Dissolved Oxygen	mg/L	6.5	8	9.5	7.1	8.1	9.6	6.8	7.9	10.2
	Dissolved Solids	mg/L	208	245	275	201	220	254	214	249	286
Major cations	Calcium (Dissolved)	mg/L	36	41	45	35	38	44	35	39	43
	Magnesium (Dissolved)	mg/L	9.7	12	13	9.6	11	13	9.8	12	14
	Sodium (Dissolved)	mg/L	16	22	28	15	18	26	15	20	28
	Potassium (Dissolved)	mg/L	2.8	3.3	3.5	2.5	2.9	3.3	2.8	3.3	3.6
Major Anions	Alkalinity (Total, as CaCO ₃)	mg/L	90	106	118	89	98	115	88	105	120
	Sulfate (Dissolved)	mg/L	44	53	62	40	46	57	38	48	59
	Chloride (Dissolved)	mg/L	19	25	30	18	22	29	20	26	32
Nutrients	Ammonia + Organic Nitrogen (Total, as N)	mg/L	0.5	0.7	0.9				0.5	0.7	1
	Nitrate + Nitrite (Total, as N)	mg/L	0.88	1.2	1.6	0.85	1.2	1.4	1.1	1.4	1.7
	Phosphorus (Total, as P)	mg/L	0.18	0.24	0.31	0.2	0.24	0.3	0.14	0.2	0.27
Biological Constituents	Fecal coliform	Col/100 mL	170	280	460	2,000	3,100	3,600	140	310	800
	Fecal streptococcus	Col/100 mL	200	440	880				120	280	750
	Phytoplankton	Cells/mL	760	1,400	2,800				880	1,800	4,100
Metals	Iron (Dissolved)	µg/L	BDL	20	40	BDL	BDL	30	BDL	20	29
	Zinc (Dissolved)	µg/L	BDL	BDL	20	BDL	BDL	BDL	BDL	BDL	BDL
Organic Compounds	2,4-D (Total)	µg/L	BDL	BDL	0.2	BDL	BDL	BDL			
	Phenols (Total)	µg/L				BDL	1	2			
	Oil and Grease (Total Recoverable)	mg/L				BDL	BDL	1			
	Organic Carbon (Total)	mg/L	3.6	5.6	7.7	6	6.2	8.5	5.2	6.7	8.9



Louisiana Water Quality Inventory

The 2014 Louisiana Water Quality Inventory: Integrated Report (IR) reports the most recent assessment of waterbody subsegments as required by Sections 303(d) and 305(b) of the CWA. For the Mississippi River, there are three applicable subsegments for the study area including:

1. LA070301 (Mississippi River from Monte Sano Bayou [Baton Rouge] to Head of Passes),
2. LA070401 (Mississippi River Passes – Head of Passes to Mouth of Passes [includes all passes in the birdfoot delta]), and
3. LA070601 (Mississippi River Basin Coastal Bays and Gulf Waters to the State 3 mile limit)

Table 2-5 provides the 2014 IR's summary information for the applicable waterbody subsegments. The upper reaches of the river within the study limits are fully supporting the assigned designated uses. However, the lower reach (coastal/Gulf waters) are listed as impaired due to the reasons shown below. LDEQ has developed a TMDL for mercury in fish tissue impairment while the dissolved oxygen and fecal coliform impairments are listed on the 303(d) list and require TMDL development.

Table 2-5. Mississippi River Waterbody Subsegments

Table 2-5 Mississippi River Waterbody Subsegments

Subsegment Number	Designated Uses					Impaired Use	Suspected Causes of Impairment	Suspected Sources of Impairment
	PCR ¹	SCR ²	FWP ³	DWS ⁴	OYS ⁵			
LA070301	F ⁶	F	F	F				
LA070401	F	F	F		F			
LA070601	F	F	N ⁷		N	FWP	Mercury in fish tissue	Atmospheric deposition of toxics and unknown source
	F	F	N		N	FWP	Dissolved oxygen	Upstream source
	F	F	N		N	OYS	Fecal coliform	On-site treatment systems, waterfowl, and other wildlife



¹ Primary Contact Recreation (swimming), ² Secondary Contact Recreation (boating), ³ Fish and Wildlife Propagation (fishing), ⁴ Drinking Water Supply, ⁵ Oyster Propagation, ⁶ Fully supporting, and ⁷ Not supporting

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: There would be no direct or indirect impacts from implementing the No Action Alternative. Without the proposed project, study area water quality would likely continue current trends. For example, surface water quality has improved significantly with the implementation of the Clean Water Act and industrial and municipal discharge programs such as NPDES. These programs continue to advance with new or improved technologies to treat wastewater discharges. The causes of impairment listed in Table 2-5 above will continue to degrade water quality until TMDL development and execution, and the suspected sources are addressed. In addition, contaminants of emerging concern such as pharmaceuticals and personal care products, microplastics, etc. continue to present uncertainty for surface water quality and potential concerns for human health and the environment.

2.2.4 Salinity

Historic and Existing Conditions

Due to the sheer volume of freshwater discharge from the river and its outlets, the coastal area of the delta can be classified as a mixing zone for fresh and salt water. The mixing zone is dynamic and depends on such variable factors as river discharge, tides, and wind. Saltwater intrusion occurs when freshwater flows decrease in volume, allowing saltwater from the gulf, which is heavier than freshwater, to move inland or “upstream”. Saltwater can then infiltrate fresh groundwater and surface water supplies, and damage freshwater ecosystems. The rate of saltwater intrusion depends on the amount of freshwater flows traveling downstream and the water depth in the wetlands, channels, and/or canals. Generally, high-inflow/low-salinity periods occur from late winter to late spring and low-inflow/high-salinity periods from late spring to fall. Saltwater intrusion is a principle factor in the conversion of freshwater habitats to saline habitats.

The salt water in the Gulf of Mexico is denser than the fresh water flowing in the Mississippi. Therefore, at low river flows, the Gulf’s salt water migrates upstream along the bottom of the River underneath less dense river fresh water. This wedge is blocked under extreme low water conditions by construction of the aforementioned temporary saltwater barrier/sill at RM 64. Figure 2-18 demonstrates the buoyancy of fresh water above denser saline water.

Based on monitoring data from beneficial use sites, over 95% of the area is classified as intermediate marsh. Chabrek (1972) defined the typical range of intermediate salinity as 2-5 ppt.

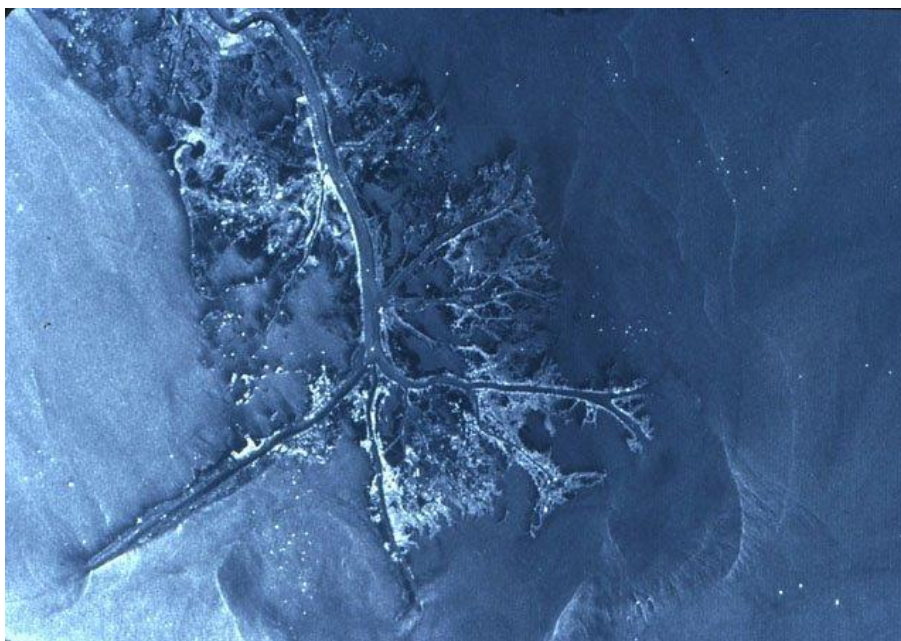


Figure 2-18 Mississippi River Delta, Salinity Front

In the black-and-white synthetic aperture radar (SAR) image of the Mississippi Delta, seen in Figure 2-18, several long, narrow, curving features can be seen in the waters to the east of the delta (at the right of the frame). These are surface waves resulting from the interaction between the outflowing fresh waters of the Mississippi River and the ambient saline waters of the Gulf of Mexico. The less-saline river water is less dense than the Gulf waters, and therefore flows out across the salty sea water at the river mouth. Fresh water can be seen discharging to a distance of about 5 kilometers out to sea where it blends with Gulf water.

(http://www.lpi.usra.edu/publications/slidesets/oceans/oceanviews/slide_28.html)

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct impacts under the no action alternative. Salinity gradient trends are expected to continue. Without the proposed project, the area would still be affected by the following:

- Coastal processes – the marshes of Plaquemines parish are anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions.
- Saltwater wedge migration-the saltwater wedge (Section 2.2.1) would continue to migrate upstream during low water conditions. The saltwater barrier sill would continue to be constructed as a mitigation measure for the project.



- Climate change, relative sea-level rise and hurricane/tropical storm surge- each of these processes would speed the process of saltwater intrusion in the area of the lower river.

2.3 Human Environment

2.3.1 Population and Housing

Historic and Existing Conditions

Population

Across the 11 affected parishes, a 6 percent population growth from 1.55 million to 1.64 million persons, was observed between the 1990 and 2000. This is significantly lower than the observed national growth of 29% over the same historical period. Six of the parishes within the immediate economic region of the study area have seen a growth in population from 1990, while 5 parishes have seen a decrease in population. The Ascension Parish experienced the highest increase in population from 1990 to 2015 (+75%), while the St. Bernard Parish experienced the greatest decrease in population (-32%) over the same time period (Table 2-6).

Currently (from year 1990 to 2015), the US Census Bureau estimates the population of the study area to be approximately 1.56 million people. East Baton Rouge, Jefferson, and Orleans Parishes are the most populous. These three parishes contain approximately 79% of the total population of the 11 study area.^{1\}

Table 2-6 Population Trends for Selected Louisiana Parishes

Parish	Population				Percentage Change			
	1990 ²	2000 ³	2010	2015 ⁴	1990 to 2000	2000 to 2010	2010 to 2015	1990 to 2015
Ascension	68,214	76,627	107,215	119,455	12%	40%	11%	75%
East Baton Rouge	285,167	412,852	440,171	446,753	45%	7%	1%	57%
Iberville	31,049	33,320	33,387	33,095	7%	0%	-1%	7%
Jefferson	448,306	455,466	432,552	436,275	2%	-5%	1%	-3%
Orleans	496,938	484,674	343,829	389,617	-2%	-29%	13%	-22%
Plaquemines	25,575	26,757	23,042	23,495	5%	-14%	2%	-8%
St. Bernard	66,631	67,229	35,897	45,408	1%	-47%	26%	-32%
St. Charles	42,437	48,072	52,780	52,812	13%	10%	0%	24%
St. James	25,575	21,216	22,102	21,567	-17%	4%	-2%	-16%
St. John the Baptist	39,996	43,044	45,924	43,626	8%	7%	-5%	9%

¹ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?_afpt=table

² Bureau of the Census, <http://www.census.gov/population/www/censusdata/cencounts/files/la190090.txt>

³ Bureau of the Census, <http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>

⁴ Bureau of the Census, American Community Survey, Quick Facts



Parish	Population				Percentage Change			
	1990 ²	2000 ³	2010	2015 ⁴	1990 to 2000	2000 to 2010	2010 to 2015	1990 to 2015
West Baton Rouge	19,419	21,601	23,788	25,490	11%	10%	7%	31%
Louisiana	4,219,973	4,468,976	4,533,372	4,670,724	6%	1%	3%	11%
United States	248,709,873	281,421,906	308,745,538	321,418,820	13%	10%	4%	29%

Housing

The 11 parishes have estimated occupancy rates ranging from 75% in Orleans Parish to 93% in both Ascension Parish and St. Charles Parish. An estimated 61% of all residents in the eleven counties own their home. Orleans Parish has the lowest ownership rate at an estimated 47% and St. Charles Parish has the highest with an estimated 81% of residents owning their home (Table 2-7).

Table 2-7 Estimated Occupancy in Selected Louisiana Parishes

Parish	Owner-Occupied	Renter-Occupied	Vacancy Rate
Ascension	80%	20%	7%
East Baton Rouge	60%	40%	8%
Iberville	76%	24%	13%
Jefferson	63%	53%	10%
Orleans	47%	53%	25%
Plaquemines	71%	29%	16%
St. Bernard	70%	30%	21%
St. Charles	81%	19%	7%
St. James	80%	20%	9%
St. John the Baptist	77%	23%	9%
West Baton Rouge	70%	30%	14%

Future without Project Conditions (No Action / Alternative 1)

Direct and Indirect Impacts: Population and housing would continue to grow as projected. Moody's Economy projected the populations of all but one of the eleven parishes to increase in all but three parishes: East Baton Rouge Parish, Iberville Parish, and West Baton Rouge Parish (Table 2-8).

Table 2-8 Population Projections for Select Louisiana Counties – 2015 to 2035

Parish	2015	2020	2025	2030	2035	Projected Percentage Change
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						2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035
Ascension Parish	120,261	133,212	145,076	155,967	166,192	10.8%	8.9%	7.5%	6.6%
East Baton Rouge Parish	430,202	428,749	423,971	416,921	409,210	-0.3%	-1.1%	-1.7%	-1.8%
Iberville Parish	30,860	30,736	30,554	30,430	30,368	-0.4%	-0.6%	-0.4%	-0.2%
Jefferson Parish	451,766	459,592	466,229	471,364	476,624	1.7%	1.4%	1.1%	1.1%
Orleans Parish	233,959	238,011	241,448	244,108	246,832	1.7%	1.4%	1.1%	1.1%
Plaquemines Parish	23,577	23,986	24,332	24,600	24,875	1.7%	1.4%	1.1%	1.1%
St. Bernard Parish	16,248	16,529	16,768	16,952	17,142	1.7%	1.4%	1.1%	1.1%
St. Charles Parish	55,257	56,214	57,026	57,654	58,297	1.7%	1.4%	1.1%	1.1%
St. James Parish	22,008	22,300	22,626	22,926	23,242	1.3%	1.5%	1.3%	1.4%
St. John the Baptist Parish	50,835	51,716	52,463	53,041	53,633	1.7%	1.4%	1.1%	1.1%
West Baton Rouge Parish	22,766	22,805	22,676	22,405	22,065	0.2%	-0.6%	-1.2%	-1.5%
Louisiana	4,423,850	4,495,380	4,556,410	4,604,250	4,650,210	1.6%	1.4%	1.0%	1.0%
United States	321,369,000	334,503,000	347,335,000	359,402,000	370,338,000	4.1%	3.8%	3.5%	3.0%

2.3.2 Employment and Industrial Activity

Historic and Existing Conditions

Louisiana employment in 2014 totaled 2 million. Of the major industry sectors within the state, the health care and social assistance sector employs the most persons (283,000). This industry is followed by retail trade (234,000), educational services (184,000), construction (161,000), manufacturing (160,000), and accommodation and food services (156,000). The parishes in the study region yield fairly similar proportions of workers per sector (all within 5 percent) compared to what was observed at the state level. The one industry exception was manufacturing in St. James Parish and West Baton Rouge Parish. Respectively, 23 percent and 16 percent of workers participated in the manufacturing industry compared to 8 percent at the state level.



According to the United States Bureau of Labor Statistics (BLS), the unemployment rate⁵ in the 11 affected parishes ranged from 6% to 8.7%, as of June 2016. Statewide, the unemployment rate in June 2016 was 7%, higher than the national rate of 4.9%. Only Iberville Parish with 7.7% unemployment and St. James Parish with 8.7% unemployment had rates higher than the state average. Unemployment in all eleven parishes has been declining steadily, between .2 and .95 percentage points, since 2011.

Future without Project Conditions (No Action / Alternative 1)

Direct and Indirect Impacts: Industry and business would continue to grow or shrink depending on market forces. Inefficiencies due to shallow water depth along navigation channels would inhibit the ability of shipping-related business to grow and expand. Unemployment is predicted to decline in all parishes by the year 2035. All parishes, with the exception of St. James parish, are forecasted to see a rise in unemployment between 2015 and 2025 before seeing an increase in employment (Table 2-9).

Table 2-9 Projected Change in Unemployment for Select Louisiana Counties – 2015 to 2035

	2015	2020	2025	2030	2035	Projected Change			
						2015 to 2020	2020 to 2025	2025 to 2030	2030 to 2035
Ascension Parish	3.4%	3.5%	3.7%	3.7%	3.5%	1.7%	5.9%	-0.7%	-3.9%
East Baton Rouge Parish	3.5%	3.6%	3.8%	3.7%	3.6%	1.7%	5.9%	-0.7%	-3.9%
Iberville Parish	5.0%	5.1%	5.4%	5.3%	5.1%	1.7%	5.9%	-0.7%	-3.9%
Jefferson Parish	3.7%	3.8%	4.1%	4.1%	4.0%	3.7%	6.9%	0.2%	-2.7%
Orleans Parish	5.2%	5.4%	5.8%	5.8%	5.7%	3.7%	6.9%	0.2%	-2.7%
Ouachita Parish	4.0%	4.1%	4.4%	4.4%	4.3%	2.9%	7.1%	0.4%	-3.7%
St. Bernard Parish	4.8%	5.0%	5.3%	5.3%	5.2%	3.7%	6.9%	0.2%	-2.7%
St. Charles Parish	3.9%	4.0%	4.3%	4.3%	4.2%	3.7%	6.9%	0.2%	-2.7%
St. James Parish	5.5%	5.3%	5.1%	4.8%	4.5%	-5.1%	-2.7%	-5.8%	-6.0%
St. John the Baptist Parish	5.1%	5.3%	5.7%	5.7%	5.5%	3.7%	6.9%	0.2%	-2.7%
West Baton Rouge Parish	3.5%	3.6%	3.8%	3.8%	3.6%	1.7%	5.9%	-0.7%	-3.9%

2.3.3 Public Facilities and Services

Historic and Existing Conditions

The eleven parishes in the study area contain public facilities and services typical of other American Communities. Public schools, fire and police departments, and public health services

⁵ Not seasonally adjusted



are among the services provided by the parishes. Ascension Parish has a public boat ramp operated by the Louisiana Fish and Wildlife services. Iberville Parish, Plaquemines Parish and Orleans Parish have both State and Parish operated Ferry services.

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: Increases in population could increase demand for public services such as police, school and public health services. Other public services, such as boat ramps and ferry services, may also see an increase in usage as a result of population growth.

2.3.4 Transportation

Historic and Existing Conditions

The eleven parishes contain five ferry terminals.⁶ Three are state-operated and two are parish-operated. A study conducted in 2009 noted the average ridership for ferries in the Jefferson, Orleans, Plaquemines, St. Bernard and St. Tammany Parishes have experienced an average decline of about 1% per year. The decline was attributed, in part, to the effects of Hurricane Katrina on the region's population. In addition to water transportation, the area also has an extensive network of state, county and municipal roads to accommodate vehicle traffic.⁷

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: The volume of goods transported by ship would remain similar to current levels, due to constraints imposed by water depth. Increased population numbers would put more demand on roadways and public transportation.

2.3.5 Community and Regional Growth

Historic and Existing Conditions

Presently, population numbers have remained largely stable in 8 of the 11 affected parishes. Orleans Parish saw a sharp decline in residents from 2005 to 2010, due to Hurricane Katrina. West Baton Rouge Parish also saw a sharp decline during the same time frame. Ascension Parish has seen a steady increase in residents from 1995 until the present.

Future without Project Conditions (Alternative 1)

⁶ http://wwwapps.dotd.la.gov/operations/ferrystatus/fmbs_map.aspx?PID=F_ALL

⁷ [http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Data_Collection/Mapping/Wall%20Map/Official%20Highway%20Map%20\(side%201\).pdf](http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Data_Collection/Mapping/Wall%20Map/Official%20Highway%20Map%20(side%201).pdf)



Direct and Indirect Impacts: Communities would continue to grow and expand along with their populations. Community growth could fuel business development, as well as expand the physical community borders.

2.3.6 Cultural and Historic Resources

Historic and Existing Conditions

The Mississippi River is integral to the history of the United States. In both prehistoric and historic times, the Mississippi River has been a means of transit and an area of rich resources conducive to settlement along its banks. During the growth of the United States and during the Civil War, control of the Mississippi River warranted fortifications. In the industrial age, numerous efforts to control the Mississippi River began and continue with engineered features such as levees, dikes, channel training and similar features. The current project involves deepening of select crossings, and increasing the availability of designated disposal areas for beneficial use of dredged material in the constant battle to stem land loss occurring in the Delta of the Mississippi River. Channel depths have been examined and coordinated for impacts to natural resources, via documents of the National Environmental Policy Act (NEPA). Not all of these areas were subject to cultural resources survey, but studies that have been completed and that discuss these areas, present large agreement that resources are not preserved at the depths in question, both because of the continued dredging that has occurred during the age of navigation, and because of the high velocity and large energy of the Mississippi River at these depths.

Consideration of the disposal areas support a similar conclusion. The vast majority of the currently proposed disposal area has already been discussed in previous NEPA documents including those assessing the disposal of material acquired by dredging the Venice Harbor, and those assessing the expansion of disposal areas associated with South Pass and Southwest Pass by 51,000 acres. Not all of the prior NEPA documents on the lower river contain a cultural resources survey (Appendix A-1) but they do discuss the natural forces at work that make the existence of intact historic properties unlikely. The proposed project's proposed disposal areas are underlain by several hundred ft of alluvial material which is slowly compressing and causing surface sediments to subside. Large land areas develop and disappear over several centuries. The current proposal would add approximately 24,000 acres of new disposal areas to the approximately 143,207 acres of existing and previously cleared disposal areas in the vicinity of the lower Mississippi River.

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: There would be no direct impacts. Indirect impacts at Channel Crossings are unknown but could involve unknown steps taken by private shipping interests to allow deeper draft shipping to navigate the Mississippi River. Indirect impacts of no action would



involve increased land loss and potential impacts to existing unknown cultural resources by lack of effort to provide sediments to prevent subsidence and erosion.

2.3.7 Aesthetics and Visual Resources

Historic and Existing Conditions

The project area is large and water resources are abundant. Water resources include a large stretch of the Mississippi River and associated tributaries and passes located at the river delta going out into the Gulf of Mexico. There are a plethora of bays and other similar water bodies as well. There are no scenic streams, either state or federally recognized, anywhere near the vicinity of the disposal areas.

There are two wildlife management areas in the vicinity of the disposal areas. These include Delta National Wildlife Refuge and Pass a Loutre Preserve Wildlife Management Area. There are other recreational, public and institutionally significant lands along the Mississippi River corridor but those will be removed from any potential work associated with this project.

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: Under the no action alternative, there would no direct impacts to visual resources within the study area. Visual resources would most likely evolve from existing conditions in a natural process, or change as dictated by future land use maintenance practices and policies.

Any future changes or alterations to the study area would evolve in a natural process over the course of time, or by local land use patterns and maintenance practices. These incremental direct and indirect impacts would be in addition to the direct and indirect impacts of visual resources in the region, Louisiana and the Nation.

2.3.8 Noise

Historic and Existing Conditions

Generally, noise is a localized phenomenon throughout the study area. There are many different noise sources throughout the area including commercial and recreational boats, and other recreational vehicles; automobiles and trucks, and all-terrain vehicles; aircraft; machinery and motors; and industry-related noise. Noise levels vary depending on the time of day and climatic conditions. Automobile, navigation traffic, train traffic, all-terrain vehicle traffic, industry and to a lesser extent air traffic, contribute to the background noise levels.



Pass a Loutre WMAs and the Delta National Wildlife Refuge are located in the vicinity of the lower river and existing disposal areas. These public lands are sensitive noise receptors where serenity and quiet are an important public resource. Residential homes, apartments, schools, churches, and businesses are also in proximity. Noise levels around the project area are variable depending on the time of day and climatic conditions. Near developed areas, automobile and train traffic, and to a lesser extent air traffic, contribute to the background noise levels.

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct impacts under the no action alternative. Localized and temporary noise impacts would likely continue to affect animals and the relatively few people in the remote coastal wetland areas. Potential noise impacts concerns may be expected for those workers at oil and gas extraction sites, recreationists, and construction activities. Additional noise impacts would be associated with the villages, towns, and clusters of human habitations. Institutional recognition of noise, such as provided by the regulations for Occupational Noise Exposure (29 CFR Part 1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue.

It is anticipated that, in some instances, noise impacts may be an important issue for their potential effects on wildlife, such as disruption of normal breeding patterns and abandonment of nesting colonies. However, tolerance of unnatural disturbance varies among wildlife. Therefore, these issues shall be addressed by identifying the key species of concern and following feasible administrative and or engineering controls, determining and implementing appropriate buffer zones, and implementing construction “activity windows” (i.e., project construction initiation and completion dates to minimize disturbance to nesting birds).

Terrestrial wildlife generally will not be impacted, as construction activities will occur mainly over open water. There is the potential for noise or wave action generated by construction activities to displace terrestrial wildlife in the area; however, this would be a temporary disturbance, with wildlife likely to return following the completion of disposal activities. Migratory waterfowl and other avian species, if present, would likely be only temporarily displaced from the project area. Overall populations would not likely be adversely affected because these species would move to existing adjacent habitat areas during construction activities.

2.3.9 Recreation Resources

Historic and Existing Conditions

Primary recreational activities in the Study Area have been consumptive in nature, including fishing and hunting. Saltwater recreational activities have revolved primarily around saltwater



fishing and to a lesser degree recreational shrimping and crabbing. Freshwater-based recreational opportunities have primarily been waterfowl hunting and freshwater fishing.

All proposed disposal areas presented in this Supplemental Report are within the active delta of the Mississippi River. Boating and fishing (fresh and saltwater) occur within all proposed disposal areas. The study area contains two state- and federally-managed parks typically used for active and consumptive recreational activities (Table 2-10). The value the public places on recreational resources in the study area, such as boating, fishing, and hunting, can be directly measured by the large number of fishing and hunting licenses sold in the study area, and the large number of recreational boat registrations per capita (Table 2-11). Numerous water bodies in the study area provide boating and fishing opportunities.

Pass a Loutre Wildlife Management Area (WMA): The Pass a Loutre WMA, owned by the Louisiana Department of Wildlife and Fisheries is located in southern Plaquemines Parish, Louisiana, at the mouth of the Mississippi River approximately 10 miles south of Venice and is accessible only by boat. Approximately 115,000 acres in size, this WMA is characterized by river channels, channel banks, bayous, man-made canals, and intermediate and freshwater marshes. Hurricane damage and subsidence have formed large ponds within the marsh complex. Waterfowl and other migratory game bird hunting, rabbit hunting, and archery hunting for deer as well as recreational fishing are permitted on the Pass a Loutre WMA. (LDWF 2014). Several camps, five campgrounds and Port Eads Marina are located in the WMA

Approximately 64,000 acres of existing disposal site area is located within the Pass a Loutre WMA. The nearest public boat launches are in Venice. Consumptive recreation uses include hunting for waterfowl, birds, rabbits, and deer; trapping for surplus furbearing animals and alligators; fishing for freshwater and salt water species; and crabbing. Other recreational activities include boating, picnicking, nature study, bird watching, and camping. The WMA has 5 designated tent-camping areas, Port Eads Marina and 3 areas have been designated to allow the mooring of recreational houseboats.

Table 2-10 Recreational Features within the Study Area

Recreation al Area	Location	Land Management Agency	Size (acres)	Key Recreational Features
Delta NWR	Plaquemines Parish, LA	USFWS	49,000	<ul style="list-style-type: none">• Boat access only• Hunting and fishing
Pass-a- Loutre WMA	Plaquemines Parish, LA	LDWF	115,000	<ul style="list-style-type: none">• Boat access only• Hunting and fishing



Delta National Wildlife Refuge (NWR): The Delta NWR established in 1935 and located on the east side of the Mississippi River in Plaquemines Parish 10 miles south of Venice, Louisiana, is under the jurisdiction of the U.S. Fish and Wildlife Service and is contiguous with the Pass-a-Loutre WMA. The Delta NWR serves as a breeding ground for migratory birds and other wildlife, and as a migratory waterfowl refuge. The refuge lands are accessible only by boat. Despite this limitation, the area has a long record of public use. The majority of this public use has been in the form of consumptive uses such as hunting and fishing (fresh and saltwater). Other public use includes wildlife observation, bird watching, boating, canoeing and kayaking, and photography. Camping is not allowed on the refuge. About 8,534 acres of existing disposal site area is located within the Delta.



2-11 Boater Registrations, Fishing/Hunting License in the Study Area

Parish or County	Fishing License				Hunting License		Boater Registrations
	Resident Freshwater	Resident Saltwater	Non Resident Fresh water	Non Resident Saltwater	Resident	Non Resident	
Jefferson	40,145	38,650	1,151	1,237	14,244	60	18,627
Lafourche	19,656	18,605	290	298	8,742	25	11,878
Orleans	17,145	16,014	637	638	5,899	49	4,171
Plaquemines	4,605	4,488	228	231	2,304	31	4,649
St. Charles	8,230	7,796	83	82	3,725	11	4,343
East Baton Rouge	35,334	27,562	640	593	19,648	77	16,145
Iberville	4,967	3,453	78	52	3,445	8	3,320
Ascension	17,830	14,939	239	215	9,142	30	8,530
St. James	3,852	3,405	36	29	2,221	5	2,135
St. John the Baptist	5,291	4,926	92	92	2,443	4	2,269
Total	157,055	139,838	3,474	3,467	71,813	300	76,067

Source: LDWF 2015

Future without Project Conditions (No Action / Alternative 1)

Direct and Indirect Impacts: Without implementation of the proposed action, the conditions within the recreational environment would continue as they have in the past and would be dictated by the natural land use patterns and processes. Direct impacts to recreation from dredging of the Mississippi River will be minimal and relate mostly to those impacts related to the dredge material placement in open water and marshes. During dredging of the river, bank fishing opportunities may diminish but this affect will be temporary. Indirect impacts would include the continued loss of wetlands/marshes and habitat diversity that affects recreational opportunities. Storm surge and saltwater could have a negative impact on freshwater forests and habitats and could reduce recreational resources (e.g., fishing, hunting, bird watching, and other). In general, further degradation of area marshes will continue and its associated negative impacts including lower quality fishery spawning, nursery, and foraging habitat would likely translate to a decline in recreational fishing, shrimping, and crabbing catch rates in the future. As existing freshwater wetland/marsh areas convert to saltwater marsh, then to open water, the recreational opportunities will change accordingly. For example, fresh water fishing opportunities may be expected to become saltwater opportunities. If the expected peak and then decline of fishery production occurs



in these open waters, then the associated marine-fishery recreational opportunities will also decline. As populations of migratory birds and other animals dependent on marsh and swamp decrease, associated recreational opportunities, such as hunting and wildlife viewing, will decrease.

2.3.10 Vegetation Resources

Historic and Existing Conditions

Vegetation varies considerably between the 254 River Mile corridor between Baton Rouge, Louisiana and that of the lower delta. Plant assemblages in the study area provide primary productivity and structural stability to terrestrial (supratidal) and aquatic (inter- and subtidal) substrates thereby creating diverse habitats for a variety of estuarine and coastal fauna (Hester et al. 2005). Plants that tolerate salty Gulf waters form a narrow band along the study area coast line. Inland of this salt marsh are the brackish water species which grade inland into freshwater species (Chabreck 1998).

Based on monitoring of salinity and beneficial use placement site vegetation, it is estimated that over 95% of the study area marshes classify as intermediate marsh, with the remaining areas classifying as fresh marsh (mostly occurring around the Coastal Wetland Planning Protection and Restoration Act (CWPPRA) West Bay Sediment Diversion). Penfound and Hathaway (1938) conducted what many consider the seminal research in describing the plant communities of southeastern Louisiana; their findings are still applicable today. Vegetation zonal communities or plant associations in coastal Louisiana are determined by four major factors: elevation, salinity of soil water and surface water, water level with respect to soil surface including soil water content, and soil organic matter. Vegetation resources in the study area include five main wetland types: fresh, intermediate, brackish, and saline marsh; and swamp forest. These wetlands are distributed not only within the study area, but also within the entire coastal Louisiana area, based on the salinity tolerance of the various plant species (Table 2-12, Chabreck 1988).

Table 2-12 Salinity ranges for the four coastal wetland types

Wetland Type	Range (ppt)	Mean (ppt)	Typical Range (ppt)
Fresh	0.1 – 6.7	<3.0	0 – 3
Intermediate	0.4 – 9.9	3.3	2 – 5
Brackish	0.4 – 28.1	8.0	4 – 15
Saline	0.6 – 51.9	16.0	12 +

(Source: Chabreck, 1972; Louisiana Coastal Wetlands Conservation and Restoration Task Force; and the Wetlands Conservation and Restoration Authority 1998) ppt – parts per thousand



More recently Dahl and Stedman (2013) indicate that saltwater inundation of freshwater wetlands along the coast of Louisiana has resulted in the continued conversion of freshwater wetlands into saltwater wetlands. Sasser et al. (2014) indicate the approximate size of wetland areas in Louisiana's coastal zone: 956,617 acres of fresh marsh, 940,592 acres of intermediate marsh, 997,437 acres of brackish marsh, 729,942 acres of saline marsh, and 464,805 acres of swamp.

Batture Vegetation

The batture community is a pioneer community which is first to appear on newly formed sand bars and river margins. The area receives sands and silts with each flood and the soils are semi-permanently inundated or saturated. Soil inundation or saturation by surface water or groundwater occurs periodically for a major portion of the growing season, and such conditions typically prevail during spring and summer months with a frequency ranging from 51 to 100 years per 100 years. The total duration of time for the seasonal event(s) normally exceeds 25 % of the growing season (LNHP 2009).

Tidal Intermediate, Brackish, and Salt Marshes

Tidal salt marsh vegetation zonation is strongly influenced by small differences in elevation above the mean high water level. The intertidal zone or low marsh next to the estuary, bay, or tidal creek is dominated by the tall form of smooth cordgrass (*Spartina alterniflora*). In the high marsh, smooth cordgrass gives way to stands of saltmeadow cordgrass (*Spartina patens*) (saltmeadow cordgrass; dominant species in the northern Gulf Coast) mixed with saltgrass (*Distichlis spicata*) and occasional patches of the shrub marsh elder (*Iva frutescens*) and other shrubs. Beyond the saltmeadow cordgrass zone and at normal high tide, black rush (*Juncus roemerianus*) forms pure stands (Mitsch et al. 2009).

Submerged Aquatic Vegetation (SAV)

Fresh and intermediate marshes often support diverse communities of submerged aquatic plants that provide important food and cover to a wide variety of fish and wildlife species. Fresh and intermediate marshes often support more diverse communities of submerged aquatic vegetation (SAV) than brackish marshes. However, in lower salinity marshes, widgeon-grass provides important food and cover for many species of fish and wildlife. Saline marshes typically do not contain an abundance of SAVs. Submerged aquatic vegetation (SAV) persists in shallower, protected areas of the disposal area. It is estimated that less than 10 % of the open water portions of disposal area contains SAV's.

Invasive Plant Species



Invasive plants play a large part in the loss of wetland and coastal habitats. These plants have been introduced into the local environment either purposefully or accidentally. Invasive aquatic plant species often increase and spread rapidly because the new habitat into which they are introduced is often free of insects and diseases that are natural controls in their native habitats (USGS 2000).

The following species are classified in coastal Louisiana as Extensively Established Species (Tulane and Xavier 2013: Wild Taro (*Colocasia esculenta*), Brazilian Waterweed (*Egeria densa*), Water Hyacinth (*Eichhornia crassipes*), Hydrilla (*Hydrilla verticillata*), Parrot Feather (*Myriophyllum aquaticum*), Eurasian Watermilfoil (*Myriophyllum spicatum*), Water Lettuce (*Pistia stratiotes*), Common Salvinia (*Salvinia minima*), and Chinese Tallow (*Sapium sebiferum*). Locally Established Species are: Giant Salvinia (*Salvinia molesta*), and Cogongrass (*Imperata cylindrica*) (Tulane and Xavier 2013).

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: There would be no direct impacts to the project area except for the placement of beneficial use of dredge material in the lower river delta during ongoing river maintenance (under the no action alternative). It is estimated that annual O&M dredging of the project area could establish approximately 528 acres of intermediate marsh annually on average. Existing conditions and trajectories of ecological change to area vegetation would persist. Undeveloped vegetated lands, including wetlands, would continue to be lost to subsidence and erosion. Emergent and upland habitats and associated sub-canopy species would continue to be subjected to saltwater intrusion and subsidence. These areas would convert to marsh and eventually open water (USACE 2010a and 2010b).

Much of the lower study area could be permanently inundated under the intermediate and high RSLR scenarios further speeding conversion of existing habitats. The area would continue to be subjected to increases in RSLR which could increase the geographic extent of saltwater intrusion, potentially convert vast areas of existing forested wetlands and swamp habitats to marsh and eventually open water. There could also be a shift from fresh water dominant species to species that can tolerate higher salinity.

2.3.11 Air Quality

Historic and Existing Conditions

The U.S. Environmental Protection Agency (USEPA) Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, called “criteria” pollutants. They are carbon monoxide, nitrogen dioxide, ozone, lead, particulates of 10 microns or less in size (PM-10 and PM-2.5), and sulfur dioxide. Ozone is the only parameter not directly emitted into the air but forms in the atmosphere when three atoms of oxygen (O₃) are



combined by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of NO_x and VOC, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air. The Clean Air Act General Conformity Rule (58 FR 63214, November 30, 1993, Final Rule, Determining Conformity of General Federal Actions to State or Federal Implementation Plans) dictates that a conformity review be performed when a Federal action generates air pollutants in a region that has been designated a non-attainment or maintenance area for one or more NAAQS. A conformity assessment would require quantifying the direct and indirect emissions of criteria pollutants caused by the Federal action to determine whether the proposed action conforms to Clean Air Act requirements and any State Implementation Plan (SIP).

The general conformity rule was designed to ensure that Federal actions do not impede local efforts to control air pollution. It is called a conformity rule because Federal agencies are required to demonstrate that their actions “conform with” (i.e., do not undermine) the approved SIP for their geographic area. The purpose of conformity is to (1) ensure Federal activities do not interfere with the air quality budgets in the SIPs; (2) ensure actions do not cause or contribute to new violations, and (3) ensure attainment and maintenance of the NAAQS.

St. James Parish, St. Charles, and Plaquemines Parishes are currently in attainment of all National Ambient Air Quality Standards, and operating under attainment status. This classification is the result of area-wide air quality modeling studies.

East Baton Rouge, West Baton Rouge, Iberville, and Ascension Parishes are four of the five Baton Rouge area parishes that were designated by the Environmental Protection Agency as ozone non-attainment areas under the 8-hour standard effective June 15, 2004. Currently none of the five parishes are in attainment of NAAQS. The five parish area has been classified as marginal, which is the least severe classification. This classification is the result of area-wide air quality modeling studies, and the information is readily available from Louisiana Department of Environmental Quality, Office of Environmental Assessment and Environmental Services.

Federal activities proposed in East Baton Rouge, West Baton Rouge, Iberville, and Ascension Parishes may be subject to the State’s general conformity regulations as promulgated under LAC 33:III.14.A, Determining Conformity of General Federal Actions to State or Federal Implementation Plans. A general conformity applicability determination is made by estimating the total of direct and indirect volatile organic compound (VOC) and nitrogen oxide (NO_x) emissions caused by the construction of the project. Prescribed de minimis levels of 100 tons per year per pollutant are applicable in the four parishes. Projects that would result in discharges below the de minimis level are exempt from further consultation and development of mitigation plans for reducing emissions.



Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct impacts under the no action alternative. Without implementation of the proposed project the status of attainment of air quality for East Baton Rouge, West Baton Rouge, Iberville, and Ascension Parishes would not change from current conditions, and there would be no direct, indirect, or cumulative impacts.

2.4 Natural Environment

2.4.1 Soils and Water Bottoms

Historic and Existing Conditions

The project study area consists of a winding river corridor of 254 river miles between Baton Rouge, Louisiana and the Gulf of Mexico via Southwest Pass. Approximately 35% of this corridor requires at least some maintenance dredging to maintain the current channel dimensions. Specifically 28 miles from Venice, LA, to the Gulf of Mexico are dredged at less than an annual occurrence, and 61 combined miles of 14 deep draft crossings between Baton Rouge, LA, and New Orleans, LA, require some level of maintenance dredging. On an average annual basis, a combined 3.7 miles between Venice, LA, and the Gulf of Mexico (via Southwest Pass) are maintained. Since 1986, Crossings have required an average of 16,403,283 cubic yards of dredging. By comparison, since 1986 Southwest Pass has required 15,091,427 cubic yards of dredging. Dredged material from the Mississippi River would be placed in approximately 167,318-acres of new and existing disposal areas in the Mississippi River Delta for the purpose of creating coastal habitat such as emergent and high marsh, bird islands, and deltaic ridges.

There are three soil types identified in the proposed disposal areas and include Aquents, Balize and Larose, and Carver/Cancienne/Schriever soils. Aquents are poorly to very poorly drained soils typically formed by human transport such as dredging or on excavated landscapes. Approximately 37% of the soils in the proposed disposal areas is Aquent likely resulting from previous dredging and disposal activities occurring in the vicinity. Balize and Larose soils are very poorly drained and frequently flooded soils that are commonly associated with marsh landforms. Balize soils are typically associated with a parent material originating from fluid loamy backswamp deposits of silt loam and silty clay loam. Larose soils form from the decay of thin herbaceous organic material over fluid clayey alluvium, developing into muck and mucky clay. Carville, Cancienne, and Schriever soils are somewhat poorly to poorly drained and associated with natural levees, depressions, and backswamps. Profiles typically consist of silt loam, fine sandy loam, and silty clay. None of these soils are identified as prime and/or unique farmlands. More detailed information and descriptions of the soil types is provided in Table 2-13.



Table 2-13 Soil types and descriptions in the proposed disposal areas

Soil Symbol	Soil Type and Description	Approximate Acres in Disposal Areas	Percentage in Disposal Areas
AT	Aquents, dredged, frequently flooded, poorly to very poorly drained	14,789	37%
BA	Balize and Larose soils, frequently flooded, very poorly drained	22,661	57%
CV	Carville, Cancienne, and Schriever soils, somewhat poorly to poorly drained	2,426	6%
Total		39,876	100%

Water Bottoms

Water bottoms in the study area (Table 2-14) include large shallow estuaries of the Mississippi River Delta and the deep-draft navigation channel of the Mississippi River from Baton Rouge to the Gulf of Mexico. Many water bottoms in the study area are a result of degraded and collapsing marshes or transgressing and subsiding barrier islands, and areas that were previously wetlands or upland ridges are now subsided below the water surface. The sediments of most of the water bottoms in the study area are composed of fine grain material with a high organic content and a low sand content. Organic content in the soils increases in areas that were formerly coastal marsh and swamp and now form shallow water bottoms.

Table 2-14 Area of water bottoms in the study area

Water Bottom	Approximate Acres
Mississippi River Delta	123,923
Mississippi River	68,033
Total acres	191,956

Future without Project Conditions (No Action / Alternative 1)

Without the proposed action, operation and maintenance of the 45-foot Mississippi River deep-draft navigation channel from Baton Rouge to the Gulf of Mexico would continue as it has in the



past. Direct and indirect impacts to soils and water bottoms in the Mississippi River and the Mississippi River Delta would remain the same under current operation and maintenance dredging of the river and placement of dredged material. Dredging in the Mississippi River would continue at current levels, resulting in direct impacts to approximately 2,500-acres of water bottoms. The placement of dredged material into existing disposal areas in the Mississippi River Delta would continue, resulting in direct impacts to approximately 38,000-acres of soils and 100,000-acres of shallow open water bottoms. Annual O&M dredging of the project area would continue at an average 35,318,498 cy per year and would establish approximately 528 acres of intermediate marsh annually.

Soil erosion and land loss in the Mississippi River Delta would continue into the future. Natural and man-made levees would continue to subside and organic soils would not be able to maintain their elevations due to subsidence, decreased plant productivity, changes in existing land cover, and wave erosion. Soils in the study area would continue to degrade and be converted to open shallow water bottoms. Deltaic formation processes would continue at the mouth of the Mississippi River. Many water bottoms in the study area are a result of degraded and collapsing marshes, and areas that were previously wetlands or upland ridges are now subsided below the water surface. In the future without project conditions, organic content in the soils would continue to increase in areas that were formerly coastal marsh and swamp, and these areas would continue to be converted to shallow water bottoms. Water bodies would grow larger increasing the acreage of water bottoms in the study disposal areas. Wave erosion would accelerate causing further land loss, thus making coastal communities more vulnerable to tropical storms.

2.4.2 Wildlife

Historic and Existing Conditions

Important wildlife species utilizing coastal wetlands in Louisiana (Nyman et al. 2013) include: American alligator (*Alligator mississippiensis*), nutria (*Myocastor coypus*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), waterfowl (Anser spp., Anas spp., Aythya spp., Mergus spp., etc.), woodcock (*Scolopax minor*), river otter *Lutra Canadensis*), white-tailed deer (*Odocoileus virginianus*), mink (*Mustela vison*), rabbit (*Sivilagus spp.*), squirrel (*Sciurus spp.*), and snapping turtle (*Macrocllemys temmincki*) (Nyman et al. 2013).

The project area is also home to federally and state managed wildlife areas (Figure 2-19). Pass-a-Loutre Wildlife Management Area is located in southern Plaquemines Parish at the mouth of the Mississippi River. This area is owned by the Louisiana Department of Wildlife and Fisheries and encompasses some 115,000 acres. The area is characterized by river channels with attendant channel banks, natural bayous, and man-made canals which are interspersed with intermediate and fresh marshes. Hurricane damage and subsidence have contributed to a major demise of vegetated



marsh areas resulting in formation of large ponds. Habitat development is primarily directed toward diverting sediment-laden waters into open bay systems (i.e., creating delta crevasses), which promotes delta growth.

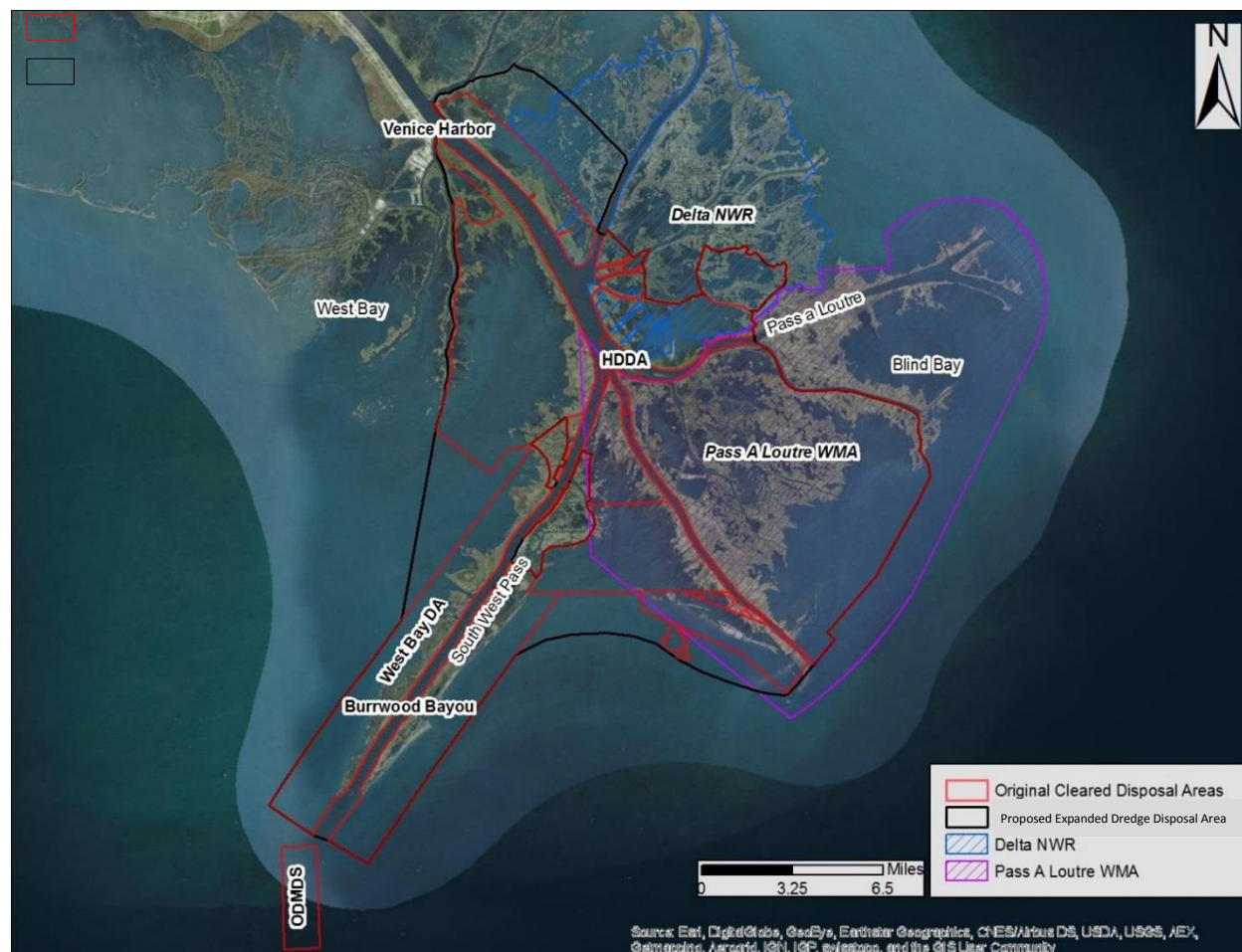


Figure 2-19 Location of Delta NWR and Pass A Loutre WMA in relation to beneficial use disposal activities in the lower river

Delta National Wildlife Refuge was established in 1935. Its 49,000 acres were formed by the deposition of sediment carried by the Mississippi River. This area combines the warmth of the Gulf and the wealth of the river. Its lush vegetation is the food source for a multitude of fish, waterfowl and animals. Delta is the winter home for hundreds of thousands of snow geese, coots and ducks.

Invasive Wildlife

Invasive animals have been recognized as playing a large part in the loss of wetland and coastal habitats (USGS 2015c). Nutria and feral swine are the only mammals identified as invasive in



Louisiana. Although nutria are not distributed throughout all of Louisiana, their numbers and environmental impact in coastal Louisiana are so great that they warrant consideration as extensively established and extremely problematic. Feral hogs are established sporadically throughout the state. The problems caused by feral hogs in Louisiana, however, are dwarfed by those caused by nutria. Feral hogs also provide some social and economic benefit for local hunters and trappers, whereas nutria no longer offer any benefit to Louisiana residents (Tulane and Xavier 2005).

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct or indirect impacts under the no action alternative. Existing conditions and trajectories of ecological change to wildlife in the area would persist. Continued human encroachment and development would result in loss of existing wildlife wetland habitats. The area would be subjected to increases in RSLR which could increase saltwater intrusion and exacerbate ongoing conversion of existing forested wetland and swamp habitats to marsh and open water (USACE 2010a, USACE 2010b). Migratory neotropical avian species currently utilize the area as stopover habitat. As forested wetlands and emergent wetland habitats are lost, there would be a corresponding reduction in overall species diversity and abundance. Most mammal, amphibian and reptile species would be required to relocate to more suitable swamp habitats. There could be an increase in the population and distribution of nutria due to the conversion of swamp into open water and marsh which are the preferred habitats by nutria.

2.4.3 Aquatic and Fisheries Resources

Historic and Existing Conditions:

Mississippi River

The Mississippi River plays an important role in the distribution of fishes across the state because it provides suitable habitat for many species and it also divides the state into ecologically different areas (Douglas 1974). Douglas (1974) is one of the first most comprehensive studies on the diversity of freshwater fishes in Louisiana with at least 148 freshwater species in Louisiana's waters. Douglas (1974) attributes the large number of species to the diverse freshwater habitats found in Louisiana (from placid bayous and oxbows of the eastern Mississippi River floodplain to the swift flowing streams of the north, central, and western parishes).

La Roe et al. (1985) study of fish species within the Mississippi River found the river supports one of the most diverse fisheries in the world with at least 183 species of freshwater fish in the Mississippi River Delta. There are three species of mussels, and 13 species of crawfish found within the Mississippi Basin in Louisiana. Minnow, darter, perch, sturgeon, and paddlefish species



are the most common fish species in the river (NPS 2014b). Native fish stocks have been declining in number; approximately 6 % of the native fish species in the Delta are found on the endangered, threatened, or special concern lists of the U.S. Fish and Wildlife Service (NPS 2014b).

Delta Fishery Resources

Brackish and saltwater species include spotted seatrout, red drum, flounder, sheepshead, pinfish, and croaker. Shellfish in the study area include blue crab, white shrimp, brown shrimp, Gulf stone crab, grass shrimp, mysid shrimp, and mud crab (O'Connell et al. 2005). Commercially and recreationally important species include blue crab, white and brown shrimp, American oyster, and the gulf stone crab (NMFS 2012).

Three species of crustaceans — brown shrimp, white shrimp, and blue crab — are of major commercial and recreational importance in the coastal waters of Louisiana (Caffey and Schexnayder 2002). Each of these species follows a circular migration, which encompasses a broad range of estuarine salinities. Because commercial harvesting targets the late juvenile and adult stages, productivity is often incorrectly equated with higher salinities. Although higher salinities tend to favor harvestability, Caffey and Schexnayder (2002) indicate they are not directly linked to absolute productivity.

The project area is not considered productive oyster habitat. There is currently one oyster lease that overlaps the far western boundary of the existing western disposal area along Southwest Pass (<http://gis.wlf.la.gov/oystermapping/map.html>). This lease would not be impacted by the project.

O'Connell et al. (2005) identify the most common commercially and recreationally important aquatic species found in coastal Louisiana that are estuarine dependent (see Table 2-15).

Table 2-15 Common commercially and recreationally important aquatic species found in coastal Louisiana that are estuarine dependent (from O'Connell et al. 2005)

Group Common Name (Scientific Name)	Commercial Significance	Description of Estuarine Dependence
Invertebrates		
brown shrimp (<i>Farfantepenaeus aztecus</i>)	Most productive shrimp fishery species in Gulf of Mexico; LA leads Gulf states	Postlarvae and juveniles require inshore nursery habitats, preferably with vegetation
white shrimp (<i>Litopenaeus setiferus</i>)	Second most productive shrimp fishery species in	Postlarvae and juveniles require inshore nursery habitats, preferably with vegetation



Group Common Name (Scientific Name)	Commercial Significance	Description of Estuarine Dependence
	Gulf of Mexico; LA leads Gulf states	
blue crab (<i>Callinectes sapidus</i>)	Most productive commercial crab species in US; LA leads US in landings (31 % of US total)	Juveniles require inshore nursery habits, adults spawn in estuaries
pink shrimp (<i>Fafante duorarum</i>)	Third most productive shrimp fishery species in Gulf of Mexico; LA leads Gulf states	Postlarvae require inshore nursery habitats, preferably with vegetation
Vertebrates		
Gulf menhaden (<i>Brevoortia patronus</i>)	Most productive finfish fishery in US (all menhaden species); LA leads Gulf States	Larvae and juveniles use inshore nursery habitats
Atlantic croaker (<i>Micropogonias undulatus</i>)	Only US finfish in top 10 most abundant species both commercially and recreationally	Larvae and juveniles use inshore nursery habitats
spotted seatrout (<i>Cynoscion nebulosus</i>)	Most popular recreational food fish in LA	Larvae and juveniles use inshore nursery habitats; adults spawn in deep passes
spot (<i>Leiostomus xanthurus</i>)	Fourth most numerous finfish collected in long term fishery-independent sampling	Larvae and juveniles use inshore nursery habitats
red drum (<i>Sciaenops ocellatus</i>)	Species has widespread recreational and culinary interest within LA	Juveniles and adults use shallow barrier island habitats



Group Common Name (Scientific Name)	Commercial Significance	Description of Estuarine Dependence
striped mullet (<i>Mugil cephalus</i>)	Small Louisiana commercial fishery; importation prey species	Juveniles use inshore nursery habitats
sand seatrout (<i>Cynosican arenarius</i>)	Valuable recreational fishery species	Juveniles use inshore nursery habitats
black drum (<i>Pogonias cromis</i>)	Valuable commercial and recreational species throughout Gulf of Mexico	Juveniles use inshore nursery habitats (though tolerant to wide salinity range)
sheepshead (<i>Achosargus probatocephalus</i>)	Valuable recreational fishery species	Adults feed in bay and estuaries
southern flounder (<i>Paralichthys lethostigma</i>)	Valuable commercial and recreational species throughout Gulf of Mexico	Juveniles use estuaries, brackish water, and freshwater creeks

Invasive Aquatic and Fisheries Species

The State Management Plan for Aquatic Invasive Species in Louisiana (2005) identifies several established finfish and mollusks within the state (Tulane and Xavier 2005). The management plan focuses not on all invasive species in Louisiana, but on those inhabiting aquatic environments and those spread via aquatic pathways. Established finfish include Rio Grande cichlid (*Cichlasoma cyanoguttatum*), common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), silver carp (*Hypophthalmichthys molitrix*), and bighead carp (*Hypophthalmichthys nobilis*). The network of interconnected waterways within the state makes it easy for fish to relocate, constantly changing their ranges. Two mollusks are known as invasive in Louisiana, the zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*). These species are predominantly freshwater mollusks, and, in general, are confined to river drainages. Zebra mussels and Asian clams are established in the three largest rivers in Louisiana (Mississippi, Red, and Atchafalaya) and, therefore, are considered extensively established. (Tulane and Xavier 2005).

Federally Managed Essential Fish Habitat



Submerged aquatic vegetation (SAV) persists in shallower, protected areas of the disposal areas. It is estimated that less than 10 % of the open water disposal areas contain SAV's. In 1996 Congress amended the Magnuson-Stevens Fishery Conservation and Management Act with the Sustainable Fisheries Act (SFA). Through the SFA, and its "essential fish habitat" (EFH) provisions, Congress sought to increase the attention fisheries managers and other federal coastal zone stakeholders pay to habitat (Fletcher and Shea 2000). Congress defined EFH as *those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity* (16 U.S.C. 1802(10)). Specific categories of EFH in the basin include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (sea grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). Louisiana has historically been an important contributor to the Nation's domestic fish and shellfish production, and one of the primary contributors to the Nation's food supply for protein (NMFS 2014b).

The following federally-managed species utilize EFH in some areas of the study area: brown shrimp (*Penaeus aztecus*), white shrimp (*Penaeus setiferus*), red drum (*Sciaenops ocellatus*), lane snapper (*Lutjanus synagris*), dog snapper (*Lutjanus jocu*), blacktip shark (*Carcharhinus limbatus*), bonnethead shark (*Sphyrna tiburo*), Atlantic sharpnose shark (*Rhizoprionodon terraenovae*), and blacknose shark (*Carcharhinus acronotus*). Each of these species, their life stages, the aquatic systems where they may be found, and EFH are described in detail in Table 2-17. Other economically important marine fishery species in the study area (according to the April 25, 2012 NMFS scoping letter): striped mullet (*Mugil cephalus*), Atlantic croaker (*Micropogonias undulatus*), Gulf menhaden (*Brevoortia patronus*), spotted and sand seatrout (*Cynoscion nebulosus* and *Cynoscion arenarius*, respectively), southern flounder (*Paralichthys lethostigma*), black drum (*Pogonias cromis*), and blue crab (*Callinectes sapidus*). Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the Gulf of Mexico Fishery Management Council (GMFMC) (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Text Descriptions and GIS Data Inventory website provides spatial representations of aquatic species, their life stages, and important habitats that, for certain species, span the entire northern portion of the Gulf of Mexico (NMFS 2014a). GIS data were downloaded to determine NMFS designated EFH areas and (their associated species) that overlay the study area. These designated EFH areas and the species associated with these areas are provided in Table 2-16 below (NMFS 2014a).

Table 2-16 NMFS designated EFH areas for various species in the study area

NMFS Designated EFH Area	Species
Coastal Migratory Pelagics of the Gulf of Mexico and South Atlantic	cobia (<i>Rachycentron canadum</i>)
	king mackerel (<i>Scomberomorus cavalla</i>)
	Spanish mackerel (<i>Scomberomorus maculatus</i>)



NMFS Designated EFH Area	Species
Coral and Coral Reefs of the Gulf of Mexico	black corals (Order Antipatharia)
	fire corals (Order Milleporina)
	hydrocorals (Order Stylasterina)
	stony corals (Order Scleractinia)
Gulf of Mexico Red Drum	red drum (<i>Sciaenops ocellatus</i>)
Gulf of Mexico Shrimp	brown shrimp (<i>Penaeus aztecus</i>)
	pink shrimp (<i>Penaeus duorarum</i>)
	rock shrimp (<i>Sicyonia brevirostris</i>)
	royal red shrimp (<i>Pleoticus robustus</i>)
	seabob shrimp (<i>Xiphopenaeus kroyeri</i>)
	white shrimp (<i>Penaeus setiferus</i>)
Reef Fish Resources of the Gulf of Mexico	almaco jack (<i>Seriola rivoliana</i>)
	banded rudderfish (<i>Seriola zonata</i>)
	blackfin snapper (<i>Lutjanus buccanella</i>)
	black grouper (<i>Mycteroperca bonaci</i>)
	blueline tilefish (<i>Caulolatilus microps</i>)
	Cubera snapper (<i>Lutjanus cyanopterus</i>)
	gag (<i>Mycteroperca microlepis</i>)
	goldface tilefish (<i>Caulolatilus chrysops</i>)
	gray (mangrove) snapper (<i>Lutjanus griseus</i>)
	gray triggerfish (<i>Balistes capriscus</i>)
	greater amberjack (<i>Seriola dumerili</i>)
	hogfish (<i>Lachnolaimus maximus</i>)
	lane snapper (<i>Lutjanus synagris</i>)
	lesser amberjack (<i>Seriola fasciata</i>)
	mutton snapper (<i>Lutjanus analis</i>)
	Nassau grouper (<i>Epinephelus striatus</i>)
	queen snapper (<i>Etelis oculatus</i>)
	red grouper (<i>Epinephelus morio</i>)
	red snapper (<i>Lutjanus campechanus</i>)
	scamp (<i>Mycteroperca phenax</i>)
	silk snapper (<i>Lutjanus vivanus</i>)
	snowy grouper (<i>Epinephelus niveatus</i>)
	speckled hind (<i>Epinephelus drummondhayi</i>)
	tilefish (<i>Lopholatilus chamaeleonticeps</i>)
	Vermillion snapper (<i>Rhomboplites aurorubens</i>)



NMFS Designated EFH Area	Species
	Warsaw grouper (<i>Epinephelus nigritus</i>)
	wenchman (<i>Pristipomoides aquilonaris</i>)
	yellowedge grouper (<i>Epinephelus flavolimbatus</i>)
	yellowfin grouper (<i>Mycteroperca venenosa</i>)
	yellowmouth grouper (<i>Mycteroperca interstitialis</i>)
South Atlantic Snapper-Grouper and Reef Fish Resources of the Gulf of Mexico	goliath grouper (<i>Epinephelus itajara</i>)
	yellowtail snapper (<i>Ocyurus chrysurus</i>)

The tables below provide supplemental info on Highly Migratory Species with EFH in the study area that are species managed by the NMFS (Tables 2-17 through 2-18).

Table 2-17 Highly Migratory Species with EFH in the study area (species managed by NMFS,

Species Common Name	Species Scientific Name
Atlantic sharpnose shark	<i>Rhizoprionodon terraenovae</i>
Atlantic yellowfin tuna	<i>Thunnus albacres</i>
bignose shark	<i>Carcharhinus altimus</i>
blacknose shark	<i>Carcharhinus acronotus</i>
blacktip shark	<i>Carcharhinus limbatus</i>
bonnethead Shark	<i>Sphyrna tiburo</i>
bull shark	<i>Carcharhinus leucas</i>
dusky shark	<i>Carcharhinus obscurus</i>
finetooth shark	<i>Carcharhinus isodon</i>
great hammerhead	<i>Sphyrna mokarran</i>
lemon shark	<i>Negaprion brevirostris</i>
sailfish	<i>Istiophorus platypterus</i>
scalloped hammerhead	<i>Sphyrna lewini</i>
silky shark	<i>Carcharhinus falciformis</i>
spinner shark	<i>Carcharhinus brevipinna</i>
swordfish	<i>Xiphias gladius</i>
tiger shark	<i>Galeocerdo cuvier</i>
whale shark	<i>Rhincodon typus</i>



Table 2-18 EFH for fishery species within the study area (species managed by the GMFMC)

Species Habitat	Species Common Name	Species Scientific Name
Emergent Marsh	red drum	<i>Sciaenops ocellatus</i>
	gray (mangrove) snapper	<i>Lutjanus griseus</i>
	brown shrimp	<i>Penaeus aztecus</i>
	white shrimp	<i>Penaeus setiferus</i>
Mangrove	gray triggerfish	<i>Balistes capriscus</i>
	lane snapper	<i>Lutjanus synagris</i>
SAV	red drum	<i>Sciaenops ocellatus</i>
	lane snapper	<i>Lutjanus synagris</i>
	brown shrimp	<i>Penaeus aztecus</i>
	pink shrimp	<i>Penaeus duorarum</i>
Oyster Reefs	brown shrimp	<i>Penaeus aztecus</i>
Hard Bottom	red drum	<i>Sciaenops ocellatus</i>
	gag	<i>Mycteroperca microlepis</i>
	gray (mangrove) snapper	<i>Lutjanus griseus</i>
	lesser amberjack	<i>Seriola fasciata</i>
	red snapper	<i>Lutjanus campechanus</i>
	Vermilion snapper	<i>Rhomboplites aurorubens</i>
Soft Bottom	red drum	<i>Sciaenops ocellatus</i>
	gray (mangrove) snapper	<i>Lutjanus griseus</i>
	lane snapper	<i>Lutjanus synagris</i>
	red snapper	<i>Lutjanus campechanus</i>
	brown shrimp	<i>Penaeus aztecus</i>
	white shrimp	<i>Penaeus setiferus</i>
Sand Shell	red drum	<i>Sciaenops ocellatus</i>
	gray snapper	<i>Lutjanus griseus</i>
	gray triggerfish	<i>Balistes capriscus</i>
	lane snapper	<i>Lutjanus synagris</i>
	red snapper	<i>Lutjanus campechanus</i>
	brown shrimp	<i>Penaeus aztecus</i>
	pink shrimp	<i>Penaeus duorarum</i>



Species Habitat	Species Common Name	Species Scientific Name
	white shrimp	<i>Penaeus setiferus</i>
Reefs	gag	<i>Mycteroperca microlepis</i>
	gray snapper	<i>Lutjanus griseus</i>
	gray triggerfish	<i>Balistes capriscus</i>
	greater amberjack	<i>Seriola dumerili</i>
	lane snapper	<i>Lutjanus synagris</i>
	red snapper	<i>Lutjanus campechanus</i>
	Vermilion snapper	<i>Rhomboplites aurorubens</i>
Pelagic	cobia	<i>Rachycentron canadum</i>
	king mackerel	<i>Scomberomorus cavalla</i>
	Spanish mackerel	<i>Scomberomorus maculatus</i>
	red drum	<i>Sciaenops ocellatus</i>
	greater amberjack	<i>Seriola dumerili</i>
	lane snapper	<i>Lutjanus synagris</i>
	red snapper	<i>Lutjanus campechanus</i>
	brown shrimp	<i>Penaeus aztecus</i>
	pink shrimp	<i>Penaeus duorarum</i>
	white shrimp	<i>Penaeus setiferus</i>
	spiny lobster	<i>Panulirus argus</i>
Shoal-Banks	gray (mangrove) snapper	<i>Lutjanus griseus</i>
	lane snapper	<i>Lutjanus synagris</i>
Shelf Edge –Slope	lane snapper	<i>Lutjanus synagris</i>

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: O&M activities within the river would continue, however, there would be no direct impacts under the no action alternative. Annual O&M dredging of the project area would continue at an average 35,318,498 cy per year and would establish approximately 528 acres of intermediate marsh annually, and would remain compliant with the Magnuson-Stevens Fishery Act. Existing conditions and trajectories of ecological change to aquatic and fisheries resources, as described in previous Sections, would persist. The area would be subjected to increases in RSLR which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of forested wetlands and swamp habitats to marsh and open water. Much of the area, could be permanently inundated under both the intermediate and high



RSLR scenarios. There could be a shift from fresh water dominate species to those species that can tolerate higher salinity.

2.4.4 Threatened and Endangered Species

Historic and Existing Conditions

Based on discussions with USFWS and the NMFS, the animals presented in Table 2-19 are known to occur or occasionally enter the the study area.

Table 2-19 Federally protected species and critical habitat potentially impacted by the proposed project

Species	Critical habitat	Status
West Indian Manatee		Endangered
piping plover	X	Threatened
rufa red knot		Threatened
Green Sea Turtle		Threatened
Hawksbill Sea Turtel		Endangered
Kemps Ridley Sea Turtle		Endangered
Leatherback Sea Turtle		Endangered
Loggerhead Sea Turtle	X	Threatened
pallid sturgeon		Endangered
gulf sturgeon	X	Threatened

Piping Plover: The piping plover, as well as its designated critical habitat, occurs along the Louisiana coast (habitat.fws.gov/crithab). Piping plovers winter in Louisiana and may be present eight to ten months of the year (LDWF 2011), however, critically habitat is not present in the study area. They depart for the wintering grounds from mid-July through late October and remain until late March or April. Piping plovers forage on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse vegetation. They roost in unvegetated or sparsely vegetated areas, which may have debris, detritus, or micro-topographic relief offering refuge from high winds and cold weather. They also forage and roost in wrack deposited on beaches. Piping plovers could occur along the shoreline and in the intertidal areas of the project vicinity during winter migration, but are not permanent residents of the area. Critical habitat (Critical Habitat Unit LA-6) has been designated south of Pass a Loutre—mainly near the mouth of South Pass and in portions of East Bay between South and Southwest passes. Dredging and disposal areas associated with the proposed work do not lie within these critical habitat areas. Construction activities associated with the proposed project may cause piping plovers occurring near the project area to be temporarily displaced to nearby areas containing foraging and loafing habitat.

Red knot: The red knot (*Calidris canutus rufa*) was federally listed as a threatened species on December 11, 2014, as announced in the Federal Register Vol. 79, No. 238. The red knot is a



medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through March).

Pallid Sturgeon: The pallid sturgeon is an endangered fish found in Louisiana, in both the Mississippi and Atchafalaya Rivers (with known concentrations in the vicinity of the Old River Control Structure Complex); it is possibly found in the Red River as well. The pallid sturgeon is adapted to large, free-flowing, turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Detailed habitat requirements of this fish are not known, but it is believed to spawn in Louisiana. Habitat loss through river channelization and dams has adversely affected this species throughout its range. Entrainment issues associated with dredging operations in the Mississippi and Atchafalaya Rivers and through diversion structures off the Mississippi River are two potential effects that should be addressed in future planning studies and/or in analyzing current project effects. Juvenile pallid sturgeon appear to be at risk for entrainment in hydraulic dredges, because of their benthic holding behavior and their relatively low burst swimming speed (Hoover et al. 2005). The density of pallid sturgeon in the lower Mississippi River Delta is thought to be low; however, sampling efforts in that area have not been extensive so population estimates in these areas are uncertain (USFWS 2010). Because pallid sturgeon are believed to be a strictly freshwater fish, they are probably absent from the Mississippi River Delta during low river flows when salt water from the Gulf of Mexico intrudes upriver along the bottom of the channel (salt water wedge). If project construction is planned during these events, impacts to pallid sturgeon due to dredging activities in the Mississippi River Delta are unlikely.



Gulf Sturgeon: The threatened Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is found in river systems from Louisiana to Florida, in nearshore bays and estuaries, and in the Gulf of Mexico. Gulf sturgeons are primitive, anadromous fish that annually migrate from the Gulf of Mexico into freshwater streams to spawn. Subadults and adults spend eight to nine months each year in rivers. Although Gulf sturgeon activity is not well documented, the species has been found in the upper reaches of the Pearl River and Lake Pontchartrain tributaries. The Gulf sturgeon is documented as occurring within parishes comprising the Mississippi Delta,

Mississippi Sound, Breton Sound, Barataria, and Pontchartrain Basins (LDWF 2014a). Critical habitat has been designated along Louisiana river systems, nearshore bays and estuaries, and in the Gulf of Mexico (Figure 2-20; NOAA 2015). The areas impacted by project activities are not critical habitat for the Gulf sturgeon. However, it is possible that Gulf sturgeon may wander outside of areas where they are generally found to the north of the project area into the mud and sand-bottomed area where the navigation channel is located during cooler months when they are feeding in the estuaries. Even if they do occur in the area, Gulf sturgeon have the mobility necessary to avoid being adversely affected by dredging operations. Larval and small juvenile sturgeon, which are more susceptible to entrainment are not be expected in this area due the distance from spawning habitat.

Sturgeon entrainment or "takes" from dredging activities with observer programs are summarized in the USACE, Sea Turtle Data Warehouse available at <http://el.erdc.usace.army.mil/seaturtles/index.cfm>. From 1995 through January 2013, a total of 42 sturgeon takes (3 Gulf sturgeon, 11 shortnose sturgeon, 34 Atlantic sturgeon) have been recorded from the Atlantic and Gulf Coasts. Of these, 3 Atlantic and 2 shortnose sturgeon were released alive and the remainder were mortalities. Of the 34 observed Atlantic sturgeon mortalities, the majority were associated with hopper dredging (n=22) and mechanical clamshell dredging (n=3), operations. During this period a single Atlantic sturgeon was entrained by a hydraulic pipeline (i.e. cutterhead) dredge. Of the 11 shortnose sturgeon entrained, 5 each were taken by hopper and cutterhead dredge, while only 1 was entrained by a mechanical bucket dredge. All three Gulf sturgeon were entrained by hopper dredge, and all were reported from areas within the boundaries of the Corps of Engineers, Mobile District, Alabama. Two other takes in which the

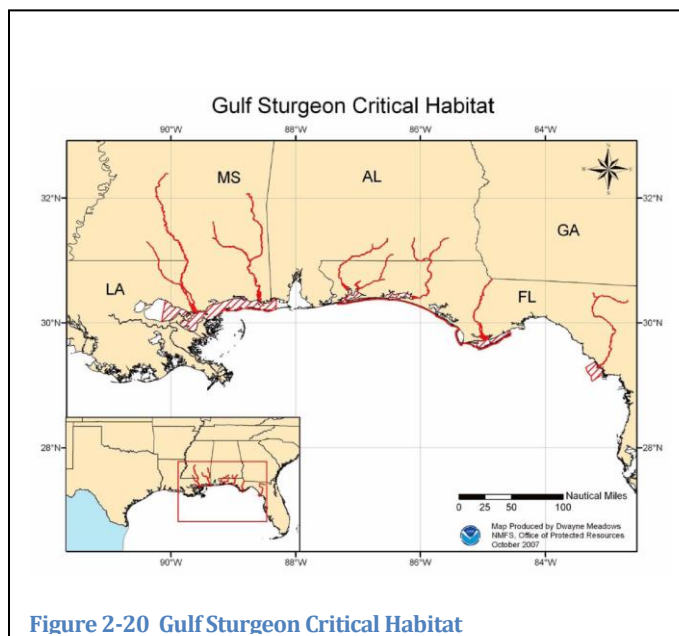


Figure 2-20 Gulf Sturgeon Critical Habitat



species was not reported was taken by hopper dredge. It is important to note that observers are more commonly required for hopper dredging operations compared to mechanical and cutterhead dredging operations, so the relative numbers of sturgeon taken by each dredge type are not necessarily an indication of how likely each dredge type is to take the species.

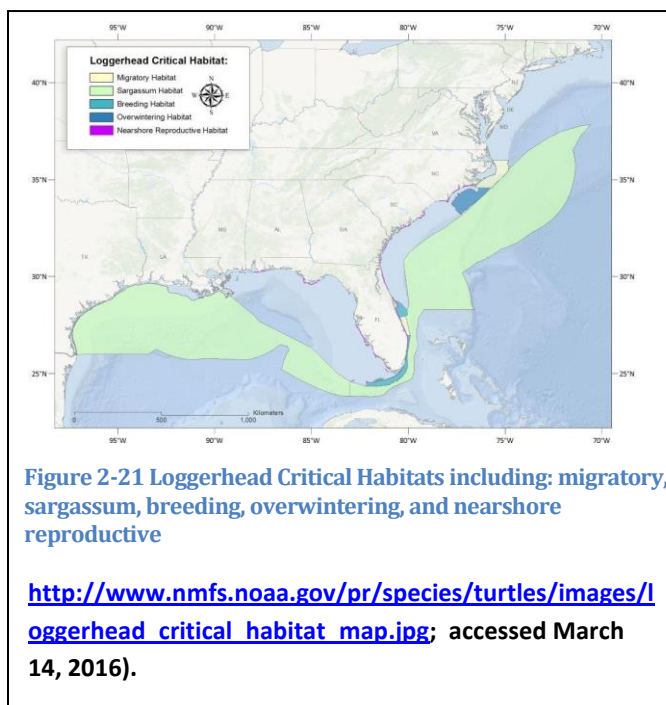
A technical report prepared by the Corps of Engineers, Engineer Research and Development Center (ERDC/EL TR-14-12) contains the results of a study on tagged Atlantic sturgeon responses to cutterhead dredges. Tagged fish were actively tracked throughout a section of the James River during dredging operations, and their movements included passage both upstream and downstream in the vicinity of the dredge. Atlantic sturgeon behavior did not show either attraction or avoidance responses to any stimuli likely associated with the dredging operation (i.e., the physical presence of the dredge plant itself, noise generated during the dredging operation, or disturbance of sediment, either from increase turbidity or re-suspending potential food resources in the water column). This study and other reviewed reports and studies suggest that sturgeon encounters with cutterhead dredges are coincidental, and extremely rare unless the dredge is operating in areas where sturgeon are known to congregate. In areas where sturgeon are very uncommon to rare, cutterhead dredge encounters with sturgeon are highly unlikely.

The areas impacted by project activities are not critical habitat for the Gulf sturgeon. However, it is possible that Gulf sturgeon may wander outside of areas where they are generally found to the north of the project area into the mud and sand-bottomed area where the navigation channel is located during cooler months when they are feeding in the estuaries. Even if they do occur in the area, Gulf sturgeon have the mobility necessary to avoid being adversely affected by dredging operations. Larval and small juvenile sturgeon, which are more susceptible to entrainment are not be expected in this area due the distance from spawning habitat.

West Indian Manatee: Substantial food sources (submerged or floating aquatic vegetation) have not been observed in the area. Given the extensive areas of relatively undisturbed wetlands in the region and the paucity of food sources in the project area, it is considered unlikely for the manatee to frequent and utilize the inshore waters of Lake Maurepas and Pontchartrain as habitat, although manatees could pass through this area while transiting the lake.



Green and Loggerhead Sea Turtles: Two species of threatened sea turtles inhabit Gulf of Mexico waters along the Louisiana coast; these include the green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) sea turtles. Although sea turtles are predominantly marine animals, they come ashore to nest on barrier islands and mainland beaches of parishes comprising the Mississippi Delta, Mississippi Sound, Breton Sound, Barataria, and Pontchartrain Basins (LDWF 2014a). Loggerhead Critical Habitat, Sargassum (brown macroalgae) habitat, exists in the southern (offshore) portion of the study area (see Figure 2-21; NOAA 2015).



Kemp's Ridley Sea Turtle: The most seriously endangered of the sea turtles, Kemp's Ridley turtles (*Lepidochelys kempii*) occur mainly in bays and coastal waters of the Atlantic Ocean and Gulf of Mexico (NMFS/USFWS 1992a). Nesting occurs on the northeastern coast of Mexico and occasionally on Texas Gulf Coast beaches from April to July. No Kemp's Ridley sea turtle nesting habitat occurs near the project site, and nesting has not been known to occur in the area. Along the Louisiana coast, turtles are generally found in shallow nearshore and inshore areas, and especially in salt marsh habitats, from May through October.

Hawksbill Sea Turtle: The hawksbill (*Eretmochelys imbricate*) is a small sea turtle, generally spending most of its life in tropical waters such as the warmer portions of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (NMFS/USFWS 1993). Hawksbills frequent rocky areas, coral reefs, shallow coastal areas, lagoons, narrow creeks, and passes. Nesting may occur on almost any undisturbed deep-sand beach in the tropics—in North America, the Caribbean coast of Mexico is a major nesting area. In the continental United States, nesting sites are restricted to Florida where nesting is sporadic at best (NMFS/USFWS, 1993). Due to the lack of suitable foraging and nesting habitats, there is a low probability of this species occurring within the project area.

Leatherback Sea Turtle: The leatherback sea turtle (*Dermochelys coriacea*) is the largest, deepest diving, and most migratory and wide ranging of all the sea turtles (NMFS/USFWS 1992). Leatherbacks are mainly pelagic, inhabiting the open ocean and seldom entering coastal waters



except for nesting purposes. Nesting in the United States is mainly confined to the Florida coast, and no nesting has been reported from Louisiana (Gunter 1981).

Future without Project Conditions (Alternative 1)

Direct and Indirect Impacts: Adverse impacts on threatened or endangered species, designated critical habitats, and other species of concern would not be likely. The species identified above would continue to occasionally enter the project area, and the potential for harassment or a take would remain during regular dredging operations. All takes would be documented and reported to the appropriate management agency. Routine dredging operations would continue to be coordinated with the USFWS and NMFS on at least an annual basis under the Endangered Species Act.

2.5 Cumulative Impacts of No Action (Alternative 1)

Cumulative impacts resulting from the No Action Alternative (i.e., current O&M practices) would be the result of all past, present, and reasonably foreseeable future actions in the study area. Cumulatively, 1,765,924,900 cubic yards of material over the course of 50 years would be dredged in the project area to maintain the river at its current state. As such, approximately 23,209 acres (6,161 AAHUs) of intermediate marsh habitat is anticipated to be constructed via beneficial use over the 50 year project life as part of the no-action alternative (Appendix A-7). Without the proposed action, study area water quality would still be affected by industrial activity along the corridor, by other coastal environmental projects, Federal and state water quality management programs, coastal deltaic processes, land development, flood protection, and climate:

- O&M of the River— In order to maintain the river at its current navigational capacity, the project area would continue to require a combined annual average of approximately 35,318,498 cubic yards of dredging. Approximately 528 acres of coastal marsh habitat (target elevation of 2ft) is expected to establish each year via beneficial use. However, due to tropical storms, subsidence, erosion, and sea level rise, approximately 57% of these areas are not expected to exist 50 years after construction. Ongoing maintenance activities identified under the No Action alternative would complement any future marsh creation projects, including those associated with the BP oil spill.
- Other coastal environmental projects—Existing diversions would continue to affect study area water quality, salinity, aquatic vegetation and phytoplankton community dynamics, and bioaccumulation rates. Long-term river water inflows from diversions may in some cases accelerate wetland loss (Swarzenski et al. 2005, Kearny et al. 2012). Other coastal projects affecting study area water quality include wetlands creation and nourishment,



ridge rehabilitation, shoreline protection, oyster reef creation, and other types of hydrologic modification.

- To date, a total of 80 acres of wetlands were created by placing HDDA dredged material in shallow open water areas of West Bay under the Louisiana Coastal Authority (LCA) Beneficial Use of Dredged Material (BUDMAT program in FY 2015. At least for some unidentified period of time, LCA BUDMAT will potentially utilize dredge material from this project beneficially beyond the federal standard. Presently the LCA BUDMAT authorization is limited to federal expenditure of \$100,000,000. The 2012 State Master Plan indicates little opportunity in partnering on beneficial use south of Venice, LA.
- Federal and state water quality management programs—State and federal water quality management programs are expected to improve study area water quality. There are currently no anticipated changes in nonpoint source pollution management and regulation that would significantly reduce Mississippi River nutrient and pesticide loads.
- Coastal deltaic processes—The study area would continue to be impacted by coastal deltaic processes associated with a transgressive delta. The continued subsidence and erosion of estuary wetlands would reduce their water quality benefits. Changes in barrier island morphology may lead to increased tidal prism volumes, which may provide some water quality benefits in regions of the study area where salinities may increase, such as decreased harmful algal blooms and removal of inorganic and organic materials. Additional foreseeable changes in water quality may occur due to redistribution of river discharge between the Mississippi and Atchafalaya rivers.
- Existing conditions are anticipated to change in Plaquemines Parish as trajectories of ecological change to aquatic resources would persist. The area would be subjected to increases in RSLR, which could increase saltwater intrusion and lead to increases in and the potential conversion of vast areas of adjacent marsh to open water. Much of the area could be permanently inundated under both the intermediate and high RSLR scenarios. There could be a shift from fresh water dominate species to those species that can tolerate higher salinity.
- Development— Population growth could increase traffic circulation, creating need for expanded roadways and bridges. Land use patterns in the Mississippi River and delta are expected to continue, along with industrial activities affecting the study area. In general, it appears that river water quality as impacted by basin agriculture will not change significantly (e.g., see Murphy et al. 2013, Thelin and Stone 2013). Recent (2008-2013) study area watershed land use data was evaluated using the Annual Kendall test to determine land use trends in the study area (USDA-NASS 2014). Results suggest



decreasing shrubland area, increasing forest area, increasing or decreasing land use for several crops, and increasing high intensity development, all of which may affect water quality (e.g., see Demcheck et al. 2004, Southwick et al. 2002). Industrial activities, including accidental spills, would continue to affect study area water quality. Although unanticipated, environmental catastrophes such as the 2011 BP oil spill can have widespread impacts on study area water quality.

- **Flood Risk Reduction**—Diversion of Mississippi River water into Lake Pontchartrain during river floods would continue during flood events in order to maintain the river at 17.5 ft' at the Carrollton Gage in New Orleans.
- **Climate**—Increasing surface water temperatures could affect water quality by increasing primary productivity, rates of waterborne disease, and frequency of harmful algal blooms, and decreasing dissolved oxygen levels (Milello et al. 2014). Increasing sea-level and severity of hurricanes could aid in accelerating wetland loss rates, as well as increases in the flooding of study area infrastructure, impacting water quality by removing habitat capable of ameliorating water quality and increasing the frequency of introduction of infrastructure floodwaters into study area estuaries. Increasing severity of droughts in the study area may impact water quality by facilitating stagnation of estuary waters during the warm summer months, leading to changes in phytoplankton community and decreases in pH and dissolved oxygen levels. Increasing severity of droughts may also foster dieback of some marsh communities and saltwater intrusion of upper estuary swamps, with both temporary and permanent impacts to these wetlands communities, affecting water quality. More severe rainfall events in the study area and Mississippi River watersheds could affect water quality by altering the transport of runoff constituents, particularly nutrients. Changes in Mississippi River discharge in response to climate change could alter the timing and extent of the Gulf of Mexico dead zone.
- Without the proposed project, study area water quality would likely continue current trends. For example, surface water quality has improved significantly with the implementation of the Clean Water Act and industrial and municipal discharge programs such as NPDES. These programs continue to advance with new or improved technologies to treat wastewater discharges.
- The causes of impairment will continue to degrade water quality until TMDL development and execution, and the sources are addressed. In addition, contaminants of emerging concern such as pharmaceuticals and personal care products, microplastics, etc. continue to present uncertainty for surface water quality and potential concerns for human health and the environment.



- With no action, processes affecting known or unknown cultural resources will continue as they are. Dredging within the channel is a regular maintenance activity that will likely have no additional effect on any resources that may have been within its area of effect. Within disposal areas, natural process will continue to erode and degrade remaining lands and will likely submerge any cultural resource that has not already been destroyed.
- The continued beneficial use of dredged material in existing disposal areas in the Mississippi River Delta would not result in overall adverse direct, indirect, or cumulative impacts to soils or water bottoms in or near the project area. The direct, indirect, and cumulative impacts to soils and water bottoms would remain consistent with current impacts to those resources from existing operation and maintenance dredging in the Mississippi River from Baton Rouge to the Gulf of Mexico. Cumulatively, approximately 26,400 acres of intermediate marsh habitat is anticipated to be constructed within the Federal Standard limitations, via beneficial use over the 50 year period of analysis via annual O&M actions. Overall, the cumulative impacts of the proposed action would be positive, with long-term benefits to navigation, recreation, coastal habitat, and other resources in the study area. During the final feasibility design phase of the study USACE will consider whether additional dredge material placement and access lands are needed for the construction and OMRR&R of the project for the period of analysis.
- The Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) represents a portion of the Congressional response to the Deepwater Horizon oil spill. The Act dedicates 80 percent of all Clean Water Act administrative and civil penalties related to the Deepwater Horizon oil spill to the Gulf Coast Restoration Trust Fund (Trust Fund). RESTORE Act funds are allocated between five buckets: the Direct Component (35%), the Council-Selected Restoration Component (30%), the Spill Impact Component (30%), the Gulf Coast Ecosystem Restoration Science Program (2.5%); and Centers of Excellence Research Grants Program (2.5%). In early 2013, Transocean entered into a plea agreement to pay \$1 billion to resolve federal Clean Water Act civil penalty claims, of which \$800 million will be made available under the RESTORE Act to fund Gulf Coast recovery projects. The process of selecting projects for implementation under the RESTORE Act is anticipated to continue through the period of analysis, until the allocated funds are exhausted. Some projects have been selected and funded for implementation and will be discussed as a part of the reasonably foreseeable actions section below. In November of 2016, the Louisiana Coastal Protection and Restoration Authority (CPRA) has been awarded two grants totaling approximately \$7.5 million from the Gulf Coast Ecosystem Restoration Council (RESTORE Council) for engineering and design of the Golden Triangle Marsh Creation (\$3.2M) project and the Biloxi Marsh Living Shoreline (\$4.3M) project under the



Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act). These projects represent two out of seven total projects that were selected for funding by the RESTORE Council under its Initial Funded Priorities List that will directly benefit Louisiana. One additional grant in the amount of \$7.3 million was funded by the RESTORE Council in September for the engineering and design of the West Grand Terre Beach Nourishment and Stabilization Project.

- Economic activity related to shipping would be held back by low water depth along the river. Economic activity related to wetland resources would be adversely affected by the depletion of these resources along the coastline. Industry development would contribute to the degradation of wetlands. Businesses may relocate to areas with less risk of storm damage.
- There are no foreseen cumulative impacts to visual resources in the study area from the no action alternative. Cumulative impacts would be the incremental direct and indirect impacts of not implementing the proposed action and the continued loss of wetland and habitats due to human development and conversion of existing forested wetlands and swamp habitats to marsh and open water.



3.0 PLAN FORMULATION

Plan formulation is the key to supporting the U.S. Army Corps of Engineers (USACE) Civil Works water resources development mission. It is a process requiring experience, analysis, intuition, and inspiration. To ensure sound decision-making, the process requires a systematic and repeatable approach. The 1983 Principles and Guidelines, published by the United States Water Resources Council, describes the study process for Federal water resource projects, and the systematic formulation of alternative plans that contribute to the Federal objective.

Plans or alternatives are composed of measures. Measures consist of features, which are structural elements that require construction or assembly and/or activities that are nonstructural actions implemented to address planning objectives. Each feature and/or activity represents an implemental measure to address planning objectives at a specific geographic site.

This study considered measures to accomplish objectives pursuant to NED and to maximize project benefits. All measures were evaluated and screened for capability to meet objectives and avoid constraints, for engineering and economic feasibility, and for benefits provided over the 50-year period of analysis from year 2020 to 2070. Those measures that warranted continued consideration and met the success thresholds were assembled into alternative plans. In the evaluation process, each alternative plan was required to meet study-specific minimum standards and qualifying criteria in order to merit further consideration.

3.1 Prior Studies

USACE has conducted numerous studies concerning deep-draft navigation on the Mississippi River below Baton Rouge, LA. The 1981 Feasibility Report documents details of some of the early studies.

The Federal project “Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana,” sometimes referred to as the “Mississippi River Ship Channel, Baton Rouge, Louisiana to the Gulf of Mexico” has been authorized in parts dating back to the River and Harbor Acts of 1925. Subsequently, additional authorization was included in portions of the following Public Laws: the Rivers and Harbor Act of 1937; the Rivers and Harbor Act of 1945, and the Rivers and Harbor Act of 1962 (Refer to Chapter 1 for details on project authority).

Table 3-1 provides a list of studies completed since the 1981 Feasibility Study and identifies their relevance to the MRSC study. The table is not intended to be a comprehensive list, it is intended to provide a list of relevant documents that have been completed since the 1981 Feasibility study. That report provides information on studies and reports completed prior to its completion.



Table 3-1 Relevant prior reports and studies.

		Relevance to MRSC Study				
		Data Source	Consistency	Structural Measures	Non-Structural Measures	FWOP Conditions
Comprehensive Planning Studies						
1981	Final EIS and Feasibility Study <i>Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana</i>	X	X	X	X	X
1983	Chief's Report, <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana</i>	X	X	X	X	X
General Design Memoranda						
1983	General Design Memorandum No. 1 <i>Mississippi River Deep Draft</i>	X	X	X	X	X
1986	General Design Memorandum No. 1 Supplement No 1. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana (Venice, La. To RM 181)</i>	X	X	X	X	X
1986	General Design Memorandum No. 1 Supplement No 4. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana (Training Works 45-ft channel)</i>	X	X	X	X	X
1990	General Design Memorandum No. 1 Supplement No 6. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, Saltwater Intrusion Mitigation</i>	X	X	X	X	X
1992	General Design Memorandum No. 1 Supplement No 2. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, Phase II 45 Foot Channel (Mile 181 – 232.4)</i>	X	X	X	X	X
Deferred	General Design Memorandum No. 1 Supplement No 3. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana (Training Works RM 181 to 232.4)</i>					
Deferred	General Design Memorandum No. 1 Supplement No 5. <i>Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana (Widening of Jetty in Southwest Pass)</i>					
April 1984	Mississippi River Baton Rouge to the Gulf of Mexico, LA South West Pass and the Bar Channel General Design Memorandum Supplement No. 2	X	X	X	X	X
May 1987	Mississippi River Baton Rouge to the Gulf of Mexico, LA South West Pass and the Bar Channel General Design Memorandum Supplement No. 3	X	X	X	X	X
March 1988	Mississippi River Baton Rouge to the Gulf of Mexico, LA South West Pass and the Bar Channel General Design Memorandum Supplement No. 5	X	X	X	X	X
Environmental Assessments						
1990	Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Channel Training, Miles 181.0- 232.4	X	X	X	X	X



		Relevance to MRSC Study				
		Data Source	Consistency	Structural Measures	Non-Structural Measures	FWOP Conditions
Comprehensive Planning Studies						
1991	Mississippi River Ship Channel Gulf to Baton Rouge, Louisiana, Saltwater Intrusion Mitigation, Plaquemines Parish, Louisiana	X	X	X	X	X

3.2 Planning Objectives

The planning goal of the study is to re-evaluate alternative channel depths between 45 ft and 50 ft and identify the depth that provides the greatest net benefits to the Nation in order to determine whether it is in the Federal interest to proceed with construction of the channel to a deeper dimension, as opposed to a recommendation of the no action alternative (maintaining the existing constructed and maintained condition). The goal of the MRSC project is to improve deep draft navigation on the MRSC in a deeper channel, up to the authorized 55 ft depth, through phased construction.

The plan formulation was based on the following project objectives and constraints:

- **Objective 1:** Reduce transportation costs related to the limiting depths of the MRSC from the entrance channel in the Gulf of Mexico (RM 22 BHP) to Baton Rouge (RM 232.4 AHP), beginning in base year 2020. This is measured in terms of transportation cost savings for current and future shipping fleets.
- **Objective 2:** Preserve, enhance, and restore ecological resources in the lower delta adjacent to the MRSC to the extent possible under the requirements of the Federal Standard; measured in terms of acres built from beneficial use of dredge material.
- **Objective 3:** Maintain or improve operations and maintenance dredging intervals within MRSC Crossings, particularly in areas where improvements have already been investigated for the existing 45 ft depth channel. This is measured based on the anticipated shoaling rates, deposition rates, annual dredging costs, and training dike construction costs.

3.3 Planning Constraints

Plan formulation is based on the objectives as defined, while considering the following constraints:

- **Constraint 1:** Avoid or minimize impacts on existing ecological resources in the lower delta.



- **Constraint 2:** Avoid or minimize impacts to existing channel training works in the lower Mississippi River Delta, particularly in South West Pass.
- **Constraint 3:** Avoid or minimize impacts to the riverine and hurricane risk reduction system adjacent to the MRSC.
- **Constraint 4:** As described in Chapter 1, at the request of the NFS, the alternatives considered were limited to a maximum depth of 50 ft.

3.4 Management Measures Considered

Management measures considered for providing larger deep draft navigation access channels in the Mississippi River from the Gulf of Mexico to Baton Rouge, La were limited to deep draft navigation approaches within the lower reaches of the Mississippi River from RM 22 BHP to RM 13.4 AHP, and the crossings which are located between RM 115 AHP to RM 232.2 AHP, to provide deep draft access to the Port of Plaquemines, Port of New Orleans, Port of South Louisiana, and the Port of Baton Rouge. Construction and OMRR&R measures considered for providing deep draft access were limited to existing dredging practices, including the current fleet of hopper, dustpan, and cutterhead dredges. Existing dredge practices include dredging the reach from RM 22 BHP to RM 13.4 AHP with hopper dredges, and disposing the material in the Hopper Dredge Disposal Area (HDDA). The crossings are dredged with a dustpan dredge that disposes the dredge material into the channel where it is displaced downstream.

The following additional considerations were taken into account during the evaluation and comparison of alternative plans:

3.4.1 Training Works

The implementation of training structures helps stabilize the channel to provide reliable depths and widths for safe vessel passage. Currently training works are authorized and in place in Southwest Pass, and are not authorized in any other reach of the project. Training works have the potential to reduce the long-term Operation Maintenance Repair, Rehabilitation, and Relocation (OMRR&R) cost. Due to the complexities of various types, quantities, and locations that could be considered, the evaluation of training works within the crossings will be delayed to the feasibility design phase. Deferring consideration of training works until this phase ensures that identification of the TSP is based on the most conservative analysis. Optimization of the TSP will be conducted through the evaluation of training works through feasibility level design and documented in the final GRR and associated environmental documentation. If trainings works in the crossings are determined to be warranted, a post authorization change will be recommended to the Chief of



Engineers, and may be implemented within the Chief of Engineers' discretionary authority or through Congressional action.

3.4.2 Salt-Water Sill

The 1983 Chief's Report recommended, during periods of low flow in the river, installation of a submerged sill at RM 64.1 AHP, to mitigate the impacts of saltwater intrusion upriver. Comparison of alternatives considered the frequency of installing the sill based on the alternative depths. Consideration was given to both the long term OMRR&R cost, and the potential loss of sediment that could be used for other purposes.

In addition to the salt-water sill, the 1983 Chief's Report, as approved for implementation by supplemental general design documents, included the following principal components: measure to increase the capacity of the water treatment plant for Plaquemines Parish located on the West bank of the Mississippi River in Belle Chasse, La (RM 75.8 AHP); water transmission lines and booster pumps stations to connect this added capacity to the other water treatment plants on the west bank in West Pointe-a-la Hache and Boothville, and on the east bank included conversion of the existing community pond at Davant, La to a storage reservoir; construction of a siphon from the river to the reservoir required to replenish the reservoir with fresh water; and construction of transmission lines and booster pumps to connect the reservoir to the water treatment plant on the east bank of the river at Pointe-a-la-Hache; and upgrades as necessary to [provide for future increases in the demand for potable water.

Implementation of the project mitigation features included the following measures: On the west bank of the river, the capacity of the Belle Chasse Water Plant was increased by approximately 50%. Water lines were constructed to "connect" the Belle Chasse water system with Port Sulphur and Empire municipal water systems. Two booster pumps were also constructed to help "push" water to the Port Sulphur and Empire water systems. When salinity levels at municipal water intakes become too high for these downriver communities, the additional capacity at Belle Chasse maybe utilized. The connecting water lines and booster pumps help deliver fresh water to the communities down stream of Belle Chasse on the west bank of the river. To protect this intake at Belle Chasse, a saltwater sill is constructed at River Mile 64.

On the east bank of the river, a community pond at Davant was converted to a storage reservoir and a siphon from river to the reservoir was constructed to keep the reservoir supplied. A water line and booster pump was constructed to connect the reservoir at Davant to a water plant downriver at East Pointe-a-la-Hache. The reservoir at Davant will provide needed freshwater to the eastbank of Plaquemines Parish if salinity levels get too high at East Point Ala Hache, but only if properly maintained by the non-Federal sponsor.



3.4.3 Construction and OMRR&R

Construction for each depth considered the dredge quantities, the total construction cost (major NED cost), and the acres of beneficial use from the initial construction dredge material (incidental benefits) that could be attained through placement of dredge materials within the Federal Standard.

Long term OMRR&R for each depth considered the annual dredge quantities, the incremental increase in OMRR&R annual cost for dredging of sediment, and the acres of beneficial use from long term OMRR&R of dredging (incidental benefit) that can be attained within the Federal Standard requirements.

3.4.4 Navigation Benefits

Navigation benefits (transportation cost savings) were considered under two scenarios: current benefits (no growth scenario), and future transportation cost savings through reducing the need for light loading of vessels.

3.5 Additional Project Considerations - Project Datum

The MRSC project, as authorized by the Rivers and Harbor Acts of 1925 provided depths based on a tidal datum defined in the Rivers and Harbors Act of 1915. The 1915 Act defined depths of navigation projects within tidal water and tributaries of the Atlantic and Gulf to mean low water (MLW). MLW is the average of all the low water heights observed over the National Tidal Datum Epoch. For the MRSC project, the MLW was computed based on the average of all low water heights observed in the Gulf Mexico, and was therefore called mean low Gulf (MLG). MLG has been used as a navigation reference datum in coastal waterways such as the Gulf Intracoastal Waterway (GIWW) and the coastal portion of the MRSC.

Subsequent to the 1925 Rivers and Harbor Act and continuing through the 1986 authority, MLG datum was used to define the channel depth. The 1983 Chief's Report, as authorized by subsequent Congressional enactments in 1985 and 1986, recommended a channel depth of 55 ft, except for those portions of the project that lie within the limits of the Port of New Orleans.

The Water Resource Development Act (WRDA) 1992 amended the datum as defined in the Rivers and Harbors Act of 1915 from mean low water to mean lower low water.

USACE Engineering Circular (EC 1110-2-6070), titled "Engineering and Design, Comprehensive Evaluation of Project Datums" dated July 1 2009, provided guidance that all districts perform an assessment called the Comprehensive Evaluation of Project Datums (CEPD) to ensure projects are referenced to the proper nationally recognized vertical datum. Subsequently, a memorandum from



the Director of Civil Works dated 24 October 2014, Subject: “Navigation Projects Compliance with Vertical Datum Guidance,” stated:

For federal navigation, projects where the MLLW depth differs from the depths stated in the project authorization, an Engineering Documentation Report (EDR) shall be prepared in accordance with reference 1.d [ER 1110-2-1150], paragraph 8.3 for each project and posted on a navigation home page for each district. The EDR will be of limited scope to document the datum change only.

The statutory directive in WRDA 1992, as well as the cited guidance and subsequent datum policy, resulted in an assessment and conversion of the datum used for the MRSC project from MLG to MLLW. The results of this conversion are documented in EDR-OD-01 “Mississippi River Venice, Louisiana to the Gulf of Mexico (Vicinity of South West Pass)”, dated 02 November 2016 (Project Datum Conversion EDR). A copy of the Project Datum Conversion EDR is included in Appendix H of this report. A brief discussion of the findings of this EDR follows: however, for further information regarding the basis of the conversion determination, refer to the Project Datum Conversion EDR.

For purposes of this project, MLG is defined as equal to Mean Low Water (MLW) at the Biloxi gauge. MLW is the average of all low tides, whereas Mean Lower Low Water (MLLW) is the average of only the lower of the two daily low tides.

MLG at SWP has become a localized reference, set to and maintained to National Geodetic Vertical Datum of 1929 (NGVD29). Utilizing that reference, the Project Datum Conversion EDR determined that MLG at Southwest Pass is approximately 3.5 ft below MLLW. This EDR further determined that at Southwest Pass, maintaining the channel at a depth of 45 ft MLG is comparable to maintaining the channel at a depth of 48.5 ft MLLW. Pursuant to the findings and determinations outlined in the above referenced EDR, the existing condition for the MRSC project reach between RM 13.4 AHP to 22 BHP, which is tidally influenced, is defined as a depth of 48.5 ft MLLW. For the purposes of this GRR’s plan formulation, evaluation of alternatives, engineering analysis and hydraulic modeling, MVN rounded this depth to a full increment of 48 ft MLLW in order to provide a conservative estimate.

The datum adjustment from MLG to MLLW does not apply to the crossings within the Ports of Baton Rouge and South Louisiana because tidal influence in the river ceases to exist in the vicinity of New Orleans. The crossings, which are located between RM 115 AHP to RM 232.4 AHP, are defined to a depth referenced to a hydraulic datum referred to as the lower water reference plane (LWRP). The LWRP is a hydraulic vertical datum for channel depths represented by a zero foot low water elevation established from long-term observations of the river’s stages, discharge rates,



and flow duration periods. With no need for a datum adjustment in this area, the existing conditions for the crossings are defined as 45 ft LWRP.

3.6 Existing Project Description

The MRSC extends from RM 22 BHP to RM 232.4 AHP. Among other things, Phase I deepened the MRSC to 45 ft from Donaldsonville, LA, (RM 181 AHP) to the Gulf of Mexico and construction of Phase II, deepened the MRSC to a depth of 45 ft between Donaldsonville, LA, (RM 181 AHP) to Baton Rouge, LA (RM 232.2 AHP), and included dredging of eight river crossings to an equivalent depth. The initial array of alternatives as defined below, considered deepening the MRSC based on the original Phase I and Phase II of construction, and identified RM 181 AHP as a break point. As the initial array of alternatives was further refined it was determined that the MRSC consists of three routinely dredged reaches to allow for navigation. These three reaches were used to define the final array of alternatives.

The first reach is located in the lower Mississippi River reach, and extends from RM 13.4 AHP to RM 22 BHP. This reach includes the portion referred to as Southwest Pass which extends from RM 0 (Head of Passes) to RM 22 BHP (Figure 1-2). This reach is located down river from the jurisdictional limits of the Port of Plaquemines, which jurisdictional limits extend from RM 0 to RM 81.2 AHP.

The second reach, the New Orleans Harbor, lies within the jurisdictional limits of the Port of New Orleans and extends between RM 81.2 AHP and RM 114.9 AHP, (Figure 3-1). Although the New Orleans Harbor is maintained and dredged under operation and maintenance of the MRSC, deepening of this portion is not included in the evaluation of alternatives. The Rivers and Harbor Act of 1962 included deepening portions of the Port of New Orleans to a depth of 40 ft. However the 1981 Chief's Report and subsequent 1985 Supplemental Appropriations Act did not include authority to deepen the Port of New Orleans beyond the previously authorized 40 ft.

The third reach is from RM 115 AHP to RM 232.4 AHP, immediately downstream of the US Highway 190 bridge in Baton Rouge. The area consists of crossings (locations where the channel crosses the river between bendways). Of the crossings, 12 require routine maintenance dredging. Of these 12 crossings, three crossings, Fairview, Belmont, and Richbend, lie within the footprint of the Port of South Louisiana, which extends from RM 115 AHP to RM 168.3 AHP, and the remaining 9 crossings are within the footprint of the Port of Baton Rouge, which extends from RM 168.3 AHP to RM 232.4 AHP (Figure 1-3).

The three reaches as described above are dredged annually to maintain deep draft navigation. The portions of the river in between RM 13.4 AHP to RM 115 AHP, and in between the crossings historically have depths in excess of 55 ft. Evaluation indicated this will remain the case through



the period of analysis. If future conditions result in changes in the naturally deep condition of these excluded reaches, an economic and environmental analysis and reassessment of the project will be needed in order to address the channel depth in those reaches.



Figure 3-1 Project Reaches

3.7 Initial Array of Alternatives

The initial array of alternatives was developed prior to the implementation of the datum conversion based on the premise that the depth in the lower Mississippi from RM 13.4 AHP to RM 22 BHP was at 45 ft MLLW, (rather than the 48.5 ft MLLW, as was later determined). This depth was used to define the initial array. The initial array of alternatives considered varying channel depths and widths for the MRSC.

The alternatives defined in the initial array are referenced to MLLW from RM 22 BHP to 13.4), and to LWRP for the crossings, located between RM 115 AHP to 232.4 AHP.



Initial Array Alternative 1:

45 ft LWRP depth with a 500 ft channel width at the crossings,

45 ft depth (defined to the appropriate hydraulic datum, for each particular reach of the river) with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

45 ft MLLW with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

Initial Array Alternative 2:

48 ft LWRP depth with a 750 ft channel width at the crossings,

48 ft depth (defined to the appropriate hydraulic datum, for each particular reach of the river) with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

48 ft MLLW depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

Initial Array Alternative 3:

50 ft LWRP depth with a 750 ft channel width at the crossings,

50 ft depth (defined to the appropriate hydraulic datum, for each particular reach of the river) with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

50 ft MLLW depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

3.7.1 Screening of the Initial Array

In evaluating the initial array of alternatives, several considerations were made to narrow the array.

Channel Widths: The initial array of alternatives considered varying channel widths from 500 ft to 750 ft. Based on discussions with CEMVN Operations Division and local stakeholders, it was determined that the existing channel width was adequate to safely pass the existing ship fleet, which includes Post-Panamax ships. Because vessels can safely pass at the existing width; and because widening the channel would result in additional cost and increased environmental impacts with no additional benefits, changes in the channel width were eliminated from the array of alternatives. Safety of the existing channel widths may be a concern with future shipping fleets if ship length and width increases.

Channel Depths: As discussed under “Additional Project Considerations,” when implementing the April 2007 datum guidance, it was determined that the channel from RM 13.4 AHP to RM 22



BHP has been maintained at a depth of 45 ft MLG, which is equivalent to a depth of 48.5 ft MLLW. The array of alternatives was therefore redefined based on the current dredging practice in the lower Mississippi River.

3.7.2 Evaluation of the Existing Condition

The terms “existing conditions” and “future without project conditions (FWOP)” are used to conduct economic evaluations. Existing condition is defined as the condition that exist at the start of the study. As discussed above, for purposes of this report and the alternatives analysis herein, the existing condition in the lower Mississippi, from RM 13.4 AHP to 22 BHP is 48 ft MLLW.

Because the channel depth in this area was originally assumed to exist at a depth of 45 ft, the economic justification for the incremental difference between 45 ft. and its current depth of 48 ft. was assessed. The study looked at a scenario in which the lower Mississippi Channel would silt in overtime to the depth of 45 ft, and then determined the associated cost to reconstruct the channel from 45 ft to 48 ft. The benefits were estimated based on current vessel traffic data with an artificial 45 ft draft limit enforced. Since the channel is already at a depth of 48 ft, construction cost associated with going from 45 ft to 48 ft is considered a sunk cost. The evaluation of alternatives to deepen the channel from RM 22 BHP to 13.4 AHP from the current depth of 48 ft to a depth of 50 ft indicated there was no incremental difference in the annual OMRR&R requirements. Therefore it was assumed there would also be no difference in the annual OMRR&R requirements between 48 ft and 50 ft. Table 3-2 shows the results.

Table 3-2 Economic Justification for Existing Condition

MRSC – SWP and Bar Channel	
Average Annual Benefits and Costs (3.125%)	
Channel Alternative	From 45 ft to 48 ft
First Cost of Construction	\$84,939,642
Average Annual Cost	\$3,541,763
Average Annual Incremental OMRR&R	None
Total Average Annual Benefits	\$45,922,826
Benefit to Cost (B/C) Ratio	13.0:1

This provides a B/C ratio of 13.0:1. The incremental benefits would be lost if the channel was to return to 45 ft MLLW. The B/C ratio and average annual benefits show that even if no additional increment was constructed, there is justification for maintaining the channel at its current depth. Having established that, the remaining plan formulation evaluates alternatives based on the existing condition of 48.5 ft for RM 13.4 AHP to RM 22 BHP.



3.8 Final Array of Alternatives

The following is the final array of alternatives:

- **Alternative 1 (No action/Future Without Project):** The alternative considers a depth of 45 ft LWRP for the 12 actively maintained crossings and a depth of 48 ft MLLW in the lower Mississippi from RM 13.4 AHP to RM 22 BHP.
- **Alternative 2:** The alternative considers a depth of 48 ft LWRP for the 12 actively maintained crossings and a depth of 48 ft MLLW in Lower Mississippi River from RM 13.4 AHP to RM 22 BHP.
- **Alternative 3:** This alternative considers a depth of 50 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP.

For the final array of alternatives, locations between RM 13.4 AHP to RM 115 AHP historically have a depth in excess of 55 ft and are considered naturally deep, with the exception of the New Orleans Harbor. For RM 115 AHP to RM 232.4 AHP the portions of the river between the 12 actively maintained crossings are also considered naturally deep. Therefore the alternatives only consider the reaches of the river where construction and subsequent operation and maintenance is required to provide deep draft access.

Analysis of the final array indicated opportunities to construct the channel with varying depths for the lower Mississippi (RM 22 BHP to RM 13.4 AHP) and the crossings, as long as the depth in the lower Mississippi was equal to or greater than that provided in the crossings. This scenario could possibly achieve greater benefits with lower cost. For instance, the lower Mississippi from RM 22 BHP to RM 13.4 AHP could be deepened to a depth of 50 ft MLLW while the crossings could remain at a depth of 45 ft LWRP or could be deepened to 48 ft LWRP. Deepening to RM 13.4 AHP, coupled with the naturally deep channel above RM 13.4 AHP, would effectively provide deep draft access for a depth at or in excess of 50 ft MLLW to the Port of Plaquemines and the Port of Orleans, but would limit the ability for the ships, which require this additional draft, to reach the ports above RM 115 AHP. The value of considering varying depths is it allows analysis of economic benefits provided by each port compared to the construction and operation and maintenance cost for each reach. Note, however, that this report is not conducting an analysis of implementing any construction action to sustain the naturally deep portions of the channel. Should the naturally deep portions of the channel become shallower than the existing condition, a new reevaluation report and environmental analysis would be required in order to sustain depths in excess of 50 feet for the reaches excluded from consideration in this general reevaluation study.



Within the Final Array, consideration was given to various permutations for depths in both the lower Mississippi from RM 13.4 AHP to RM 22 BHP and the crossings. Those additional permutations are listed below. These additional alternatives consider deepening the lower Mississippi to 50 ft MLLW, and deepening the crossings to depths of 45 ft and 48 ft LWRP.

- **Alternative 3a:** This alternative considers a depth of 45 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP;
- **Alternative 3b:** This alternative considers a depth of 48 ft LWRP for the 12 actively maintained crossings and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP.

3.9 Cost Estimates

Cost estimates were developed for both the first construction cost and the annual maintenance cost both within the crossings and in the lower Mississippi. Construction cost estimates assumed the continuation of current dredging practices. First construction cost and annual maintenance cost were not developed for the portions of the river that are naturally deep, and would not require construction or maintenance.

3.9.1 First Construction Cost

For both the crossings and the lower Mississippi, the construction and disposal methods used in Phase I and Phase II of the project to deepen the portions of the MRSC to the current depths were used to develop the first construction cost for each alternative in the final array. Based on the construction duration required to construct the MRSC to the current depths, a duration of 4 years was used for first construction of all alternatives. First construction cost estimates were developed based on the estimated quantity of dredge material that would be removed under each alternative.

For the lower Mississippi from the current project depth of 48 ft MLLW to 50 ft MLLW, deepening would be required between approximate Mile 6 AHP and approximate Mile 22.1 BHP. Costs were based on the assumption that this work would be accomplished using two (2) hydraulic cutterhead dredge contracts covering the reach between Miles 6 AHP to 19.5 BHP, and one (1) hopper dredge contract covering the jetty and bar channel reach from Miles 19.5 BHP to 22.1 BHP. For the hydraulic cutter head dredging work, all dredge material would be utilized in a beneficial manner, within the limits of the Federal Standard, for either bank stabilization behind existing foreshore dikes along the channel or for marsh creation in the adjacent open waters. Construction of the jetty and bar channel reach from RM 19.5 BHP to 22.1 BHP would be performed via mobile hopper dredge(s) versus stationary cutter head dredges as this area is located within the Gulf



entrance. For the hopper dredging work, all material would be dredged and hauled to the EPA approved Ocean Dredge Material Disposal Sites (ODMDS) adjacent to and west of the Gulf entrance channel between Approximate Miles 20.4 BHP and 23.1 BHP.

While there are numerous crossing locations between New Orleans and Baton Rouge, only 12 currently require maintenance dredging. These 12 deep draft crossings were evaluated as part of the deepening study based upon channel conditions that existed in the fall/ winter of 2014. These 12 crossings include: Baton Rouge Front, Red Eye, Sardine Point, Medora, Granada, Bayou Goula, Alhambra, Philadelphia Point, Smoke Bend, Richbend, Belmont, and Fairview.

The crossings are currently maintained to 45 ft below the LWRP and would be deepened, if deepening was deemed justified, to either 48 ft or 50 ft below the LWRP based on the alternative considered. Construction would be accomplished via contract and/or Government dustpan dredge(s) consistent with the method of construction already utilized to deepen and maintain the crossings. Material dredged from the crossings would be placed adjacent to the crossing and put back into the system for the material to be carried downstream and to fall out into deeper holes within the river.

Table 3-3 provides a breakdown of the first construction cost for each of the alternatives in the final array. Because the lower Mississippi is currently at a depth of 48' ft MLLW, there is no first construction cost for this reach for Alternative 2. For purposes of cost estimating, the reach identified as "Southwest Pass" in the tables extends from RM 13.4 AHP to RM 18 BHP. The reach identified as the Bar Channel extends from RM 18 BHP to 22BHP. These reaches were divided based on the type of dredge used and the disposal method, both of which result in a different cost per cubic yard of dredge material.

The first construction cost for all alternatives also include estimates for relocation and real estate requirements, refer to Chapter 5 for additional information on these estimates.



Table 3-3 First Construction Quantities and Cost

Alternative 1		
	Construction Quantities (CY)	Construction Cost
Total	None	None
Alternative 2		
	Construction Quantities (CY)	Construction Cost
Crossings	5,467,000	\$88,700,000
Southwest Pass	N/A	
Bar Channel	N/A	
Total	5,467,000	
Alternative 3		
	Construction Quantities (CY)	Construction Cost
Crossings	8,588,600	\$180,600,000
Southwest Pass	18,281,000	
Bar Channel	1,619,000	
Total	28,488,600	
Alternative 3a		
	Construction Quantities (CY)	Construction Cost
Crossings	N/A	\$80,000,000
Southwest Pass	18,281,000	
Bar Channel	1,619,000	
Total	19,900,000	
Alternative 3b		
	Construction Quantities (CY)	Construction Cost
Crossings	5,467,000	\$169,000,000
Southwest Pass	18,281,000	
Bar Channel	1,619,000	
Total	25,367,000	



3.9.2 Annual Operation and Maintenance Cost

Comparison of alternatives for economic analysis is based on the incremental difference between current annual Operation and Maintenance (O&M) cost, and anticipated O&M cost for each alternative. For this phase of the study, the Engineer Research and Development Center (ERDC) was tasked with developing a 1D model to determine the annual maintenance dredging quantities that could be anticipated within the 12 actively maintained crossings, as well as the lower Mississippi River reach between RM 13.4 AHP to RM 22 BHP under each of the alternatives. O&M costs were developed based on both the results of the 1D model as well as on historic dredging practices. (Refer to the Engineering Appendix C, for detailed information on development of the quantities.)

CEMVN and ERDC both agreed that shoaling and maintenance dredging needs within the lower portion of the Mississippi River, from Venice, Louisiana (Mile 13.4 AHP) to the Gulf entrance channel (Mile 22 BHP), would remain essentially the same as currently exists in these locations. For this reason, the dredging needs for both the 48 ft and 50 ft MLLW alternative channel depths in this reach were based on average annual quantities obtained from historical dredging performed within this reach of the MRSC. Because the annual dredge quantities in this reach would essentially remain the same as the current project, there is no cost difference in estimated annual O&M cost for this reach. In addition, there are no annual maintenance requirements for the reaches between RM 13.4 AHP to RM 115 AHP. Although New Orleans Harbor does require annual O&M, because it is excluded from the scope of this evaluation, there would be no change in the O&M cost.

The only locations within the project area that would have an increase in quantity of dredge material, and therefore an incremental increase in cost would be the 12 crossings that are currently maintained between RM 115 AHP to RM 232.4 AHP. Table 3-4 provides a comparison of annual OMRR&R dredge quantities for the 12 crossings for the alternative depths of 48 ft and 50 ft LWRP. The table provides the estimated annual OMRR&R cost, and the difference in the estimated annual cost from the current OMRR&R cost based on a 5 year average of recent operations expenditures for the crossings.



Table 3-4 Incremental OMRR&R Quantities and Cost

Alternative 1:			
	Current OMRR&R Quantities (CY)	Current OMRR&R Expenditures	Incremental Cost Increase
Crossings	19,419,180	\$23,969,413	N/A
Alternative 2			
	OMRR&R Quantities	OMRR&R Cost	Incremental Cost Increase
Crossings	38,397,000	\$124,308,045	\$100,300,000
Alternative 3			
	OMRR&R Quantities	OMRR&R Cost	Incremental Cost Increase
Crossings	48,377,000	\$155,451,482	\$131,400,000
Alternative 3a			
	Current OMRR&R Quantities (CY)	Current OMRR&R Expenditures	Incremental Cost Increase
Crossings	19,419,180	\$23,969,413	N/A
Alternative 3b			
	Current OMRR&R Quantities (CY)	Current OMRR&R Expenditures	Incremental Cost Increase
Crossings	38,397,000	\$124,308,045	\$100,300,000

The quantities shown in Table 3-4 reflect the quantity for the neat line quantity (dredge quantity to obtain the required depth) plus advance maintenance. To estimate the total OMRR&R cost for dredging of the crossings, the quantity was increased by 20% to account for over depth. In addition, the OMRR&R includes estimates for Preliminary Engineering and Design (6%); and Construction Supervision and Administration (8%). A risk-based contingency was added to each line item. The current OMRR&R expenditures are based on a 5-year average of actual expenses as recorded by O&M. This reflects a cost of \$1.25 per cubic yard for dredge material when using a hopper dredge. The estimated cost for the alternatives used a more conservative cost of \$1.95 per a cubic yard based on using a dustpan dredge.

While Table 3-4 reflects the incremental difference in OMRR&R for the comparison of alternatives, it should be noted that the table does not reflect the full OMRR&R budget required to maintain MRSC. Table 3-4 only reflects the incremental cost required to dredge the crossings under each alternative. The OMRR&R budget is estimated at \$200 million annually and includes



funding for: dredging of lower Mississippi; dredging of the New Orleans Harbor Access Area and Hopper Dredge Disposal Area; repair of foreshore rock, jetties, and pile dikes in Southwest Pass; and annual implementation of the saltwater sill barrier. The incremental cost shown in Table 3-4 would be in addition to the present \$200 million annual OMRR&R budget.

Comparison of alternatives considered the frequency of implementation for the sill for salt-water intrusion impact. However, the evaluation determined that there would be limited, if any change in the frequency of construction of the sill for all of the alternatives. Therefore, this was not used for comparison of alternatives.

Additional information on the development of quantities and cost for both construction and OMRR&R can be found in the Engineering Appendix (Appendix B).

3.10 Summary of Accounts and Comparison of Alternatives

To facilitate the evaluation and display of effects of the alternative plans there are four Federal Accounts to consider:

- (1) The national economic development (NED) account displays changes in the economic value of the national output of goods and services.
- (2) The environmental quality account displays non-monetary effects on ecological, cultural, and aesthetic resources including the positive and adverse effects of ecosystem restoration plans.
- (3) The regional economic development (RED) account displays changes in the distribution of regional economic activity (e.g., income and employment).
- (4) The other social effects account displays plan effects on social aspects such as community impacts, health and safety, displacement, energy conservation and others.

The NED account is required. Other information that is required by law or that will have a material bearing on the decision-making process should be included in the other accounts, or in some other appropriate format used to organize information on effects. The Federal objective is to determine the project alternative with maximum net economic benefits while protecting or minimizing impacts to the environment. The alternative plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment, the NED plan, shall be selected. Display of the NED and environmental quality accounts is required. Display of the regional economic development (RED) and other social effects accounts is discretionary. Although not reflected in this analysis, there are real and tangible benefits to be gained in the region upriver from Baton Rouge by deepening the channel. RED (regional economic development) benefits come in the



form of efficiencies that are separate from the transportation cost savings used by USACE to evaluate a project. Although RED may be used to further describe alternatives, and independent studies exist that point to real and tangible benefits to be gained, these are not considered in the NED decision process.

Consideration of the NED and other social effects is provided in the Economics Appendix D.

Environmental Quality impacts are described in Chapter 4 and no significant impacts were identified for any alternative. In fact, due to the anticipated incidental benefits from beneficial use of dredged material within the Federal standard, the NED plan is anticipated to have a net beneficial environmental impact. Therefore, the comparison and selection of alternatives is based on the NED plan. The NED plan is the alternative that provides the greatest net benefits to the Nation.

3.11 Comparison of Alternatives

Table 3-5 provides a comparison of each alternative considering the first construction cost, the incremental annual OMRR&R cost, the total average annual cost, and the total average benefits used to calculate the net benefits.

Table 3-5 Economic Comparison of Final Array of Alternatives

Channel Alternative	Alternative 2	Alternative 3	Alternative 3a	Alternative 3b
First Cost of Construction	\$ 88,663,029	\$ 183,076,433	\$ 82,218,030	\$ 170,881,059
Interest During Construction	\$ 3,897,405	\$ 8,047,583	\$ 3,614,099	\$ 7,511,505
Total Investment	\$ 92,560,434	\$ 191,124,016	\$ 85,832,129	\$ 178,392,564
Average Annual Const. Cost	\$ 3,512,491	\$ 7,252,791	\$ 3,257,165	\$ 6,769,656
Average Annual Increm. O&M	\$ 100,007,021	\$ 131,446,950	\$ -	\$ 100,007,021
Total Average Annual Cost	\$ 103,519,512	\$ 138,699,741	\$ 3,257,165	\$ 106,776,677
Total Average Annual Benefits	\$ 105,900,338	\$ 147,604,765	\$ 10,973,375	\$ 116,873,779
Net Excess Benefits	\$ 2,380,826	\$ 8,905,025	\$ 7,716,210	\$ 10,097,102
B/C Ratio	1.02	1.06	3.37	1.09



Alternative 1 (No Action): No NED benefits are associated with the No Action Alternative.

Alternative 2 (48 ft depth for the Crossings and Lower Mississippi): Alternative 2 has a positive B/C ratio and provides NED benefits however these are not as great as Alternatives 3, 3a, and 3b, all of which include deepening of the lower Mississippi from RM 13.4 AHP to RM 18 BHP to a depth of 50 ft. This indicates that there are NED benefits associated with deepening the lower Mississippi from its current depth of 48 ft to 50 ft, which reduces transportation cost savings for ships to reach the Port of Plaquemines and the Port of New Orleans.

Alternative 3 (50 ft depth for the Crossings and the Lower Mississippi): Alternative 3 has a positive B/C ratio and provides NED benefits greater than Alternative 2. While alternative 3 has very good NED benefits, and its B/C ratio is above 1, the B/C is not as great as alternatives 3a and 3b.

Alternative 3a (45 ft depth for the Crossings and 50 ft for the Lower Mississippi): Alternative 3a has the highest B/C ratio and provides NED benefits greater than Alternative 2. However, the net excess benefits are not as great as Alternative 3 or 3b. Since this alternative only includes construction in the lower Mississippi from RM 13.4 AHP to RM 22 BHP, it shows there are benefits to be gained from deepening this reach to 50 ft. Since this alternative includes no construction or increase in O&M in the crossings, this indicates that cost for the crossings is significantly impacting the B/C ratio.

Alternative 3b (45 ft depth for the Crossings and 50 ft for the Lower Mississippi): Alternative 3b has a positive B/C ratio and provides the greatest net net excess benefits. A comparison of Alternative 3b and Alternative 3a, which includes no deepening of the crossings, indicates that there is benefit to be gained by deepening the crossings to some amount, but the cost of construction and incremental O&M, significantly reduce the B/C ratio.

3.12 Optimization of Alternatives

Based on the comparison of Alternative 3b and 3a, it is discernible that there are benefits to be gained by deepening the crossings to reduce transportation cost for ships traveling to the Port of South Louisiana and the Port of Baton Rouge. However, the cost of construction and the annual incremental increase in OMRR&R is significantly influencing the B/C ratio.

With the understanding that there were opportunities to be gained from varying the depths in the crossings from those implemented in the lower Mississippi reach, a more detailed analysis of the reaches of the river and the various ports serviced by each crossing was conducted. There are three crossings actively maintained that are within the footprint of the Port of South Louisiana: Fairview;



Belmont; and Richbend. There are nine actively maintained crossings that are within the footprint of the Port of Baton Rouge: Smoke Bend; Philadelphia; Alhambra; Bayou Goula; Granada; Medora; Sardine; Red Eye; and Baton Rouge Front (refer to Figure 3-2).

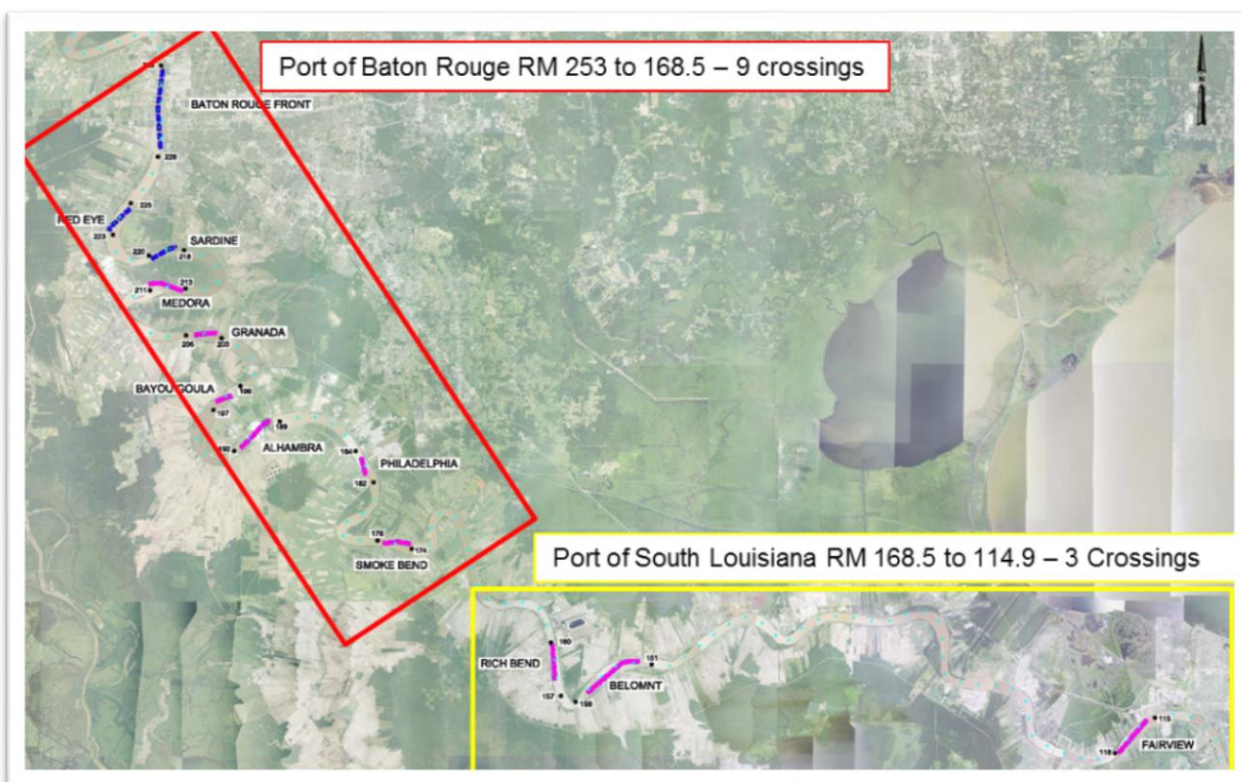


Figure 3-2 Crossing by Port

In order to optimize the final array, additional alternatives were developed that would allow for comparison of the NED benefit and B/C ratio for deepening the river through the Port of South Louisiana to a depth of 48 ft and 50 ft LWRP. This was compared to deepening the full channel (through the Port of Baton Rouge) to depths of 48 ft and 50 ft LWRP. These additional alternatives are defined as:

- **Alternative 2a:** The alternative considers a depth of 48 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 48 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.
- **Alternative 3c:** The alternative considers a depth of 48 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the



Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.

- **Alternative 3d:** The alternative considers a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.

(Note the nomenclature for the alternatives is based on the depth of the lower Mississippi River reach from RM 13.4 AHP to RM 22 BHP, 48 ft for Alternative 2 and 2a, and 50 ft for alternative 3, and 3a through 3d).

Table 3-6 provides a comparison of the first construction cost, incremental O&M cost, Net Excess Benefits, and B/C ratio for each of the newly defined alternatives as well as Alternatives 2 and 3. Alternative 3a is not included in table 3-6, as it did not provide greater net excess benefits when compared to alternative 3b, therefore this alternative was not carried forward in the evaluation.

The optimization of the final array of alternatives identified that Alternative 3d yielded the greatest net excess benefits.



Table 3-6 Optimization of Alternatives

Channel Alternative	Alternative 2	Alternative 2a	Alternative 3	Alternative 3b	Alternative 3c	Alternative 3d
First Cost of Construction	\$88,663,029	\$5,551,980	\$183,076,433	\$170,881,059	\$87,770,010	\$88,971,120
Interest During Construction	\$3,897,405	\$244,051	\$8,047,583	\$ 7,511,505	\$3,858,151	\$3,910,948
Total Investment	\$92,560,434	\$5,796,031	\$191,124,016	\$ 178,392,564	\$91,628,160	\$92,882,068
Average Annual Const. Cost	\$3,512,491	\$219,948	\$7,252,791	\$ 6,769,656	\$3,477,113	\$3,524,697
Average Annual Increm. O&M	\$100,007,021	\$13,443,710	\$131,446,950	\$ 100,007,021	\$13,443,710	\$18,126,110
Total Average Annual Cost	\$103,519,512	\$13,663,658	\$138,699,741	\$ 106,776,677	\$16,920,824	\$21,650,806
Total Average Annual Benefits	\$105,900,338	\$84,519,999	\$147,809,587	\$ 116,873,779	\$95,023,734	\$118,436,481
Net Excess Benefits	\$2,380,826	\$70,856,340	\$9,109,847	\$ 10,097,102	\$78,102,911	\$96,785,675
B/C Ratio	1.02	6.19	1.07	1.09	5.62	5.47



3.13 Identifying the Tentatively Selected Plan

Alternatives 1 through 3 as described above were reviewed and approved by the CEMVN vertical team (i.e., Division and HQ) and local sponsor at the designated Alternatives Milestone meeting on July 6, 2016 at CEMVN. The three original alternatives (1, 2, 3) were carried forward for evaluation in the draft SEIS, while economics and cost/benefits analysis for this study were also being developed concurrently. It was recognized that the original alternatives represented the maximum environmental impacts; all additional alternatives reduced the maximum impacts from the three original alternatives. For that reason, the other alternatives 2a, 3a, 3b, and 3c were developed, analyzed, and screened based on economic analysis only. The economic analysis screened alternatives 2a, 3a, 3b, and 3c from further consideration based on their respective net excess benefits. The draft EIS was reinitiated to include alternative 3d, with the original alternatives, in the consideration for a selection of a TSP.

Although the project is authorized to a depth of 55 ft for the full channel (through the Port of Baton Rouge), the economic and environmental analysis indicates that the increment with the greatest net excess benefits is alternative 3d. The Tentatively Selected Plan (TSP) for the next phase of construction is Alternative 3d. This alternative is to deepen the MRSC to a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana (refer to Figure 3-2) and to a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP (Refer to Figure 3-1). The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP. Further deepening of the channel through the Port of Baton Rouge may be implemented in a future construction phase as additional increments become economically justified to achieve the fully authorized project.

3.14 Additional Plan Formulation and TSP Confirmation

After release of the draft report, and upon consideration of the public comments, Independent External Peer Review, and Agency Technical Review comments, and the development of feasibility level design, to include evaluation of training works, sea level rise and further refinement of relocation and real estate needs, further plan formulation may be warranted to confirm and further optimize the TSP.



4.0 ENVIRONMENTAL CONSEQUENCES FOR COMPARATIVE ANALYSIS (*NEPA Required)

An evaluation of the impacts associated with the no action alternative (Alternative 1) was presented in Chapter 2. This chapter describes the direct, indirect, and cumulative environmental consequences of implementing 3 alternatives beyond the no action. The discussion of resources in this chapter coincides chronologically with Chapter 2. Several data gaps are present in the current evaluation (a 2D hydraulic model, a 3D hydraulic model, and half a dataset from Clean Water Act contaminant sampling within the crossings). These outstanding data will be shared with the resource agencies, as well as the public upon request. All data will be thoroughly evaluated prior to signing of the Record of Decision.

As detailed in Chapter 3, after completion of the draft report, public comment, and consideration of all remaining data, final feasibility level designs will be developed for the TSP if it becomes the Recommended Plan. In order to conduct a comparative analysis of the final alternative array, alternatives were “brought up” to a similar level of detail using assumptions derived from data collected during development of the TSP. Estimates developed from that analysis provide the basis for comparing potential impacts to significant resources from the alternatives in the Final Alternative Array to potential impacts from the No Action Alternative.

The direct project-related impacts would occur within the navigation channel of the Mississippi River, in designated beneficial use disposal areas, and proposed beneficial use disposal areas adjacent to the river South of Venice, LA. As such, for the purposes of environmental discussion and analysis, the scope of the potentially affected environment has been defined as the Mississippi River corridor between Baton Rouge and the Gulf of Mexico via Southwest Pass, and the surrounding coastal habitat in lower Plaquemines Parish, LA where dredged material would be used beneficially within the limits of the Federal Standard. Alternatives were compared by total NED cost and benefits; however, consideration of the following factors were also used for the evaluation and comparison of alternative plans in light of the important resources discussed in this Chapter.

- Constructing the sill and other saltwater mitigation measures for salt water intrusion impact
- Potential loss of sediment resources for other purposes
- Construction for each depth
- Dredge quantities



- Acres of beneficial use from initial construction (*incidental benefits*)
- Long term O&M for each depth
- Annual O&M dredge quantities
- Location of shoaling
- Acres of beneficial use from long term O&M dredged material placement within the Federal Standard (*incidental benefits*)
- Due to unpredictable river conditions and navigational needs, an assumption of uniform placement of dredge material was carried forward with the environmental analysis.

4.1 Description of Alternatives

The direct, indirect and cumulative impacts of Alternative 2, Alternative 3 and Alternative 3d, are evaluated in this chapter in order of the combined total of construction cubic yardage and average annual maintenance cubic yardage (i.e., impacts of Alternative 3 > Alternative 2, > 3d, Table 4-1). It should be noted that changes in advanced maintenance (+2 ft) and allowable over depth (+2ft) are not proposed under Alternative 2.

The TSP (Alternative 3d) resulted from the optimization of Alternative 3. Alternative 3d did not increase the overall environmental footprint to the degree identified under Alternative 3 because work in the lower river was the same as in Alternative 3, and because the number of crossings dredged decreased from 12 to 3 (Fairview, Belmont, Rich Bend). As such, the level of detail in the following discussion of impacts associated with Alternative 3d will be less than that detailed for Alternative 3, as many of the impacts identified with Alternative 3d will be similar to but less than those identified for Alternative 3. For this reason, many of the impacts discussions for Alternative 3d reference the impacts disclosed under Alternative 3. This chapter presents an evaluation of Alternatives 2, 3, and 3d in terms of the anticipated incremental impacts of each alternative beyond the no action / existing conditions (Table 4-1). Cumulative impacts of each alternative will be discussed later in Section 4.5 (Table 4-7). Impacts to important resources by alternative are discussed below in light of ongoing O&M experiences and the final results of 1 of 3 sedimentation models that have been completed for the study thus far. A one-dimensional (1D) sedimentation model based on the HEC-6T computer program was used to investigate long-term (multi-decade) system response to channel deepening alternatives (discussed in detail in Appendix C). System response was evaluated by comparison of plan condition (channel deepening) simulations to base condition (45-foot channel) simulations. The upstream shift in deposition projected by the 1D



model is accompanied by a very slight reduction in deposition below Head of Passes. That reduction occurs because less sediment is transported into Southwest Pass; however, there is still an ample supply of fine sediment entering the Pass. The 1D model result does not rule out the possibility that increased salinity and sediment flocculation will yield a net increase in fine sediment deposition.

It may be worth noting, that the large scale diversions that are currently being proposed upriver from Venice, LA, if ever constructed, would have much larger potential impacts on shoaling than sea level rise and channel deepening. Those diversions, if constructed and depending on size, could shift deposition to a location upstream of Venice (as opposed to upstream of Cubit's Gap). In "wet" years, the combined effects of sediment diversions and increased upstream deposition could potentially reduce sediment loads passing Venice enough to reduce dredging downstream of Venice, LA. However, because future diversions are not part of the reasonably foreseeable future, impacts to future diversions associated with project alternatives are not evaluated.

An Adaptive Hydraulics (AdH), two-dimensional (2D) sedimentation model will be used to investigate the potential effects of channel deepening on maintenance of the channel crossings (upstream of Belle Chasse, LA) and shoaling and/or lateral bar growth (downstream of Belle Chasse, LA). An existing 2D model developed for the Mississippi River Hydrodynamic and Delta Management Study will be adapted to the requirements of this study. The project TSP will be evaluated using a 3D model in order to determine the project impact on salinity intrusion and shoaling. Upon conclusion and analysis of pending 2D and 3D model findings, results will be incorporated in the final SEIS to support feasibility level analysis and will be provided to the resource agencies to conclude coordination of regulated and protected resources.

4.1.1 Alternative 3

Alternative 3 would require construction and maintenance of twelve river crossings to 50 ft LWRP and the lower river (RM 13.4 AHP – RM 22 BHP) to a depth of 50 feet MLLW. Construction and O&M quantities under Alternative 3 for the crossings and the lower river are exhibited in Table 4-1.

For the purposes of discussion, preliminary wetland value assessments (WVA) have been performed in order to quantify the benefits achieved from using construction and O&M material beneficially (Appendix A-7). Because the alternatives that consider beneficial use in the lower river would not impact wetlands except for the minor, temporary, and incidental impacts associated with accessing beneficial use (i.e., wetland creation sites), the project would not require compensatory mitigation (Section 4.6).



Table 4-1 Incremental impacts of each alternative . Alternative 1 included as reference of existing practice/conditions.

	Crossings Construction	Lower River Construction	Annual O&M Crossings	Annual O&M Lower River	Acres created
Alt. 1	0	0	13,069,498	22,250,000	528/year
Alt. 2	5,467,000	0	25,327,502	0	0
Alt. 3	8,588,600	19,900,000	35,307,502	0	1462.5
Alt 3d	616,600	19,900,000	5,087,000	0	1462.5

Depending on need and availability, both construction and maintenance activities would utilize dustpan, hopper and cutterhead dredges to maintain the crossings and the lower river under Alternative 3. It is anticipated that construction and maintenance would occur across 12 crossings (Table 2-3). Material dredged during both construction and maintenance of crossings would be placed immediately downstream, (via agitation dredging from dustpan, direct deposit from hoppers, or pumping via cutterhead), in areas greater than 50 ft LWRP. Maintenance of crossings is anticipated to be more than twice that of the current maintenance quantities, from 19,419,180 cy to 48,377,000 cy (Table 4-1).

Construction of the lower river would occur at various shoals from RM 13.4 AHP to RM 19 BHP with cutterhead dredges over 4 years and that all material would be used beneficially to the extent possible under the Federal Standard. It is anticipated that construction from RM 10 to RM 19 BHPB would result in 1462.5 acres of fresh marsh habitat over the 4-year construction period. It is also anticipated that construction of the bar channel would occur at shoals from RM 19 BHP to RM 22 BHPB with hopper dredges utilizing the Ocean Dredge Material Disposal Site (ODMDS) over 4 years. One dimensional sedimentation modeling concludes that shoaling in the lower river would not be anticipated to increase as a result of deepening from 48 ft to 50 ft (Table 4-3 and 4-5, Appendix C). As such, maintenance of the lower river would not be anticipated to increase. Alternative 3 is not anticipated to require additional maintenance dredging at a depth of 50 ft in the lower river; therefore an incremental benefit from beneficial use of dredged material during annual maintenance is not anticipated.

The current evaluation has determined that construction and/or OMRR&R of the alternatives beyond 48 ft in the Lower Mississippi River reach of the project (RM 13.4 AHP to RM 22 BHP) will potentially require the acquisition of additional dredged material placement areas, either through exercise of the Federal navigation servitude or, if necessary, by the acquisition of a real property interest in privately owned lands or on lands under the jurisdiction of USFWS or LDWF.



The determination of whether such additional lands are required for project construction of the TSP will not be made until the final feasibility design phase. If such lands are determined to be necessary, the Government intends, during that phase, to also identify the extent of the Federal navigation servitude as it relates to the additional areas for dredged material placement and access. acquisition of a real property interest in privately owned lands. Refer to Chapter 5 and the Real Estate Plan (Appendix B) for additional information. The area identified as “Original Cleared Disposal Area” is 143,264 acres, the proposed expansion area adds an additional 24,054 acres for a combined total of 167,318 acres, shown as the total area with the “Proposed Expanded Disposal Area.” (Figure 4-1).



Figure 4-1 Expanded disposal area under Alternative 3 and 3d.

4.1.2 Alternative 2



Alternative 2 would not require construction work in the lower river, but it would require construction and maintenance of twelve river crossings to a depth of 48 feet (LWRP). Constructing and maintaining the deep draft crossings (from 45 ft LWRP) to 48 ft LWRP would typically require the use of dustpan dredges; however, hopper dredges and cutterheads may occasionally be utilized, in emergency situations. Material for both construction and maintenance would be placed immediately downstream (via agitation dredging from dustpan, direct deposit from hoppers, or pumping via cutterhead), in areas greater than 50 ft (LWRP).

A total of 5,467,000 cubic yards (cy) would be dredged during a construction window of 1-2 years (Table 4-1). Once construction is completed, approximately 25,327,502 cy would be removed from the crossings annually via the three dredge types previously identified (Table 4-1).

4.1.3 Alternative 3d / Tentatively Selected Plan

Alternative 3d only differs from Alternative 3 in that it would deepen and maintain fewer crossings (i.e., a subset of 3 crossings) to 50 ft (LWRP). Construction and O&M quantities under Alternative 3d for three crossings and the lower river are exhibited in Table 4-1. For Alternative 3d, activities in the lower river would not differ from those previously described under Alternative 3. Rather than deepening the 12 crossings, Alternative 3d would deepen a subset of those crossings, specifically Rich Bend crossing (Mile 160-155), Belmont crossing (Mile 156-151), and Fairview crossing (Mile 117-111). Deepening this subset of crossings would allow for deep draft access to the Port of South Louisiana.

4.2 Water Environment

4.2.1 Mississippi River

Alternative 3

Direct and Indirect Impacts: Under Alternative 3, the project area would be constructed and maintained to a depth of 50 feet. The recent trend in shoaling between RM 13.4 AHP and RM 6 AHP in the vicinity of Venice, LA, is anticipated to increase due to additional channel deepening and eustatic sea level rise. Because MVN places material directly back into the downstream channel as it dredges the crossings, the sediment load is not anticipated to change above RM 13.4 AHP. As such, construction and maintenance of the crossings is not likely to have an impact on existing diversions as the sediment budget of the river would remain constant. Because construction and maintenance of the lower river would remove sediment from the system, negative impacts (i.e., additional shoaling) in existing anchorage areas are not anticipated.



Construction of crossings to 50 ft (LWRP) would require 8,588,600 cy over a 1-2 year period (Table 4-1). It is anticipated that three crossings would be constructed beginning at Fairview crossing, continue upriver, and cease at Rich Bend crossing. Construction of the crossings to 50 ft (LWRP) would require 8,588,600 cy over a 1-2 year period (Table 4-1). Once constructed, average annual maintenance of crossings would increase from existing practice by approximately 35,307,502 cy in these crossings. Dredged material would remain in the Mississippi River system and would be disposed of in deeper portions of the river immediately downstream.

Construction would temporarily disrupt transportation, navigation, and commercial fishing in project areas. Disturbances due to dredging activities, such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments, would likely have a short duration before returning to pre-dredging conditions. Impacts to localized fisheries would be temporary and minimal because the river system is a highly turbid system. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available. Because MVN dredges and places material back into the channel at the crossings, crossing construction and maintenance would not likely to affect sediment supply on existing downstream diversions.

Because of saltwater intrusion and relative sea level rise, based on study area loss rates from 1932-2010, the 1462.5 acres that would be created during construction of Alternative 3 would likely be reduced by approximately 57 percent to open water, by 833.6 acres after 50 years. However, it is anticipated that the proposed project would not result in overall adverse direct or secondary impacts to the aquatic environment and human environment in or near the project area.

Alternative 2

Direct and Indirect Impacts: Under alternative 2, the 12 crossings would be constructed and maintained at 48 feet (LWRP). The sediment load within the river would not be expected to change because as CEMVN dredges the crossing it would place material directly back into the downstream channel. As such, crossing construction and maintenance would not be likely to impact sediment supply for existing river diversions. Construction would temporarily disrupt transportation, navigation, and commercial fishing in project areas; however, these impacts would continue to be minor and temporary during the period of construction.

Construction of crossings to 48 ft LWRP would require 5,467,600 cy over a 1-2 year period. It is anticipated that three crossings would be constructed each year beginning at Fairview crossing and work sequentially upriver and cease after Rich Bend crossing. Once constructed, average annual maintenance of crossings would increase from existing practice approximately 25,327,502 cy.



Marsh creation would not occur under Alternative 2 because maintenance activities would not increase in the lower river and construction would not occur; however, approximately 528 acres of intermediate marsh would continue to be established annually as part of the project under the no action alternative. Because MVN dredges and places material back into the channel, crossing construction and maintenance would not likely have a cumulative impact on water levels, sediment transport, and existing diversions.

Disturbances due to dredging activities, such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments, would likely have a short duration before returning to pre-dredging conditions. Impacts to localized fisheries would be temporary and minimal because the river system is a highly turbid system. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available.

Alternative 3d

For Alternative 3d, activities in the lower river would not differ from those previously described under Alternative 3. Alternative 3d only differs from Alternative 3 in that it would deepen fewer crossings (i.e., a subset of crossings) to 50 ft (LWRP). A total of 616,000 cy would be dredged from water bottoms during construction and disposed of in deeper adjacent areas in the river. Once constructed, average annual maintenance within these 3 crossings would increase by approximately 5,087,000 cy in these crossings. (Table 4-1).

Disturbances due to dredging activities, such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments, would likely have a short duration before returning to pre-dredging conditions. Impacts to localized fisheries would be temporary and minimal because the river system is a highly turbid system. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available.

4.2.2 Mississippi River Delta

Alternative 3

Direct and Indirect Impacts: Deepening the crossings upstream of New Orleans, LA, to 50 ft would not be expected to affect coastal land building/loss. Dredged material from the crossings would remain in the Mississippi River system and would be disposed of in deeper portions of the river immediately downstream; therefore, the sediment supply to the lower river is not anticipated to change.



According to wetland value assessment models (Appendix A-7), approximately 576.5 AAHUs of intermediate marsh would be created during construction of 1462.5 acres of intermediate marsh under Alternative 3 from work in the lower portion of the river. Based on historic land loss, approximately 1082 acres would remain after 50 years (Appendix A-7).

Deepening of the channel could have impacts on the frequency and location of the salt-water sill that occurs in the deep draft channel. Comparison of alternatives initially considered the frequency of implementation of the sill for salt-water intrusion impact. However, the evaluation determined that there would be limited, if any, change in the frequency of construction of the sill for all of the alternatives. This will be further assessed with a 3D hydraulic model during feasibility level design.

With implementation of the TSP there would be some minimal and insignificant impacts to wetland resources. Depending on the existing conditions of the surrounding environment at the time of dredging and beneficial use placement, a small, undetermined amount of wetland habitat may be temporarily impacted by accessing to the open water proposed disposal areas. However, these minor, incidental impacts would be temporary and would occur as a result of coastal habitat creation. It is anticipated, that through the efforts taken to avoid wetlands impacts and the beneficial use of dredged material that functionally compensates unavoidable remaining impacts, the proposed project would not result in overall adverse direct or secondary impacts to the aquatic environment and human environment in or near the project area. Due to the incidental benefits achieved from beneficial use, the project is anticipated to have a net benefit in the delta area.

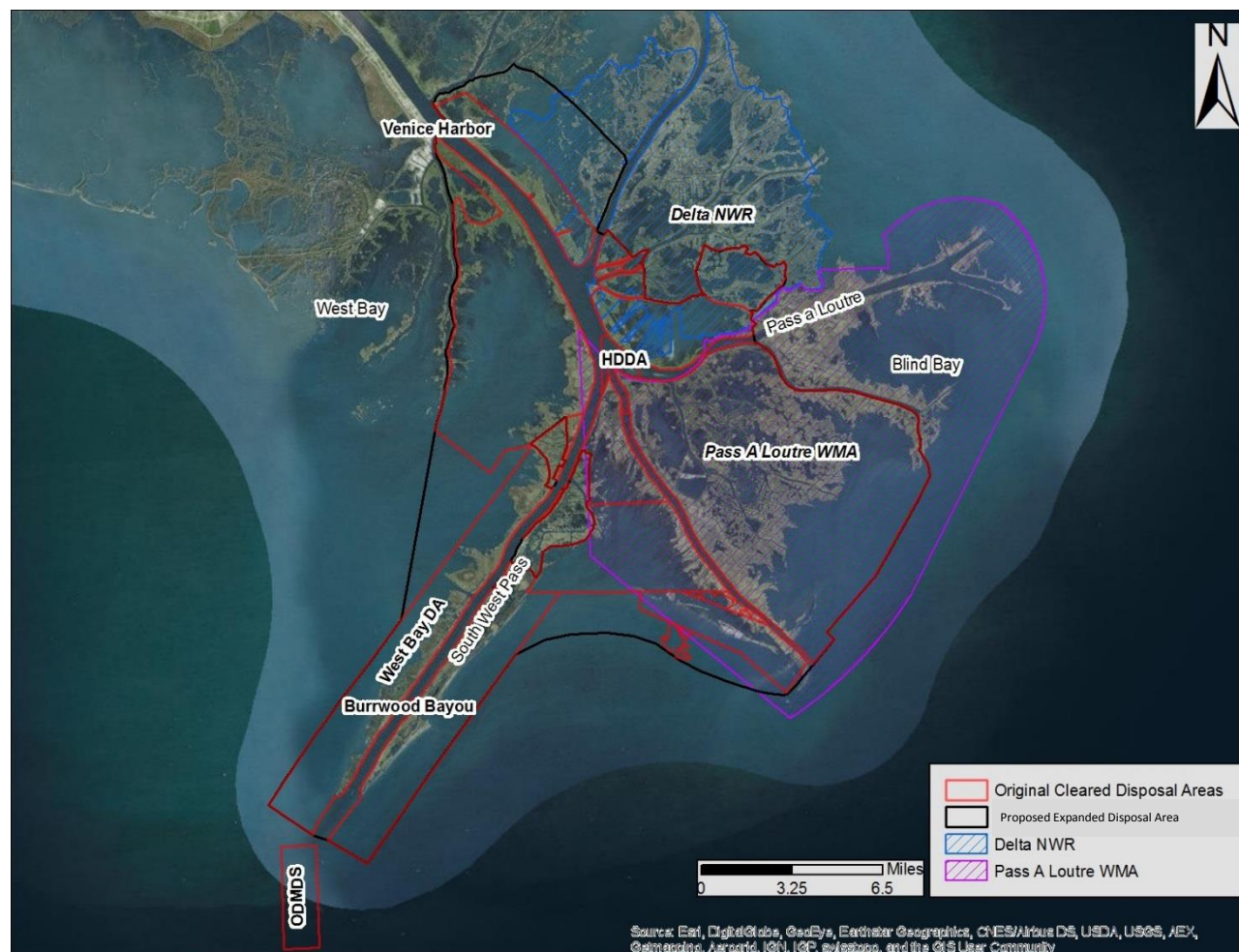


Figure 4-2 Beneficial use area in the Mississippi River Delta. (HDDA represents the open water Hopper Dredge Disposal area, and the ODMDS represents the Ocean Dredge Material Disposal Site)

Alternative 2

Direct and Indirect Impacts: Coastal habitat would not be created under Alternative 2. Deepening the crossings to 48 ft (LWRP) upstream of New Orleans, LA, is not anticipated to affect coastal land building/loss. Dredged material would remain in the Mississippi River system and would be disposed of in deeper portions of the river immediately downstream; therefore, the sediment supply to the lower river would not be expected to change. At this time, deepening the crossings would not be expected to influence the frequency and duration of saltwater wedge migration that threaten drinking water supplies upriver; however, modeling results are still ongoing. Regardless of results, it is anticipated that appropriate mitigation measures associated with potential impacts to the saltwater wedge (identified in Chapter 2) would be taken to avoid such impacts, should they occur.



Alternative 3d

For Alternative 3d, activities in the lower river and delta area would not differ from those previously described under Alternative 3. Dredging operations in the crossings would not be expected to affect the delta and lower river area.

4.2.3 Water Quality

Alternative 3

Direct and Indirect Impacts: The upper reach of the river from Baton Rouge to New Orleans has 12 crossings where channel depths are generally maintained at a depth of 45 feet. At 11 of the crossings, sediment samples were collected along with river water for chemical analyses of the sediment and dredging elutriates, where dredging would occur to deepen the river. Dredge slurry was collected directly from the discharge lines of dustpan dredges performing maintenance on 11 Deep Draft Crossings during Fiscal Year 2016. The solid and liquid fractions of the slurry were analyzed individually for the presence of EPA priority pollutants including metals, pesticides, PCBs, and semi-volatile organic compounds. With over half of the analysis complete at the time of this draft, metals were common to both fractions, and were detected at or below background levels in the Mississippi River. Chlordane pesticides and hydrocarbon exhaust products were detected infrequently in the solid samples, but at levels generally at or below 1 part per billion. All contaminant detects in dredge slurry were below regulatory water quality criteria and ecological screening values, and dredging of the crossings is not expected to have a negative impact on human health or the environment.

As 2D and 3D models are completed, this section will be updated with an evaluation of any potential direct or indirect impacts as it relates to drinking water intakes (three identified) in close proximity or just downstream of the crossings locations. Figure 4-7 shows the Donaldsonville intake at the Smoke Bend Crossing and Figure 4-8 shows two intakes for the St. James Water Districts #1 and #2 in relation to Belmont Crossing. Based on the chemical analyses of half of the sediment contaminant samples, elutriate concentrations of contaminants are not above water quality criteria, and potential impacts to drinking water intakes are not anticipated.

As described in Chapter 2, for the No Action Alternative, other on-going activities and sources of impairment will continue to influence surface water quality, which would be beyond the impacts of the proposed action.

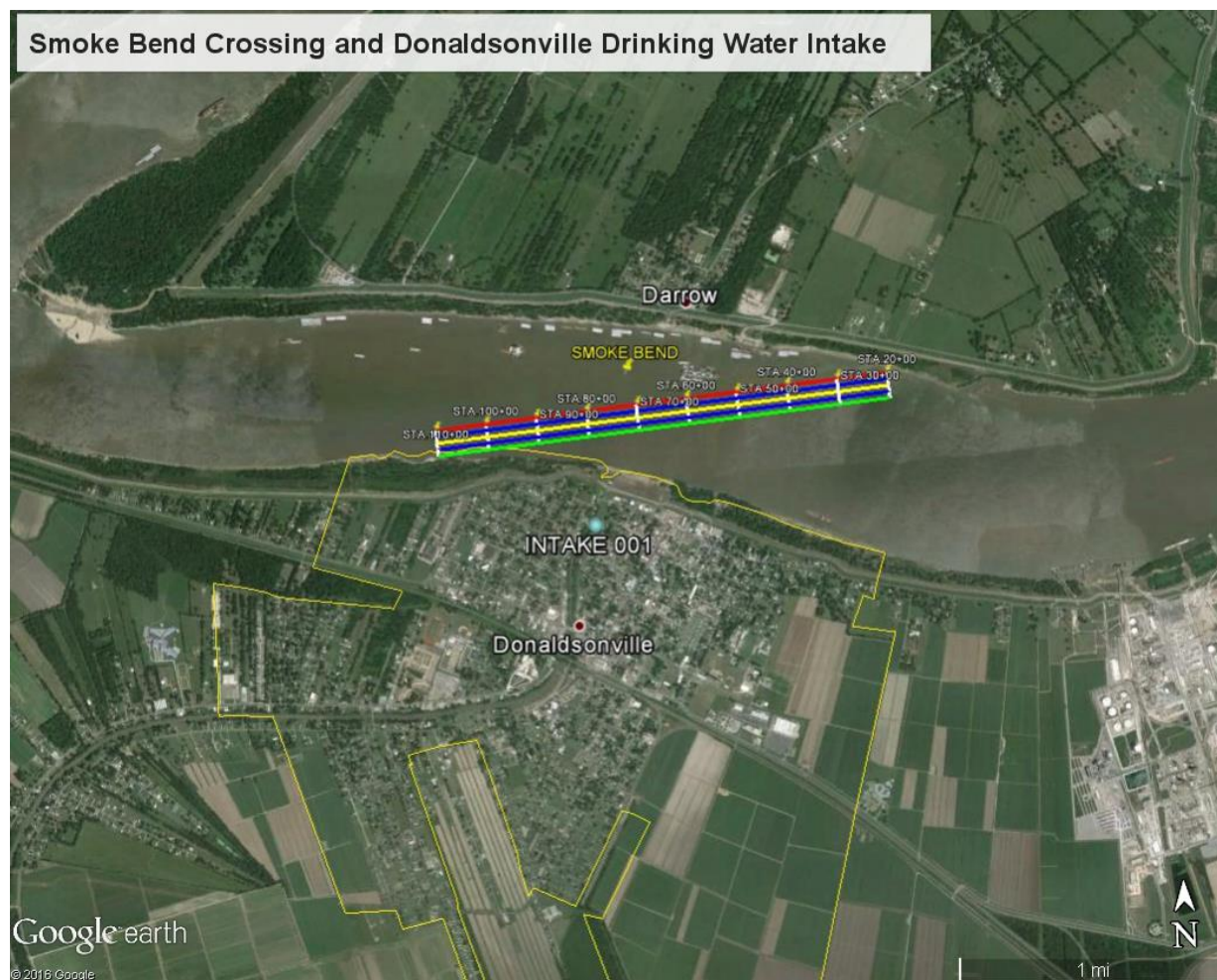


Figure 4-3 Smoke Bend Crossing and Donaldsonville Drinking Water Intake

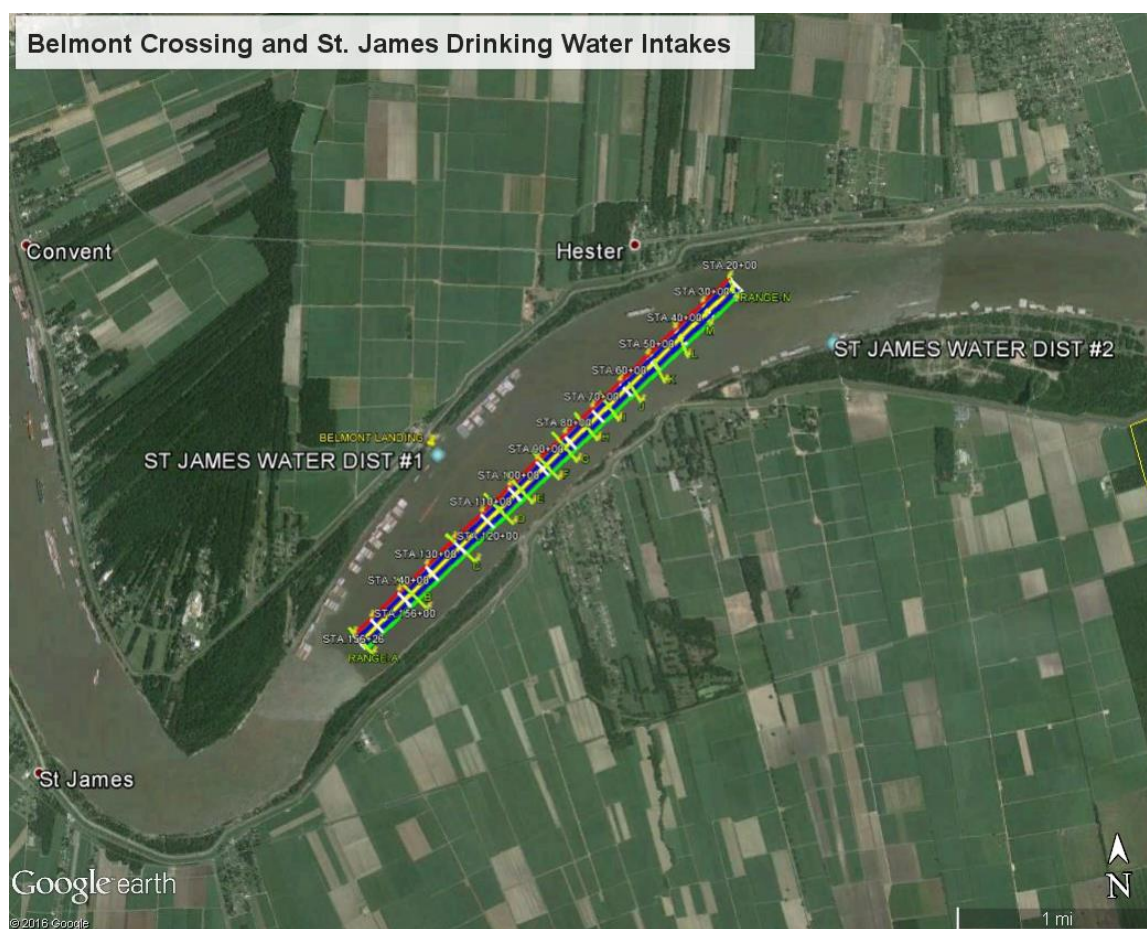


Figure 4-4 Belmont Crossing and St. James Water District #1 and #2 Intakes

Alternative 2

Direct and Indirect Impacts: See *Direct and Indirect Impacts* section for Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.2.4 Salinity

As previously discussed, impacts are discussed below in light of the results of 1 of 3 sedimentation models that have been completed and analyzed for the study. A one-dimensional (1D) sedimentation model based on the HEC-6T computer program was used to investigate long-term (multi-decade) system response to channel deepening alternatives (Appendix C). It should be noted



that the 1D model does not address the extent or frequency of salinity intrusion due to channel deepening or relative sea level rise. The salt water wedge is present throughout the year in Southwest Pass and during low flow conditions may intrude upstream of Head of Passes. Fine sediments tend to flocculate when fresh water encounters saline water enhancing sediment deposition. Increased frequency and extent of salinity intrusion, due to channel deepening or relative sea level rise, could increase the contact area between fresh and saline water. However, such increases are most likely during low flow periods when fine sediment concentrations are relatively low.

Alternative 3

Direct and Indirect Impacts: Despite the data-gaps involving two pending hydraulic models, it appears there would be little if any change in the frequency of construction of the sill for all of the alternatives. The evaluation determined that historically through the process of using localized reference gages, as described in chapter 3, the channel has been deepened over time from a depth of 45 ft. to a depth 48.5 ft MLLW, without an apparent change in the frequency of the construction of the sill. Further, since the construction of Phase I the frequency of construction of the sill has not changed. The frequency of enacting the sill is still on a 10 yr. basis. USACE will continue to investigate saltwater intrusion with additional modeling under feasibility design.

The saltwater wedge is further expected to be influenced by eustatic sea level rise. Under alternative 3, over 50 years, the marshes of Plaquemines Parish are anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions. Climate change, relative sea-level rise, and hurricane/tropical storm surge would speed the process of saltwater intrusion in the area of the lower river.

Alternative 2

Direct and Indirect Impacts: There would be no direct impacts to salinity under alternative 2. Current salinity gradient trends are expected to continue. The saltwater wedge is expected to be negatively influenced by eustatic sea level rise. Under alternative 2, over 50 years, the marshes of Plaquemines Parish are anticipated to continue to decline and convert to marsh and open water, in turn affecting local water quality conditions. Climate change, sea-level rise, and hurricane/tropical storm surge would speed the process of saltwater intrusion in the area of the lower river.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3. The project TSP will be evaluated using a 3D model in order to determine the project impact on salinity intrusion and shoaling.



4.3 Human Environment

4.3.1 Population and Housing

Alternative 3

Direct and Indirect Impacts: Deepening the river and crossings would have minimal impact on the population. Deepening the river has the potential to increase business activity at ports in the study area. An increase in business may have a positive impact on the rate of employment in the population and potentially increase population numbers in the regions where ports are located.

Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.2 Employment and Industrial Activity

Alternative 3

Direct and Indirect Impacts: Deepening the river from 45 to 50 ft would reduce the inefficiencies currently caused by insufficient depth. More sufficient navigation would reduce the light loading, tidal/river stage delays, and frequency of operation and maintenance dredging intervals and allow for easier maneuvering..

A reduction in inefficiencies may encourage shipping-related businesses to expand, potentially increasing the employment rate in the study area.

Negative impacts on business and industrial activity during construction of the project would be temporary and minimal.

Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for Alternative 3.



Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.3 Public Facilities and Services

Alternative 3

Direct and Indirect Impacts: River deepening would have a temporary and minor impact on public ferry services, public boat launches, and recreation near the deepening site.

Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for the TSP.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.3.4 Transportation

Alternative 3

Direct and Indirect Impacts: Hydraulic cutterhead dredges and disposal pipelines may cause minor and temporary interference of navigation by blocking sections of the channel, but are not expected to interfere significantly with shipping traffic. Dredging operations would be closely coordinated with representatives of the navigation industry and a Notice to Mariners would be posted by the USCG. Beneficial use-placement of dredged material in the proposed shallow open water areas could cause minor disruptions to small vessels using these portions of the project area; however, the effects on navigation would be mainly temporary. Portions of the proposed disposal areas may become inaccessible to some watercraft as wetland vegetation eventually colonizes the area; however, the shallow nature of the area currently limits most vessel access. There would be impacts to the transportation of goods along the river in the study area. Deepening the river and crossings would eliminate the inefficiencies currently caused by insufficient river depth. Transportation of goods may be interrupted during dredging, but impacts would be temporary. Public ferry services near deepening sites may also be temporarily interrupted.



Alternative 2

Direct and Indirect Impacts: Dredging operations would be closely coordinated with representatives of the navigation industry and a Notice to Mariners would be posted by the USCG. Implementing Alternative 2 would result in the same impacts described for the Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.5 Community and Regional Growth

Alternative 3

Direct and Indirect Impacts: There would be no direct impacts on community and regional growth. Indirectly, some growth in population may occur due to increased businesses at the port facilities in the study areas.

Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for the Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.6 Community Cohesion

Alternative 3

Direct and Indirect Impacts: Implementing Alternative 3 would have neither direct nor indirect effects on community cohesion.

Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.



4.3.7 Cultural and Historic Resources

Alternative 3

Direct and Indirect Impacts: There are twelve regularly maintained crossings that would be deepened from 45 ft deep to 50 ft deep, under this alternative. Both dredging depths include an additional 2 ft of advance maintenance, and 2 ft of allowed overdepth. The potential direct impact of the TSP is that any historic property located at the depth of new dredging that may have remained intact by being buried, could be destroyed by dredging. An indirect impact may be that if deeper channel crossings and the SW Pass lead to deeper draft shipping, the larger size of these watercraft may have unexpected effects via wave wash or other unpredicted physical factors that adversely affect cultural resources outside of the main shipping channel or along the banks of the river.

Alternative 2

Direct and Indirect Impacts: The direct and indirect impacts of this alternative would be the same as for the TSP. As regards cultural resources and historic properties, there is no effective difference between deepening to 50 ft or only 48 ft.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.3.8 Aesthetics and Visual Resources

Alternative 3

Direct and Indirect Impacts: Direct Impacts to Visual Resources would be minimal to negligible. The project area is remote and far removed from major thoroughfares, major urban areas, places of single-family residence, and local businesses. User activity is low and primarily relegated to water traffic only. There may be some minimal direct impacts to areas where the project boundary spreads over the Delta National Wildlife Refuge and Pass A Loutre Preserve Wildlife Management Area. Indirect Impacts may occur do to operation of machinery and construction activities in the areas where dredging would take place, but these impacts would be minimal. Use of beneficial materials dredged from the channel may create an indirect impact, depending on where and how that material is used in the future. Continued relative sea level rise could also impact the entire area, resulting in vast areas of shallow open water as vertical accretion rates fail to keep pace with rising sea levels.



Alternative 2

Direct and Indirect Impacts: Implementing Alternative 2 would result in the same impacts described for the TSP.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.9 Noise

Alternative 3

Direct and Indirect Impacts: Due to the nature of construction and O&M, the greatest noise impacts are anticipated to be associated with the extended maintenance periods of Alternative 3 over 50 years. It is anticipated that, in some instances, noise impacts may be an important issue because of their potential effects on wildlife, such as disruption of normal breeding patterns and abandonment of nesting colonies. However, tolerance of unnatural disturbance varies among wildlife. Therefore, these issues shall be addressed by identifying the key species of concern and following feasible administrative and or engineering controls, determining and implementing appropriate buffer zones, and implementing construction “activity windows” (i.e., project construction initiation and completion dates to minimize disturbance to nesting birds).

Terrestrial wildlife may be directly impacted during the placement of beneficial use of dredged material; however, most wildlife would temporarily relocate during construction. There is the potential for noise or wave action generated by construction activities to displace terrestrial wildlife in the area; however, this would be a temporary disturbance, with wildlife likely to return following the completion of disposal activities. Migratory waterfowl and other avian species, if present, would likely be only temporarily displaced from the project area. Overall, populations would not likely be adversely affected because these species would move to existing adjacent habitat areas during construction activities.

Overall, noise impacts associated with construction and O&M would be minor in relation to the ambient noise that occurs in the busy industrial corridor. Localized and temporary noise impacts would likely continue to affect animals and the relatively few people in the remote areas. Potential noise impact concerns may be expected for workers at oil and gas extraction sites, recreationists, and construction activities. Additional noise impacts would be associated with the villages, towns, and clusters of human habitations. Institutional recognition of noise, such as



provided by the regulations for Occupational Noise Exposure (29 CFR Part 1910.95) under the Occupational Safety and Health Act of 1970, as amended, would continue.

Alternative 2

Direct and Indirect Impacts: No permanent noise impacts would occur as a result of Alternative 2 and all noise emissions would be relatively short-term, ending after construction. Due to the nature of construction and O&M, the greatest noise impacts are anticipated to be associated with the extended maintenance periods of Alternative 2 over 50 years. The temporary impacts from the maintenance period for Alternative 2 are similar to those previously described for Alternative 3 above, however, the noise caused by Alternative 2 is expected to be of shorter duration than Alternative 3.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.3.10 Recreation Resources

Alternative 3

Direct and Indirect Impacts: The dredging of the Mississippi River at the crossings would have minimal impacts on recreational use. Much of the recreation impacts associated with the TSP, are related to the placement of dredge material. The material dredged at the crossing locations will be placed back into the water for transport further south. Recreationists would be temporarily displaced during construction and disposal of dredge material. New disposal sites in the Delta NWR cross into designated waterfowl hunting areas, which would most likely be temporary unavailable for use during dredge material placement. Fishing, hunting, and boating for users of the camps and campgrounds would also be affected during times of dredging and material placement.

As stated previously, about 24,000 acres in the study area are proposed to receive dredge material during three dredge cycles per year. Approximately 9,000 acres are in the Delta NWR, 1,265 acres in the Pass a Loutre WMA and the remaining 14,700 acres are in the Southwest Pass area. All work is coordinated closely with land managers from each agency to ensure compliance. Much of the receiving area that would be converted to land/marsh consists of mainly shallow open water with some eroded marsh. Less water would be available for boating and fishing; however, an increase in habitat value would be expected as the disposal area would accept the dredge material in its highly turbid form and in time, become continuous, not-turbid, brackish marsh. The creation



of marsh would provide an increase in fish and wildlife habitat including nesting habitat for water fowl and nursery habitat for fish. Consumptive recreation use would likely increase as a result of an increase in quality and quantity of fish and wildlife habitat. Bird watching opportunities are also expected to increase because of improved habitat for neo-tropical migratory songbirds.

Alternative 2

Direct and Indirect Impacts: There would be fewer impacts to recreational resources with Alternative 2 than with Alternative 3. The duration of the impacts described previously under Alternative 3 would be less. Alternative 2 does not include deepening Southwest Pass from 48 ft to 50 ft, so there would be no additional dredge material placement in the marsh areas surrounding the Pass. Dredging of the crossings further north, up river, would have no impacts on recreational resources.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3

4.3.11 Air Quality

Alternative 3

Direct and Indirect Impacts: With implementation of the proposed action, on-site construction activities would be expected to produce less than 5 tons per year of VOC emissions and less than 60 tons per year of NO_x emissions in East Baton Rouge Parish; less than 5 tons per year of VOC emissions and less than 60 tons per year of NO_x emissions in West Baton Rouge Parish; and less than 5 tons of VOC emissions and less than 75 tons of NO_x in Ascension Parish (less than the *de minimis* level of 100 tons per year per pollutant). Thus, the ambient air quality in East Baton Rouge, West Baton Rouge, and Ascension Parishes would not noticeably change from current conditions, and the status of attainment for the parishes would not be altered.

However, Iberville Parish, on-site construction activities would be expected to produce less than 10 tons per year of VOC emissions and approximately 140 tons of NO_x emissions. The 140 tons of NO_x emissions exceeds the *de minimis* level of 100 tons per year of NO_x emissions approved by the State Implementation Plan. As such, in order to avoid exceeding the *de minimis* level for NO_x, construction of the four crossings within Iberville Parish would take a phased approach and would be staged at a rate of one crossing per year.

St. James, St. Charles, and Plaquemines Parishes are currently in attainment of all NAAQS and are operating under attainment status. Calculations previously performed on fairly large



construction projects indicate that volatile organic compound emissions from typical CEMVN construction projects would be well below the 100-ton per year *de minimis* limit; therefore, it is expected that there would be no adverse impacts to air quality with the implementation of the proposed action. The status of attainment for St. James, St. Charles, and Plaquemines Parish would not be altered from current conditions, and there would be no lasting direct or indirect impacts resulting from the associated construction activities.

Alternative 2

Direct and Indirect Impacts: Ambient air quality in East Baton Rouge, West Baton Rouge, and Ascension Parishes would not noticeably change from current conditions, and the status of attainment for the parishes would not be altered. However, as explained for Alternative 3, on-site construction activities are expected to produce less than 10 tons per year of VOC emissions and approximately 140 tons of NOx emissions in Iberville Parish. The 140 tons of NOx emissions exceeds the *de minimis* level of 100 tons per year of NOx emissions approved by the State Implementation Plan. As such, in order to avoid exceeding the *de minimis* level for NOx, construction of the four crossings within Iberville Parish would take a phased approach and would need to be staged at a rate of one crossing per year.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3. All 3 crossings are in attainment of air quality standards. Ambient air quality is not expected to be altered from current conditions.

4.4 Natural Environment

4.4.1 Soils and Water bottoms

Alternative 3

Direct and Indirect Impacts: Alternative 3 would result in direct impacts to existing water bottoms in the navigation channel. Dredging at all locations would be to a maximum width of 500-feet resulting in approximately 2,800-acres of direct impacts to water bottoms in the Mississippi River.

Dredged material from the Mississippi River would be placed in the Mississippi River Delta to create coastal habitat that includes emergent and high marsh, bird islands, and deltaic ridges. The placement of the dredged material in the disposal areas would result in direct impacts to water bottoms. Hydric soils in the disposal areas consist of Aquents, Balize silty clay loam, Larose mucky clay; and less frequently Carville, Cancienne, and Shriever silty clay. Indirect impacts from the placement of dredged material would include greater soil stability in the Delta as shallow open



water bottoms are filled and vegetation density increases. The increase in land and soil stability would provide greater diversity in habitat for wildlife and improve storm surge protection for the Louisiana coast. The direct impacts to water bottoms in the long term would contribute to positive indirect impacts resulting in greater habitat diversity for wildlife, essential fish habitat, and recreational opportunities in the Mississippi River Delta.

Overall, the direct and indirect impacts to soils and water bottoms resulting from the placement of dredged material to create coastal habitat would be beneficial.

Alternative 2

Direct and Indirect Impacts: The direct and indirect impacts to soils and water bottoms under Alternative 2 would be essentially the same as Alternative 3 for construction of the crossings. Alternative 2 would increase operation and maintenance of the Mississippi River deep-draft navigation channel from the current 45 ft to 48 ft in depth, resulting in direct impacts to existing water bottoms in the navigation channel. Construction and maintenance dredging in the Mississippi River would occur at up to 12 crossings and from river mile 13.4 AHP to mile 22 BHP in Southwest Pass. Dredging at all locations would be to a maximum width of 500 –ft, resulting in approximately 2,800-acres of direct impacts to water bottoms in the Mississippi River. Soils and water bottom impacts would not be anticipated to occur in the lower river.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3. Water bottoms would only be affected within 3 crossings.

4.4.2 Vegetation Resources

Alternative 3 (a depth of 50 ft for the Crossings and a depth of 50 ft in Lower Mississippi River)

Direct and Indirect Impacts: Deepening the crossings to 50 ft (LWRP) would not be anticipated to have impacts on vegetation in the batture or the lower river area. With implementation of the proposed action there would be some minimal and insignificant impacts to wetland resources. A small, undetermined amount of wetland habitat would be temporarily impacted during the excavation of channels to provide equipment access to the proposed disposal areas. The resulting loss of wetland function would be temporary, as these areas would be backfilled to pre-project marsh elevations and eventually revegetated (naturally) and restored upon completion of the project. Direct placement of dredged material on existing marsh would be avoided. Submerged aquatic vegetation (SAV) persists in shallower, protected areas of the disposal area. It is estimated



that less than 10 percent of the open water disposal area contains SAVs. The area would be subjected to increases in RSLR, which could increase saltwater intrusion and lead to increases in and the potential conversion of remaining SAVs to open water. Much of the area, could be permanently inundated under both the intermediate and high RSLR scenarios. There could be a shift from fresh water dominant species to those species that can tolerate higher salinity.

Impacts to SAVs may occur, but with beneficial use of dredged material to the extent permissible under the requirements of the Federal Standard, impacts to fisheries habitat is anticipated to be beneficial. With implementation of alternative 3, there would be positive impacts to wetlands in the project area. Up to 1462.5 acres of new marsh and elevated wetlands would potentially be created in existing shallow open water areas with the beneficial use of dredged material within the Federal Standard removed during maintenance dredging of the Mississippi River. Due to variability in disposal placement and settling rates, a small percentage of scrub shrub habitat may establish in some higher portions of the placement during the first few years of settlement to the targeted elevation of 2 ft. Due to high rates of land loss in the area, approximately 628.9 acres would be expected to remain after 50 years (Figure 2-7).

Newly created or nourished wetlands would provide additional foraging, breeding, nesting, and nursery areas, as well as refugia for a multitude of estuarine-dependent and commercially important fish and shellfish, migratory waterfowl, wildlife, and several species of wading, diving, and shore birds, and help to offset the substantial wetlands loss currently taking place in this portion of the Mississippi Deltaic Plain. Thus, positive direct and indirect impacts to wetlands and wetland-related resources in the project area would be expected with implementation of the proposed action. Overall, there would be positive net benefits to wetland resources in the project area, with the creation of emergent wetland habitat of higher value to fish and wildlife resources than the existing open water.

Alternative 2

Direct and Indirect Impacts: Deepening the crossings to 48 ft (LWRP) would not be expected to have impacts on vegetation in the batture or disposal areas.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.



4.4.3 Wildlife

On October 11, 2016, the United States Fish and Wildlife Service (USFWS) provided a Draft Coordination Act Report, as required by the Fish and Wildlife Coordination Act (Appendix 8). The Service provided 12 Fish and Wildlife Conservation Recommendations in the report. MVN has reviewed the recommendations and responses are provided below:

1. The Service recommends that to the extent feasible all dredged material should be used beneficially to restore coastal habitats that are in decline.

Response: Concur. Dredged material will be beneficially used to the maximum extent practicable, subject to the requirements of the Federal Standard.

2. The Service and NMFS recommend the Corps evaluate options to enhance the sediment loads of proposed diversion projects or existing breaches in the vicinity of Mardi Gras Pass and Fort St. Phillip if dredging south of New Orleans is proposed in the future.

Response: Concur. If dredging south of New Orleans is proposed in the future, to the extent permissible under the USACE determination pursuant to 33 USC Section 408 and Sections 10/404 Regulatory determinations, the USACE will consider all reasonable alternatives, including those that could enhance the sediment loads of reasonably foreseeable diversion projects or existing breaches, in the context of adhering to the Federal Standard.

3. The Service and NMFS recommend the Corps expand the beneficial use areas to include areas near Spanish Pass.

Response: Do not concur. At this time the most appropriate areas available were identified, the proposed project involves the disposal of beneficial use of dredged materials at locations within the Federal Standard.

4. The Service recommends avoiding and/or minimizing impacts to wetlands, including submerged aquatic vegetation in the study area.

Response: Concur. The USACE will avoid and minimize, to the maximum extent practicable, potential project-induced adverse impacts to wetlands, submerged aquatic vegetation, and other natural resources in the study area.

5. The Service recommends avoiding and/or minimizing impacts to coastal restoration efforts in the study area and continued coordination with those efforts to avoid or minimize impacts to their effectiveness.



Response: Do not concur. Any coastal restoration effort that is constructed outside of a partnership with USACE for the construction of an authorized federal project, is subject to the 408 (33 USC Section 408) process and must avoid impacts to existing Corps water resources projects, including this project.

6. The Service recommends avoiding impacts to endangered or threatened species and their habitats, migratory birds, and colonial wading birds within and upstream of the study area as specified in this Fish and Wildlife Coordination Act Report. The service also recommends the Corps investigate the possibility of using dredged material to restore/create habitat for threatened or endangered species.

Response: Concur, in part. The USACE will avoid, to the maximum extent practicable, adverse project-induced impacts to endangered or threatened species and their habitats, migratory birds, and colonial wading birds within and upstream of the proposed study area. The USACE will also consider using dredged material to restore/create habitat for threatened or endangered species should those opportunities fall under the Federal Standard.

7. The Service recommends the Corps coordinate with the Service and other natural resource agencies in the planning of disposal areas and techniques and assessment of impacts and mitigation.

Response: Concur. The USACE will continue to coordinate with the Service as well as other natural resource agencies in planning disposal areas, the techniques utilized, assessment of the potential impacts, and potential mitigation.

8. The created wetlands should be monitored over the project life to help evaluate the effectiveness of these features and to document both the elevation and acreage of wetland areas created.

Response: Do not concur. Beneficial use of dredged material will not be monitored under this project. Beneficial use areas may be monitored under the CEMVN Beneficial Use Monitoring Plan contingent upon funding, as is current practice.

9. The Service and other resource agencies shall be provided an opportunity to review and submit recommendations on future detailed planning reports (e.g., Design Document Report, Engineering Document Report, etc.) and the draft plans and specifications on the Mississippi River Deepening Project addressed in this report.

Response: Do not concur. While the USACE will coordinate and consultation with regard to the Endangered Species Act, primarily with regard to plans and specifications review, the USACE



will not provide maintenance dredging plans and specifications to non-Corps agencies for outside review.

10. The Service recommends Special Use Permits be requested of the Delta National Wildlife Refuge (NWR) for any expected or proposed work on the Delta NWR. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by NWR. The Refuge Manager for the Delta NWR is Ms. Shelly Stiaes, ([Shelly Stiaes@fws.gov](mailto:Shelly_Stiaes@fws.gov) or 337-882-2000).

Response: Concur. The USACE will coordinate with LaDOTD as the NFS to ensure LaDOTD secures the appropriate special use permit from the Refuge Manager for the Delta NWR for proposed work on the Delta NWR. USACE will review the special use permit prior to acceptance to determine that USACE can comply with all the conditions sought by USFWS in its proposed special use permit.

11. Louisiana Department of Wildlife and Fisheries (LDWF) and the Service recommend contacting the LDWF office, Mr. Shane Granier (504-284-5264), for further information regarding any additional permits or coordination that may be required to perform work on the Pass a Loutre Wildlife Management Area (WMA).

Response: Do not concur. For that portion of the Pass a Loutre WMA that falls within the Federal Navigation Servitude, USACE will exercise its rights under the servitude for purposes of the work to be performed within that area. Should any portion of the WMA fall outside of the lands and water bottoms that are subject to the Federal Navigation Servitude, the non-Federal Sponsor is required under the project authorization to provide USACE an authorization for entry to such lands and water bottoms. Therefore, any necessary contact regarding the required authorization for entry for lands and water bottoms under the jurisdiction of LDWF will be handled by the project's NFS.

12. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service.

Response: Concur. The USACE will re-initiate Endangered Species Act consultation with the Service if the proposed project has not been constructed within 1 year or if significant changes are made to the proposed project.



Alternative 3

Direct and Indirect Impacts: With implementation of the proposed action, minimal adverse direct and indirect impacts to wildlife would be anticipated. Terrestrial wildlife generally would not be impacted, as construction activities would occur mainly over open water. There is the potential for noise or wave action generated by construction activities to displace terrestrial wildlife in the area; however, this would be a temporary disturbance, with wildlife likely to return following the completion of disposal activities. Migratory waterfowl and other avian species, if present, would likely be only temporarily displaced from the project area. Overall, populations would not likely be adversely affected because these species would move to existing adjacent habitat areas during construction activities. The placement of dredge material for beneficial use would reduce some shallow open water habitat by converting it to marsh and other coastal habitat, thereby reducing available foraging habitat for some avian species. Migratory neotropical avian species that currently utilize the area as stopover habitat would benefit as forested wetlands and emergent wetland habitats are established.

Some positive indirect impacts to wildlife in the project area would be expected with the proposed action. Approximately 1,462.5 acres of productive coastal habitat, including marsh, elevated wetlands, scrub-shrub, and other shallow open water habitat would be created through the beneficial use of dredged material. According to wetland value assessment models (Appendix 7), 576.5 AAHUs of intermediate marsh would be established during construction of 1462.5 acres (and a net of 1082 acres) of intermediate marsh under alternative 3. Submerged and emergent vegetation, as well as scrub-shrub vegetation, potentially colonizing these areas would provide valuable and diverse habitat for foraging, refugia, nesting, and loafing of terrestrial wildlife, migratory waterfowl, and other avian species. Thus, it is anticipated that wildlife in and near the project area would ultimately benefit from the proposed activities. The reduction in the amount of shallow open water is negligible compared to that remaining in the project area.

The brown pelican (*Pelecanus occidentalis*), a year-round resident of coastal Louisiana that may occur in the project area, was removed from the Federal List of Endangered and Threatened Wildlife (i.e., “delisted”) by USFWS on November 17, 2009. Despite its recent delisting, brown pelicans, and other colonial nesting wading birds and seabirds, remain protected under the Migratory Bird Treaty Act of 1918. Portions of the proposed project area may contain habitats commonly inhabited by colonial nesting wading birds and seabirds. To minimize disturbance to pelicans and other colonial nesting birds and seabirds potentially occurring in the project area, MVN would observe restrictions on activity provided by the USFWS, Lafayette, Louisiana Field Office.



Special operating conditions addressing pelicans and other colonial nesting wading birds and seabirds, that would be included in all contract awards include:

Colonial Nesting Birds

Colonial nesting wading birds (including, but not limited to, herons, egrets, and Ibis) and seabirds/water-birds (including, but not limited to terns, gulls, Black Skimmers, and Brown Pelicans) are known to nest in the project area. The nesting birds and their nests must not be disturbed or destroyed. The nesting activity period extends from 15 February through 15 September. Dredging activity during this period may be subject to additional requirements as stated below. Note that below designations (e.g. "Section X") will be filled in with the appropriate alpha or numeric reference at the proper time.

"Implementation and Reporting:

- a. In addition to the paragraph located in Section X, paragraph X entitled "Implementation and Reporting," the Contractor shall also submit the Bird Nesting Prevention Plan, see paragraph X entitled "Bird Nesting Prevention and Avoidance Measures."
- b. The presence of nesting wading birds and/or seabirds/water-birds within the minimum distances from the work area, as specified in the paragraph entitled "No Work Distances," shall be immediately reported to CEMVN.

No-work distance restrictions are as follows:

Terns, gulls, and Black Skimmers - 650 feet;

Colonial nesting wading birds - 1000 feet; and,

Brown Pelicans - 2000 feet.

Coordination by the New Orleans District personnel with the U.S. Fish and Wildlife Service may result in a reduction or relaxing of these no-work distances depending on the species of birds found nesting at the work site and specific site conditions.

Bird Nesting Prevention and Avoidance Measures:

The Contractor shall prepare and submit to the Contracting Officer's Representative, for approval, a plan detailing the efforts that will be undertaken to prevent birds from nesting within the minimum distances, as specified in paragraph X entitled "No Work Distances,"



from any work activity. The plan shall be submitted in accordance with paragraph X entitled "Implementation and Reporting."

Nest prevention measures shall be intended to deter birds from nesting on the disposal area(s) and access corridor(s) without physically harming birds during the nesting activity period, as specified in the paragraph entitled "General." Nest prevention measures may be used in combination and/or adjusted to be most effective. The use of any harassment measures shall be in accordance with EM 385-1-1 (Safety and Health Requirements), dated September 15, 2008. At minimum, nest prevention measures shall include the following:

Flagging/Streamers - Flagging and/or streamers at least 2 ft in length and which consist of reflective plastic/mylar type material shall be attached to the top of stakes at least 3 feet in height. The stakes shall be driven into the ground at approximately 20-foot intervals. Flagging and/or streamers shall be placed such that the flags/streamers move in a light wind.

Vehicular/Pedestrian Traffic - At minimum, one terrain vehicle and/or one person shall travel throughout the entire disposal area at least once per hour from dawn to dusk.

Upon the exercise of Option Item "Bird Nesting Prevention and Avoidance Measures," the Contractor shall begin work within 24 hours. Specific nest prevention measures used during the work shall be monitored for effectiveness and may require adjustment and/or modification. All equipment/supplies used for nest prevention shall be removed from the work site upon the completion of work and as directed by the Contracting Officer.

If bird nests are discovered at the work site, immediate notification shall be made in accordance the paragraph entitled "Reporting." The Contractor shall immediately mark the bird nests with flagging on stakes 3-feet above the ground surface and no closer than 3 feet from the nest. The Contractor shall immediately implement safe work distances from the nest(s) as specified in the paragraph entitled "No Work Distances," place flagging to create exclusion zone(s) around the nest(s), and advise all equipment operators of the bird nest(s) and exclusion zone(s)."

Alternative 2

Direct and Indirect Impacts: Direct and indirect impacts on wildlife caused by crossing construction and maintenance would be expected to be minor in extent and short term in duration. Wildlife (deer, birds, raccoons, rabbits, etc.) that occur in the batture may be temporally



inconvenienced by nuisance noise caused by dredging, however, considering other ambient noises, impacts on wildlife would be relatively minor in extent and short term in duration. The special operating conditions identified for Alternative 3 would also be included in the contracts for Alternative 2.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3. Increases in ambient noise levels from construction upstream from the Port of South Louisiana would not affect surrounding wildlife in the batture area.

4.4.4 Aquatic and Fisheries Resources

Coordination with NMFS for impacts to and conversion of essential fish habitat is ongoing at the time of Draft release and no conclusions have been made at the time. Preliminary MVN findings are discussed in this section.

Alternative 3

Direct and Indirect Impacts: With implementation of the proposed action, there would be some minimal direct and indirect effects to aquatic resources/fisheries in the form of altered open water bottom habitat. A maximum of approximately 1462.5 acres of shallow open water bottoms would be temporarily or permanently impacted by the beneficial use-placement of dredged material into the proposed disposal areas. Based on the current estimate of 10 percent cover of SAVs in the disposal area, it is estimated that 146.3 acres of SAV habitat would be converted to intermediate marsh as a result of project construction.

It is anticipated that mobile fishery species would avoid proposed areas of disposal activities during the project period, thereby minimizing direct and indirect impacts to those species. Brown shrimp, white shrimp, and crabs may be directly impacted through the filling of shallow open water areas with dredged materials; however, these species could potentially indirectly benefit from the abundance of introduced detritus, and subsequent food resources, from these materials. Sessile or slow moving benthic organisms may be smothered in areas where dredged material is deposited for marsh creation. Sediment particles that become suspended due to disposal activities may impact filter-feeding benthic invertebrates by fouling feeding apparatus if the concentration of such particles is excessively high. Clams and oysters, in particular, may experience a reduction in pumping rates with increased turbidity (Loosanoff 1961). The project area is not considered prime oyster habitat. Oysters would not be impacted because, per LDWF regulation, dredging would not occur within 1/2 mile of existing oyster lease boundaries, currently of which there is only one lease



in the study area. Currently, LDWF does not identify oyster seed grounds in the expanded disposal area. <http://gis.wlf.la.gov/oystermapping/map.html>. CEMVN will identify/quantify the total acreages of leases (currently only 1) within the expanded disposal area, and then disclose that those areas come with some restrictions and pose additional challenges.

With implementation of the proposed action, some positive indirect impacts to fisheries in the project area would be expected. Beneficially used dredge material would be expected to create up to 1462.5 acres of new marsh platform and other coastal habitat in the proposed open water disposal areas. According to wetland value assessment models (Appendix 7), 576.5 AAHUs of intermediate marsh would be created during construction of 1462.5 acres of intermediate marsh under alternative 3 (noting that approximately 1082 acres would remain after 50 years). The expansive emergent and elevated wetland vegetation expected to colonize this area would enhance primary and secondary productivity in the area and provide substantial fisheries benefits resulting from valuable foraging, breeding, and nursery habitat for finfish and shellfish, while helping to offset the considerable wetlands loss currently taking place in this portion of the Mississippi River Delta. Creation of new marsh would provide highly productive fisheries habitat, increase detrital food material, and likely contribute to overall increased fisheries productivity in the project area. Benefits to both commercial and recreational fisheries would be expected.

Water quality and benthic species would be expected to rebound once project construction is complete. The restoration of fresh marsh in areas that are currently open water would provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus thereby increasing the primary productivity in the wetland system.

With implementation of the proposed action, initially some EFH for brown shrimp, white shrimp, and red drum would be directly impacted in the project area during the beneficial use-placement of dredged material for wetlands development in the shallow open waters of the proposed disposal areas. Up to approximately 1,462.5 acres of shallow open water bottom and associated EFH habitat (e.g., mud/sand substrates, SAV) would be potentially impacted by the placement of dredged material in the proposed disposal areas under alternative 3; however, these areas would be converted to generally more productive categories of EFH (e.g., estuarine emergent marsh, marsh edge, inner marsh, marsh/water interface) as they eventually become colonized by emergent vegetation. Thus, the proposed action would provide mainly positive indirect impacts to EFH in the project area, and any direct or temporary adverse impacts would be sufficiently offset by the net benefits from creating up to 1,462.5 acres of marsh, new shallow open water habitat, and associated EFH.



Additional, short term EFH impacts would include a temporary and localized increase in estuarine water column turbidity during the placement of dredged material in shallow open water areas; however, the project area is a naturally turbid environment and increased turbidity is not expected to significantly affect EFH needs within the project area.

Alternative 2

Direct and Indirect Impacts: With implementation of the Alternative 2, there would be some minimal direct and indirect effects to aquatic resources/fisheries in the form of altered open water bottom habitat. Impacts to EFH would not be expected under alternative 2 because EFH does not occur within the river and there would be no impacts to coastal habitat in the vicinity of Southwest Pass. It is anticipated that mobile fishery species would avoid proposed areas of disposal activities during the project period, thereby minimizing direct and indirect impacts to those species. Sessile or slow moving benthic organisms may be smothered in areas where dredged material is removed. Sediment particles that become suspended due to disposal activities may impact filter-feeding benthic invertebrates by fouling feeding apparatus if the concentration of such particles is excessively high. Since the project area is a naturally turbid environment and the majority of resident finfish and shellfish species are generally adapted to, and very tolerant of, high suspended sediment concentrations, the effects of turbidity and suspended solids on fisheries in the area would likely be negligible.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.4.5 Threatened and Endangered Species

Endangered species consultation with USFWS and NMFS is ongoing at the time of Draft release and no conclusions have been made at the time of this draft release. Preliminary MVN findings are discussed in this section. Once finalized, annual dredging operations would continue to be coordinated with the USFWS and NMFS on at least an annual basis under the Endangered Species Act. Opportunities to avoid impacts to protected species were presented previously in the Fish and Wildlife Conservation Recommendations in Section 4.4.3 (Appendix 8).

Alternative 3

Direct and Indirect Impacts: The deepening of the crossings and the lower river, and the disposal of associated dredge materials would not adversely affect any designated critical habitats for



protected species, and the project is not likely to adversely affect threatened or endangered species.

High levels of sediment in the water column and low prey availability probably preclude any high concentrations of sea turtles in the proposed dredging regions. Sea turtles have the mobility necessary (i.e. physiology, suitable habitat elsewhere) to avoid the project area during periods of dredging. Furthermore, hydraulic cutterhead pipeline dredging operations have not been identified as a source of sea turtle mortality.

It is extremely unlikely that manatees would be found in the project area or the surrounding shallow open waters; however, if manatees are observed within 100 yards of the “active work zone” during proposed dredging/disposal activities, MVN would implement the appropriate special operating conditions (e.g., no operation of moving equipment within 50 feet of a manatee; all vessels should operate at no wake/idle speeds within 100 yards of work area; siltation barriers, if used, should be re-secured and monitored; report manatee sightings or collisions), as provided by the USFWS, Lafayette, Louisiana Field Office. The following special operating conditions for manatees would be included in any MVN plans and specifications developed prior to dredging and disposal activities, as recommended by the USFWS, Lafayette, Louisiana Field Office:

The West Indian manatee may be present in the project vicinity. The Contractor shall instruct all personnel associated with the project of the potential presence of manatees in the area, and the need to avoid collisions with these animals. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees. Manatees are protected under the Marine Mammal Protection Act of 1972, and the Endangered Species Act of 1973. The Contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of construction activities not conducted in accordance with these Specifications:

Manatee Signs. Prior to commencement of construction, each vessel involved in construction activities shall display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8-1/2" x 11" reading, "CAUTION: MANATEE HABITAT/IDLE SPEED IS REQUIRED IN CONSTRUCTION AREA." In the absence of a vessel, a temporary 3' x 4' sign reading "CAUTION: MANATEE AREA" shall be posted adjacent to the issued construction permit. A second temporary sign measuring 8-1/2" x 11" reading "CAUTION: MANATEE HABITAT. EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION" shall be posted at the dredge operator control station and at a location prominently adjacent to the issued construction permit.

The Contractor shall remove the signs upon completion of construction.



a. Special Operating Conditions if Manatees are Present in the Project Area.

(1) If a manatee(s) is sighted within 100 yards of the project area, all appropriate precautions shall be implemented by the Contractor to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee is closer than 50 feet to moving equipment or the project area, the equipment shall be shut down and all construction activities shall cease to ensure protection of the manatee. Construction activities shall not resume until the manatee has departed and the 50-foot buffer has been reestablished.

(2) If a manatee(s) is sighted in the project area, all vessels associated with the project shall operate at "no wake/idle" speeds at all times, and vessels will follow routes of deep water whenever possible, until the manatee has departed the project area. Boats used to transport personnel shall be shallow-draft vessels, preferably of the light-displacement category, where navigational safety permits.

(3) If siltation barriers are used, they shall be made of material in which manatees cannot become entangled, are properly secured, and are regularly monitored to avoid manatee entrapment

Piping plovers and the Red Knot could occur along the shoreline and in the intertidal and shallow waters of the project area during winter migration, but are not permanent residents of the area. During placement of dredged material into the proposed disposal areas, piping plovers may be temporarily displaced to other areas for foraging and loafing; however, this is not considered to be detrimental due to an abundance of similar habitat in the vicinity of the project area.

The Gulf sturgeon is not anticipated to be present at the reach of the crossings. Pallid sturgeon are believed to be a strictly freshwater fish rarely found downstream of New Orleans, LA. Both sturgeon are probably absent from the Mississippi River delta during low river flows when salt water from the Gulf of Mexico intrudes upriver along the bottom of the channel (salt water wedge). If project construction is planned during these events, impacts to pallid sturgeon due to dredging activities in the Mississippi River Delta are unlikely. Pallid sturgeon, however, are potentially affected by crossing construction and maintenance

The USFWS recently provided the following recommendations for MVN to implement during annual maintenance dredging activities. Their implementation should further reduce the unlikely chance of encountering pallid sturgeons, turtles or other fish species while conducting dredging activities.



1. To the extent possible, schedule dredging activities in the project area during low flow periods, when salt water occurs on the channel bottom further upriver than during normal or high river flows.
2. The cutterhead should remain completely buried in the bottom material during dredging operations. If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate should be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased.
3. During dredging, the pumping rates should be reduced to the slowest speed feasible while the cutterhead is descending to the channel bottom.
4. If hopper dredges are utilized, explore the feasibility of using a rigid sea turtle deflector, which is designed to protect sea turtles by preventing them from entering the draghead, and evaluate the effectiveness of that device for pallid sturgeon and other fish species.

Alternative 2

Direct and Indirect Impacts: Impacts to sea turtles, piping plover, and the red knot would not be expected with Alternative 2 due to the location of river work and because cutterhead dredges would not be utilized. All other impacts to threatened and endangered species are similar to Alternative 3 and were previously described.

Alternative 3d

See *Direct and Indirect Impacts* section for Alternative 3.

4.5 Cumulative Impacts

Past, Present, and Foreseeable Coastal Restoration Actions in Louisiana:

The list below describes coastal ecosystem restoration efforts that cumulatively effect coastal wetland loss within the region. The EPA, reporting on the Nation, states the number of restoration projects grows yearly. Current Federal initiatives call for a wide range of restoration actions, including improving or restoring 25,000 miles of stream corridor; which contributes to the success of neo-tropical migratory species

(sources: <http://www.nwd-mr.usace.army.mil/rcc/MRFTF/docs/USACE-NFPC%20Nonstructural%20Measures%20Definitions.pdf>; and <http://water.epa.gov/type/wetlands/restore/principles.cfm>).



- Coastal Impact Assistance Program (CIAP) is authorized by the Outer Continental Shelf (OCS) Lands Act, as amended; 31 U.S.C. 6301-6305. The intent of the program is to disburse funding to eligible producing states and coastal political subdivisions for the purpose of conservation, protection, or restoration of coastal areas including wetlands; mitigation of damage to fish, wildlife, or natural resources; planning assistance and the administrative costs of complying with these objectives; implementation of a federally-approved marine, coastal, or comprehensive conservation management plan; and mitigation of the impact of outer Continental Shelf activities through funding of onshore infrastructure projects and public service needs. Louisiana's CIAP Program, administered by the Department of Interior, provides approximately \$500 million dollars to Louisiana and includes a total of 103 projects state-wide, with 11 state projects, 17 state/parish projects and 75 parish projects. Examples of CIAP projects are presented below.
 - East Grand Terre Island Barrier Island Restoration
 - Barataria Land Bridge Dedicated Dredging created more than 2,000 acres of marsh
 - Currently under construction is the Marcantel Beneficial Use to create 440 acres of marsh
 - PO-73-2 - Central Wetlands – EBSTP to A2
 - PO-148 - Living Shoreline
 - TE-63 - Falgout Canal Freshwater Enhancement
 - BA-0161 - Mississippi River Water Reintroduction into Bayou Lafourche
- CWPPRA Program – In 1990, Congress passed the Breaux Act (Public Law 101-646, Title III CWPPRA); it is authorized until 2019. As of June 2016, 210 CWPPRA projects have been approved, 102 have been constructed, 23 are under construction, 23 are in the engineering & design phase, 5 are Program support projects & 57 have been deauthorized, inactivated or transferred to another program. (There are 153 active CWPPRA projects refer to the following website for a comprehensive list: <https://lacoast.gov/new/Projects/List.aspx>).
- CS-Louisiana Coastal Area (LCA), Ecosystem Restoration Study (USACE 2004) recommends 15 near-term measures aimed at addressing the critical restoration needs. The components recommended for authorization include five critical near-term ecosystem restoration measures, a demonstration program consisting of a series of demonstration projects, a beneficial use of dredged material (BUDMAT) program, and a science and technology program. The five



critical near-term ecosystem restoration measures, demonstration projects, and BUDMAT projects are all subject to the approval of feasibility level of detail decision documents by the Secretary of the Army. To date, a total of 80 acres of wetlands were created by placing HDDA dredged material in shallow open water areas of West Bay under the LCA BUDMAT program in FY 2015. At least for some unidentified period of time, LCA BUDMAT will potentially utilize dredge material from this project beneficially beyond the Federal Standard. Presently the LCA BUDMAT authorization is limited to federal expenditure of \$100,000,000. The 2012 State Master Plan indicates little opportunity in partnering on beneficial use south of Venice, LA. The January 31, 2005, Chief's Report approved the Near-Term Plan substantially in accordance with the 2004 LCA Study. Title VII of the Water Resources Development Act of 2007 (WRDA 2007) (Public Law 110-114) authorized an ecosystem restoration Program for the Louisiana Coastal Area substantially in accordance with the Near-Term Plan. Some of the LCA projects have not yet been authorized for construction, and some of those that have been authorized for construction but no longer have a local non-federal sponsor. Except for BUDMAT, portions of the following projects are being constructed by the State pursuant to an In-Kind MOU. Some portion of these projects were constructed without an agreement or In-Kind MOU in place and are thus not eligible for credit as a LCA project. None of the construction efforts by the State have been determined officially to be integral to the Federal LCA project. That will not occur until the Integral Determination Report process is commenced. Except for BUDMAT, these are being constructed independently by the state and that portions of the projects have the potential to be approved as integral to the LCA project.

- LCA projects that are completed or are currently under construction include:
- LCA BUDMAT at Tiger Pass (not yet constructed)
- LCA West Bay Marsh Creation Tier 1 project, which is part of the LCA's Beneficial Use of Dredged Material (BUDMAT) Program
- LCA Barataria Basin Barrier Shoreline Caminada (Phase II)
- LCA Barataria Basin Barrier Shoreline Shell Island (Phase II)
- A portion of the LCA Terrebonne Basin Barrier Shoreline Whiskey Island
- LCA Amite Diversion Canal modification



- The 2012 Louisiana's Comprehensive Master Plan for a Sustainable Coast, (source: http://issuu.com/coastalmasterplan/docs/coastal_master_plan-v2?e=3722998/2447530); indicates that the CPRAB has, since 2007:
 - Benefited 19,405 acres of coastal habitat
 - Moved over 150 projects into design and construction
 - Constructed projects in 20 parishes
 - Constructed 32 miles of barrier islands/berms
- USACE Navigation projects, Beneficial Use of Dredged Material Program
 1. The CEMVN maintains 11 major navigational channels in LA. (2800 miles of waterways) On average, about 74.4 million cubic yards (CY) of shoal material are removed from Federal navigation channels every year.
 - a. of this annual total, about 18.7 million CY is removed from projects located too far from potential beneficial use disposal sites to be economically feasible
 - the Mississippi River Deep Draft Crossings account for about 18 million CY of this total
 - b. of this annual total, about 16.3 million CY consists of “fluff” material that is not usable/suitable for marsh restoration
 - the Atchafalaya River and Calcasieu River bar channels account for this “fluff” material
 2. Thus, of the 74.4 million CY that the CEMVN dredges every year, only about 39.4 million CY are actually available for beneficial use placement.
 3. On average, about 16.4 million CY of dredged material is beneficially used on an annual basis.
 - a. This equals about 42 % of all dredged material removed annually in CEMVN that is actually available and suitable for beneficial use placement.
 - b. The majority of this beneficial use is funded by the O&M budget. The remainder is paid for by CWPPRA, Section 204, or by Contributed Funds depending on availability.



4. With the exception of the Gulf Intracoastal Waterway, all major Federal navigation channels where maintenance dredging is performed have had some portion of their dredged material used beneficially.

5. Shoal material removed by hopper dredges in Southwest Pass (about 13-14 million CY annually) are not currently used directly for beneficial uses. However, the hopper dredge disposal area located at Head of Passes is occasionally dredged by cutterhead dredge and this material is beneficially used to create marsh and duck nesting habitat on the nearby Delta National Wildlife Refuge.

6. Since 1976, some portion of sediments removed from Federal navigation channels in Louisiana have been used for coastal habitat restoration.

- a. Dredged material from Southwest Pass provided the sediment source for this initial beneficial use effort in 1976.

7. To date (1976-2015), the CEMVN has used dredged material to create/restore approximately 62 square miles (39,568 acres) of coastal habitat in Louisiana. The majority of this beneficial use is funded by the O&M budget under the Federal Standard. Anything beneficial use beyond the Federal Standard would require funding from other programs such as CWPPRA, LCA BUDMAT, Continuing Authorities Program - Section 204, or by Contributed Funds depending on availability.

- a. Approximately 33,083 acres of wetland habitat.
- b. Approximately 3,485 acres of bird nesting islands, beach/shoreline, and barrier island habitat.
- c. Approximately 3,000 acres of scrub/shrub, maritime forest ridge, grassland habitat (Southwest Pass).

8. Channel-by-channel breakdown of beneficial acres created/restored by Federal navigation projects:

- a. Calcasieu River = 3,358 acres
- b. Mermentau River = 242 acres
- c. Freshwater Bayou = 344 acres
- d. Atchafalaya River = 8,986
- e. Houma Navigation Canal = 143 acres
- f. Port Fourchon = 309 acres
- g. Barataria Bay Waterway = 1,079 acres
- h. Tiger Pass = 624 acres



- i. Baptiste Collette = 1,828
 - j. South Pass = 1,971 acres
 - k. Southwest Pass = 18,013 acres
 - l. MRGO = 2,591
 - m. Berwick Bay Harbor = 59
 - n. Tangipahoa River = 21
- Restoration of injuries to natural resources damaged by the 2010 Deepwater Horizon oil spill is presently under the Natural Resource Damage Assessment (NRDA), a legal process under the Oil Pollution Act of 1990 (OPA) and the Louisiana Oil Spill Prevention and Response Act of 1991 (LOSPRA) whereby designated trustees represent the public to ensure that natural resources injured in an oil spill are restored (source: <http://la-dwh.com/AboutNRDA.aspx>; accessed November 25, 2015). Both federal and state NRDA regulations provide a step-by-step process for trustees to determine injuries, to assess damages, and to develop and implement restoration projects that compensate the public for injuries to natural resources impacted by an incident. In general, the NRDA process involves three steps: (1) pre-assessment; (2) restoration planning; and (3) restoration implementation. On July 11, 2011, Governor Bobby Jindal unveiled the “Louisiana Plan” which outlines 13 initial proposed early restoration projects (source: <http://la-dwh.com/LouisianaPlanProjects.aspx>). The projects are consistent with Louisiana’s Coastal Master Plan and they support the goal of compensating the public for natural resource injuries resulting from the Deepwater Horizon Oil Spill.
- In February of 2015, the Deepwater Horizon Natural Resource Damage Assessment Trustees finalized the Deepwater Horizon Oil Spill Draft Programmatic Damage Assessment and Restoration Plan and Programmatic Environmental Impact Statement (PDARP/PEIS) for public review and comment (source: http://la-dwh.com/PDARP_PEIS/Draft_PDARP_PEIS.aspx). The Trustees identified Alternative A as their preferred alternative. Alternative A is an integrated restoration portfolio that emphasizes the broad ecosystem benefits that can be realized through coastal habitat restoration in combination with resource-specific restoration in the ecologically interconnected northern Gulf of Mexico ecosystem. The restoration dollars could be used for a variety of restoration approaches. For illustration purposes only, the approximately \$4 billion allocated to Louisiana could be sufficient to create 20,000 to 40,000 acres of coastal marsh in Louisiana along hundreds of miles of shoreline, supporting the diversity of fish, birds, and animals that depend on coastal marsh. Although no NRDA sponsored projects have yet been constructed, it is reasonably foreseeable that the nearly Gulf-coast wide damages would be mitigated.
- The Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act (RESTORE Act) represents a portion of the Congressional



response to the Deepwater Horizon oil spill. The Act dedicates 80 percent of all Clean Water Act administrative and civil penalties related to the Deepwater Horizon oil spill to the Gulf Coast Restoration Trust Fund (Trust Fund). RESTORE Act funds are allocated between five buckets: the Direct Component (35%), the Council-Selected Restoration Component (30%), the Spill Impact Component (30%), the Gulf Coast Ecosystem Restoration Science Program (2.5%); and Centers of Excellence Research Grants Program (2.5%). In early 2013, Transocean entered into a plea agreement to pay \$1 billion to resolve federal Clean Water Act civil penalty claims, of which \$800 million will be made available under the RESTORE Act to fund Gulf Coast recovery projects. The process of selecting projects for implementation under the RESTORE Act is anticipated to continue through the period of analysis, until the allocated funds are exhausted. Some projects have been selected and funded for implementation and will be discussed as a part of the reasonably foreseeable actions section below. In November of 2016, the Louisiana Coastal Protection and Restoration Authority (CPRA) has been awarded two grants totaling approximately \$7.5 million from the Gulf Coast Ecosystem Restoration Council (RESTORE Council) for engineering and design of the Golden Triangle Marsh Creation (\$3.2M) project and the Biloxi Marsh Living Shoreline (\$4.3M) project under the Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act). These projects represent two out of seven total projects that were selected for funding by the RESTORE Council under its Initial Funded Priorities List that will directly benefit Louisiana. One additional grant in the amount of \$7.3 million was funded by the RESTORE Council in September for the engineering and design of the West Grand Terre Beach Nourishment and Stabilization Project.

Past, Present and Foreseeable Actions Along the Project Corridor (Baton Rouge, LA to the Gulf of Mexico:

The impact of past, present, and reasonably foreseeable projects in the project area on the important resources documented in this SEIS are represented by Table 4-2. Ecosystem restoration type projects in the basin work to enhance and restore historic ecosystem processes within the basin. Although these projects may result in temporal impacts and tradeoffs within the important resources, their overall effects on the system from a human and natural environmental perspective would be wholly positive. The structural projects (e.g. levee systems), to a large degree, produce socioeconomic benefits (primarily in the form of navigation or flood control) that are the impetus for their construction. Though impacts to the natural environment from construction of these projects have been avoided to the maximum extent practicable, remaining unavoidable impacts would require mitigation. Environmental Justice impacts have been avoided during design of these projects. However, the structural projects have resulted in impacts to the aesthetics and recreational



opportunities within the system. Ecosystem restoration plans in the region that improve estuarine habitat also provide benefits to the commercial fishing industry.

The list is not exhaustive, but provides a representative sample of projects that cumulatively effect the river corridor and coastal wetland loss.

Table 4-2 Cumulative impacts of past present and reasonably foreseeable projects along the project corridor between Baton Rouge, LA and the Gulf of Mexico (“+”=positive, “-”=negative and “O”=no impact)

Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics
CIAP BA-43 (EB): EB-Long Distance Mississippi River Sediment Pipeline	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
CWPPRA BA-39: Mississippi River Sediment Delivery System - Bayou Dupont	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
State of Louisiana BA-03: Naomi Siphon Diversion	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
WRDA BA-01: Davis Pond Freshwater Diversion and Forced Drainage Area	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
Louisiana DOTD: Future I-49 Corridor	Structure	+/-	+/-	o	o	-	O	-	-	o	+	+
US Army Corps of Engineers: Davis Pond	Structure	+/-	+/-	o	o	o	O	-	-	o	o	o



Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics
Freshwater Diversion Structure												
Algiers Lock	Structure	+/-	+/-	o	-	-	O	+/-	-	o	o	-
Local Drainage Improvements Small Diversion at Convent/Blind River	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
Venice Ponds Marsh Creation and Crevasses	Structure	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
Empire Lock	Structure	+/-	+/-	o	-	-	O	+/-	-	o	o	-
WestBay Sediment Diversion	Diversion	+	+/-	o	+/-	+/-	O	+/-	o	o	o	o
GIWW Navigation System	Structure	+/-	+/-	o	+/-	+/-	+/-	+/-	o	o	o	+
Harvey Canal Lock	Structure	+/-	+/-	o	-	-	O	+/-	-	o	o	-
Greater New Orleans Hurricane & Storm Damage Risk Reduction System	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+
Mississippi River Levees : MR&T Project	Structure	+/-	+/-	o	-	-	+/-	-	-	o	o	+
Mississippi River Navigation Operations and Maintenance	Structure	+/-	+/-	o	+/-	+/-	O	-	o	o	o	+
New Orleans to Venice (NOV) levee project, Incorporation	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+



Project Name	Project Type	Wetlands and Other Surface Waters	Wildlife	Threatened and Endangered Species	Fisheries, Aquatic Resources, and Water	Essential Fish Habitat	Cultural Resources	Recreational Resources	Aesthetic Resources	Air Quality	Noise	Socioeconomics
of Non-federal Levees (NFL) into NOV												
New Orleans to Venice (NOV) levee project, St. Jude to Venice	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+
Oakville to La Reussite Non-federal Levee	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+
Bonnet Carré Spillway	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+
Commercial and Industrial Developments (Expansion of chemical plants and port facilities)	Structure	+/-	+/-	o	o	o	O	-	-	o	o	+

Cumulative Impacts of the Alternatives

The cumulative impacts of dredging of each alternative are quantified in table 4-3.

Table 4-3 Cumulative Impacts from dredging (No action + incremental impacts of each alternative over 50 years)

	Crossings Construction	Lower River Construction	Annual O&M Crossings	Annual O&M Lower River	Total Construction Dredging	Total Maintenance Dredging	Total Dredged Construction + Maintenance over 50 years	Acres created
Alt. 1	0	0	13,069,498	22,250,000	0.00	653,474,900.00	653,474,900.00	26,400
Alt. 2	5,467,000	0	38,397,000	22,250,000	5,467,000.00	1,919,850,000.00	1,925,317,000.00	26,400
Alt. 3	8,588,600	19,900,000	48,377,000	22,250,000	28,488,600.00	3,413,850,000.00	3,442,338,600.00	27,862.5
Alt 3d	616,600	19,900,000	18,156,498	22,250,000	20,516,600.00	1,902,824,900.00	1,923,341,500.00	27,862.5



Alternative 3

The cumulative impacts of building and maintaining the river crossings over 50 years are not anticipated to be significant based on 1D modeling results. As the sediment would remain within the river system, cumulative impacts on natural resources are expected to be minimal due to the already turbid nature of the river. Increasing the depth of the river is not anticipated to necessitate construction of additional saltwater mitigation features in the lower river. Increased saltwater intrusion events would simply require implementation of the mitigation system more frequently. However, there are provisions to increase capacity of the system with 25% to 50% growth, 50% to 75% growth and again at 75% to 100% growth in population.

By constructing and maintaining Alternative 3, approximately 3,442,338,600.00 cy of material would be dredged during the 50-year project life. Based on land loss between 1932 and 2010 (Couvillon 2012), the disposal area is projected to continue to lose approximately 57 percent of existing land within the entire disposal area long term plan. Beneficial use of dredged material would establish 365.6 acres annually during the 4 year construction of the lower river. An additional 528 acres of intermediate marsh is anticipated to be established annually as part of the project, but under the no action alternative. The amount of material dredged during construction of the Southwest Pass from 48 ft to 50 ft would be less than the amount of material dredged during typical annual maintenance, and Southwest Pass would not require additional (i.e., incremental) maintenance dredging after construction according to the 1D model (Appendix C)..

During construction, the beneficial use of dredged material into open water habitat would result in approximately 576.5 AAHUs of intermediate marsh (with a final target elevation of 2 feet or less, Appendix A-7). Due to high rates of land loss in the area, approximately 1,082 acres are expected to remain after 50 years. Cumulatively, an additional approximately 26,921 23,209 acres (6161 AAHUs) of intermediate marsh habitat is anticipated to be constructed and remain via beneficial use over the 50-year project life (as part of the no-action alternative). Due to high rates of land loss in the area, less than 11,576 acres are expected to remain after 50 years. Upon public review and agency coordination, a final estimate at year 50 will be provided in the final report.

Eustatic sea level rise and channel deepening/enlargement would continue to shift deposition (and therefore dredging) upstream towards Venice, LA, over time. However, 1D model results indicate an increase in net dredging in the lower river is not expected.

Overall, the cumulative impacts of the proposed action on the natural environment are expected to be positive, with long-term benefits to navigation, wetlands, EFH, fisheries, and wildlife resources, and recreational opportunities anticipated in the project area. The switching of EFH types from



construction of the proposed project would not be expected to have a significant impact to the overall EFH in the delta basin. Impacts to cover and foraging for managed species are not anticipated to contribute significant increases in cumulative impacts to managed species as the borrow areas are small in size compared to the available EFH habitat in the basin.

The project would be cumulatively beneficial in the form of additional cover, resting, nesting and foraging habitat for wildlife species. Water quality and benthic species would still be expected to rebound once project construction is complete. The restoration of fresh marsh in areas that are currently open water would provide indirect benefits to fisheries in the future by providing nutrients to the system in the form of detritus thereby increasing the primary productivity in the wetland system.

With a phased construction approach, cumulative impacts to the air quality would be relatively minor, and the status of attainment would not noticeably change from current conditions or those in the foreseeable future. Long-term, cumulative impacts are not anticipated as it relates to surface water quality. The cumulative noise impacts would principally be related to the potential short-term disruption of fish and wildlife species and similar impacts by other similar Federal, state, local, and private restoration activities as well as other human-induced noise disruptions to these organisms.

Short-term disturbances due to dredging activities such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments would likely have a short duration before returning to pre-dredging conditions. Impacts to localized fisheries would be expected to be temporary and minimal because the river system is a highly turbid system.

The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are final. Because MVN dredges and places material back into the channel at the crossings, crossing construction and maintenance is not likely to have cumulative impacts on existing diversions. Deepening Southwest Pass may have an effect on frequency and duration of saltwater wedge migration that threaten drinking water supplies upriver, however, modeling results are still ongoing. Regardless of results, it is anticipated that appropriate mitigation measures identified in Chapter 2 would be taken to avoid such impacts should they occur.

There are no distinct cumulative impacts to cultural resources within the channel crossings, because any unidentified cultural resources that may exist at the increased depths of dredging would be adversely affected or destroyed at the first instance of dredging. Within the expanded disposal areas (should they be determined to be necessary for the implementation of a



recommended plan), the migration of sediments from one location to another by natural processes within the disposal areas, could cumulatively lead to erosion of any unidentified historic property by physical force of moving sediment, or could gradually bury any historic property.

Overall, the cumulative impacts of the proposed action in addition to other planned and ongoing federal and state civil works projects are expected to be positive, with long-term benefits to recreational opportunities anticipated in the project area. Much of the impacts on recreation, however minimal, would be temporary. Disposal projects, in general, tend to have positive long term impacts on recreational opportunities as they, over time, provide nesting habitat for water fowl and nursery habitat for fish.

It is anticipated that the beneficial use of dredged material would not result in negative cumulative impacts to soils or water bottoms in or near the project area. Cumulative impacts to soils and water bottoms would be offset by the creation of marsh, bird islands, deltaic ridges, and other aquatic habitat types that would ultimately provide valuable coastal habitat and improve storm surge attenuation capacity in the Mississippi River Delta. Impacts associated with potential utility relocations are not anticipated to be significant once fully investigated.

There are no foreseen cumulative impacts to visual resources in the study area. Cumulative impacts would be the incremental direct and indirect impacts of implementing the proposed action combined with the continued activities of growth and development in the area. Continued relative sea level rise could also impact the entire area resulting in vast areas of shallow open water as vertical accretion rates fail to keep pace with rising sea levels. Impacts to visual resources would continue throughout not only the project area but also coastal Louisiana and the Nation due to the loss of wetlands and conversion of existing habitats to open water habitats. However, wetland restoration efforts such as the CWPPRA, CIAP, and LCA Programs could restore partially the land, would convert existing view sheds of open water into marsh, wetland, swamp or a variety of landscape types that frame large bodies of open water and use the basic design elements of form, line, texture, color and repetition to create an aesthetically pleasing view shed.

The cumulative impacts of the project, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation or other type projects in the basin would minimally and temporarily affect socio-economic resources. Due to the remote and generally unpopulated areas where the projects would be constructed and the temporary nature of the project construction activities, the proposed modifications would add very little and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the region and would not contribute significantly to cumulative impacts to socio-economic resources in the basin. The project's creation of additional marsh and upland acres offers incremental protection from



hurricane and storm damage, thereby helping to safeguard lives and property in Plaquemines Parish.

Wetland loss could threaten public facilities and increase maintenance costs. In areas with high projected population growth rates, the need for public services could increase. Temporary and permanent relocation of residents due to damage from weather events would have a negative impact on community cohesion. In addition, community cohesion would be adversely affected if residents and business chose to relocate to areas with lower risk.

Construction would temporarily disrupt transportation, navigation, and commercial fishing in project areas, however, these impacts would continue to be minor and temporary during the period of construction when compared to the previous design. Land use impacts, such as impacts to commercial/industrial properties and public facilities, are not anticipated as the projects are typically located in unpopulated areas.

It is anticipated that through the efforts taken to avoid wetlands impacts and the beneficial use of dredged material that functionally compensates unavoidable remaining impacts, the proposed project would not result in overall adverse cumulative impacts to the aquatic environment and human environment in or near the project area.

Alternative 2

The cumulative impacts of building and maintaining the river crossings over 50 years are not anticipated to be significant based on 1D modeling results. As the sediment would remain within the river system, cumulative impacts on natural resources are expected to be minimal due to the already turbid nature of the river.

By constructing and maintaining Alternative 2, approximately 1,925,317,000.00 cy of material would be dredged during the 50-year project life. No additional (i.e., incremental) marsh creation would occur under Alternative 2 because O&M would not increase, however, an additional 528 acres of intermediate marsh is anticipated to be established annually as part of the project under the no action alternative. Cumulatively, approximately 23,209 acres (6161 AAHUs) of intermediate marsh habitat is anticipated to remain via beneficial use over the 50-year period of analysis (as part of the no-action alternative, Appendix A-7). Because CEMVN dredges and places material back into the channel, crossing construction and maintenance is not likely to have a cumulative impact on water levels, sediment transport, or existing diversions.

Short-term disturbances due to dredging activities such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments would likely have a short duration



before returning to pre-dredging conditions. Impacts to localized fisheries is expected to be temporary and minimal because the river system is a highly turbid system. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available. Because MVN dredges and places material back into the channel at the crossings, crossing construction and maintenance is not likely to have add to cumulative impacts on diversions.

The cumulative impacts of the project, when added to other past, present, and reasonably foreseeable ecosystem restoration, mitigation or other type projects in the basin would minimally and temporarily affect socio-economic resources. Due to the remote and generally unpopulated areas where the projects would be constructed and the temporary nature of the project construction activities, the proposed modifications would add very little and only temporary impacts to any other impacts resulting from past, present and reasonably foreseeable projects in the region and would not contribute significantly to cumulative impacts to socio-economic resources in the basin. Wetland loss could threaten public facilities and increase maintenance costs. In areas with high projected population growth rates, the need for public services could increase. Temporary and permanent relocation of residents due to damage from weather events would have a negative impact on community cohesion. In addition, community cohesion would be adversely affected if residents and business chose to relocate to areas with lower risk. Economic activity related to shipping would be held back by low water depth (48 ft MLLW) along the river. Economic activity related to wetland resources would be adversely affected by the depletion of these resources along the coastline. Industry development would contribute to the degradation of wetlands. Businesses may relocate to areas with less risk of storm damage.

Eustatic (i.e., global) sea level rise, and a reduction in river flows due to upstream diversions would continue to shift deposition (and therefore dredging) upstream towards Venice, La over time. However, 1D model results indicate an increase in net dredging in the lower river is not expected.

The cumulative noise impacts would principally be related to the potential short-term disruption of fish and wildlife species as well as other human-induced noise disruptions to these organisms. With a phased construction approach, impacts to the air quality would be relatively minor, and the status of attainment would not noticeably change from current conditions or those in the foreseeable future. Long-term, cumulative impacts are not anticipated as it relates to surface water quality. Near-term disturbances due to dredging activities such as increased turbidity and potential suspension of contaminants that may exist in the bed sediments would likely have a short duration before returning to pre-dredging conditions. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available. There are no distinct cumulative impacts to cultural resources



within the channel crossings, because any unidentified cultural resources that may exist at the increased depths of dredging would be adversely affected or destroyed at the first instance of dredging.

Overall, the cumulative impacts of the proposed action on recreation, in addition to other planned and ongoing federal and state civil works projects, are expected to be negligible. It is anticipated that the beneficial use of dredged material within the Federal Standard would not result in negative cumulative impacts to soils or water bottoms in or near the project area. Cumulative impacts associated with potential utility relocations are not anticipated to be significant once fully investigated.

There are no foreseen cumulative impacts to visual resources in the study area. Cumulative impacts would be the incremental direct and indirect impacts of implementing the proposed action combined with the continued activities of growth and development in the area. Continued relative sea level rise could also impact the entire area resulting in vast areas of shallow open water as vertical accretion rates fail to keep pace with rising sea levels. Impacts to visual resources would continue throughout not only the project area but also coastal Louisiana and the Nation due to the loss of wetlands and conversion of existing habitats to open water habitats. However, wetland restoration efforts such as the CWPPRA (potentially deauthorized in 2019) and CIAP Programs could restore partially the land, would convert existing view sheds of open water into marsh, wetland, swamp or a variety of landscape types that frame large bodies of open water and use the basic design elements of form, line, texture, color and repetition to create an aesthetically pleasing view shed.

There are no distinct cumulative impacts to cultural resources within the channel crossings, because any unidentified cultural resources that may exist at the increased depths of dredging would be adversely affected or destroyed at the first instance of dredging. Within the expanded disposal areas (should they be determined to be necessary for the implementation of a recommended plan), the migration of sediments from one location to another by natural processes within the disposal areas, could cumulatively lead to erosion of any unidentified historic property by physical force of moving sediment, or could gradually bury any historic property.

Construction would temporarily disrupt transportation, navigation and commercial fishing in project areas, however, these impacts would continue to be minor and temporary during the period of construction when compared to the previous design. Land use impacts, such as impacts to commercial/industrial properties and public facilities, are not anticipated as the projects are typically located in unpopulated areas.



It is anticipated that the proposed project would not result in overall adverse cumulative impact to the aquatic environment and human environment in or near the project area.

Alternative 3d

See Cumulative Impacts section for Alternative 3. The cumulative impacts from work in the lower river are the same as those reported for Alternative 3. The construction of the 3 crossings would require 616,000 cy of dredging and the average annual O&M of those crossings would require 18,156,498 cy of dredging. Over a 50-year period, 1,923,341,500 cy of material would be dredged from the crossings and from the lower river under Alternative 3d. Significant impacts to important resources are not expected under Alternative 3d. Due to the nature of the beneficial use of dredged material, subject to the limit of the Federal Standard, the cumulative impacts of Alternative 3d are anticipated to have a net positive environmental impact.

4.6 Mitigation Requirements Associated With the TSP

The TSP (Alternative 3d) would result in the discharge of fill material into waters of the U.S. Under authority delegated from the Secretary of the Army and in accordance with Section 404 of the Clean Water Act of 1977, the USACE regulates discharges of dredged or fill material into waters (e.g., wetlands) of the U.S. Although the USACE does not process and issue permits for its own activities, the USACE authorizes its own discharges of dredged or fill material by applying all applicable substantive legal requirements, including public hearings and application of the section 404(b)(1) guidelines. An evaluation of the open water beneficial use-disposal site will be prepared by MVN prior to signing a Record of Decision. Signing of the 404(b)(1) evaluation by the District Commander would finalize documentation of compliance with the Section 404(b)(1) guidelines for the proposed actions addressed in this SEIS (Appendices A-9, A-10, A-11).

Construction related impacts are generally temporary and localized and include: increased turbidity and total suspended sediments, organic enrichment, chemical leaching, reduced dissolved oxygen, and elevated carbon dioxide levels. Following construction, these temporary and localized effects would return to pre-construction levels. There are no significant long-term adverse cumulative effects expected from construction.

Implementation of the proposed action in some situations may require some unavoidable (i.e., incidental), very minor impacts to wetland resources during the preparation for the placement of beneficial use of dredged material. A small, undetermined amount of wetland habitat may be temporarily impacted during pipeline placement and access to the open water proposed disposal areas. However, these minor, incidental impacts are unavoidable, would be temporary, and would result in coastal marsh creation. As such, project related impacts would not require mitigation for



the minor, incidental impacts to wetlands that are necessary for wetland creation. Approximately 146.3 acres of SAV habitat would be converted to intermediate marsh as a result of project construction, and although coordination with NMFS and USFWS is ongoing, this habitat conversion is anticipated to have a net beneficial impact on local aquatic resources and fisheries. It is anticipated that through the efforts taken to avoid wetlands impacts and the beneficial use of dredged material that functionally compensates for the minor, unavoidable remaining impacts incidental to beneficial use, the proposed project would have a net beneficial environmental impact, and would not result in overall adverse direct, secondary, or cumulative impacts to the aquatic environment in or near the project area.

As is current practice, measures to avoid and minimize impacts to significant resources would be employed to the extent practicable. During construction, the beneficial use of dredged material, subject to the limitations of the Federal Standard into open water habitat will result in approximately 1462.5 acres of intermediate marsh (and a net of 1082 acres and 576.5 AAHUs). Due to high rates of land loss in the area, 1082 acres of created marsh would be expected to remain 50 years after construction Appendix A-7).



5.0 TENTATIVELY SELECTED PLAN (*NEPA REQUIRED)

The Tentatively Selected Plan (TSP) for the next phase of construction, is Alternative 3d. This alternative is to deepen the MRSC to a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP. Feasibility-level design will commence after the SMART Planning Agency Decision Milestone and will finish before a Final Report.

5.1 Description of TSP

The TSP would deepen the MRSC from the Gulf of Mexico, beginning at RM 22 BHP, and extending upriver to near Venice, ending at river mile 13.4 AHP. Currently, this reach is routinely dredged to a depth of 48 ft MLLW and, with implementation of the TSP, would be deepened to a depth of 50 ft MLLW. Construction of the channel in this reach to a depth of 50 ft MLLW would closely follow the existing channel alignment and is estimated to result in approximately 18 million cubic yards of dredge material that may be used for beneficial use, within the limits of the requirements of the Federal Standard, by disposing it in lands adjacent to the Mississippi River.

The TSP includes deepening three crossings, Fairview, Richbend, and Belmont, which are located within the footprint of the Port of South Louisiana. Currently, these three crossings are routinely dredged to a depth of 45 ft LWRP. Implementation of the TSP includes construction to deepen the three crossings to a depth of 50 ft LWRP. It is anticipated that deepening the crossings would not result in the need to change the existing alignment. The crossings are dredged in place, with the sediment released back into the river channel, so there is no beneficial use of the dredged material.

5.2 Hazardous, Toxic, and Radioactive Waste

The discharge of dredged material into waters of the United States is regulated under the Clean Water Act (CWA). In the absence of a known Hazardous, Toxic, and Radioactive Waste (HTRW) concern, the proposed action would not qualify for an HTRW investigation.

The USACE Engineer Regulation, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or if they are a part of a National Priority List (NPL) site under CERCLA (NPL is also known as "Superfund").



Dredged material and sediments beneath the navigable waters proposed for dredging shall be tested and evaluated for their suitability for disposal in accordance with the appropriate guidelines and criteria adopted pursuant to Section 404 of the Clean Water Act and/or Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) and supplemented by the Corps of Engineers Management Strategy for Disposal of Dredged Material: Containment Testing and Controls (or its appropriate updated version) as cited in Title 33 Code of Federal Regulations, Section 336.1.

The proposed dredge material disposal areas have historically been associated with oil and gas exploration. A review of state and national environmental and natural resources databases revealed the presence of numerous active, inactive, plugged and abandoned oil and gas wells, injection wells, and oil and gas pipelines within the proposed project area. Although they are not considered to be HTRW concerns, they are considered to be Recognized Environmental Conditions that shall be avoided during construction.

Dredge slurry was collected directly from the discharge lines of dustpan dredges performing maintenance on all maintained Deep Draft Crossings during Fiscal Year 2016. The solid and liquid fractions of the slurry were analyzed individually for the presence of EPA priority pollutants including metals, pesticides, PCBs, and semi-volatile organic compounds. Metals were common to both fractions, and were detected at or below background levels in the Mississippi River. Chlordane pesticides and hydrocarbon exhaust products were detected infrequently in the solid samples, but at levels generally at or below 1 part per billion. All contaminant detects in dredge slurry were below regulatory water quality criteria and ecological screening values, and dredging of the crossings is not expected to have a negative impact on human health or the environment.

Based upon a review of the NPL, CERCLA, and environmental databases, contaminant sampling data, the probability of encountering HTRW in connection with this project is low. No portion of the project area proposed for dredging and disposal is included in the NPL. The proposed construction and beneficial use-disposal action does not qualify for further HTRW investigation.

5.3 Real Estate Requirements Associated with the TSP

A Real Estate Plan (REP) describing the real estate requirements and costs for the project can be found in Appendix C.

The current evaluation has determined that construction of the alternatives beyond 48 ft in the Lower Mississippi River reach of the project (RM 13.4 AHP to RM 22 BHP) will potentially require the acquisition of additional dredged material placement areas, either through exercise of the Federal navigation servitude or, if necessary, by the acquisition of a real property interest in privately owned lands. In addition, some portion may be located on lands under the jurisdiction of the LDWF or of the USFWS. If additional dredged material placement areas and/or access areas



are determined to be necessary for construction, the Government intends to maximize use of the Federal navigation servitude, to the extent practicable and in keeping with project needs, for the additional dredged material placement and access requirements for the project. For purposes of selecting the TSP, we have selected several broad areas, as shown in Figure 5-1, that would be examined during the feasibility design phase to identify discrete areas that would be suitable for consideration as dredged material placement areas and/or as access to those areas if such additional areas are needed for project construction. The area identified as “Original Cleared Disposal Area” is 143,264 acres, the proposed expansion area adds an additional 24,054 acres for a combined total of 167,318 acres, shown as the total area with the “Proposed Expanded Disposal Area.” (Figure 5-1).



Figure 5-1 Potential Dredge Disposal Area

Much of this broad area is situated within the lands that are available to the Government under the Federal navigation servitude. However, it appears, preliminarily, that some portion of the area may lie outside of the limits of the navigation servitude. It is possible that portions of the lands that lie



outside of the limits of the Federal navigation servitude are privately owned. If additional dredged material placement or access areas are needed that include those privately owned lands that lie outside of the Federal navigation servitude, the Government may require the non-Federal sponsor to acquire an interest in real property for that purpose over those lands. The determination of whether such additional lands are required for project construction of the TSP will not be made until the final feasibility design phase. If such lands are determined to be necessary, the Government intends, during that phase, to also identify the extent of the Federal navigation servitude as it relates to the additional areas for dredged material placement and access.

Final determination of the privately owned lands that lie outside of the Federal navigation servitude and that will be acquired for construction of the project will not take place until final project design is complete. However, for purposes of this report, the Government has estimated \$2.5M for the land and administration costs associated with acquisition of a temporary work area easement over privately owned lands in order to ensure an appropriate estimate of the cost of construction for the TSP, to inform the public of the potential for the acquisition of additional interests in real property, and to estimate the maximum environmental impact. In the subsequent phase of feasibility design, further refinement of construction and thereby dredged material placement and access requirements will be determined, and more precise dredged material placement and access needs will be available. In so doing, the Government will seek to minimize the acquisition of privately owned properties, and to maximize the exercise of the Federal navigation servitude. And finally, if it is determined during final feasibility that additional dredged material placement areas and access are required for the operation and maintenance of the project, the areas necessary to fulfill that requirement will be identified in terms of availability under the Federal navigation servitude and/or as requiring acquisition of an interest in real property, with preference being given to those lands available within the navigation servitude, to the extent practicable and in keeping with the needs of the project. Such a determination would also address the interest in real property that would be required to serve the OMRR&R needs of the project, the estimated land and administrative costs of such acquisition and the environmental impacts associated with the additional dredged material placement.

If a determination is made to acquire dredge material placement and access real estate interest, it does not appear that this project will displace residential, commercial, industrial, or habitable structures within the project boundaries; therefore, the provisions under Title II of Public Law 91-646, as amended, are not applicable.

5.4 Relocations with the TSP

The relocations for project may consist of relocating pipelines and submarine cables crossing the river at locations that require dredging to achieve the depth of 50 ft for the TSP.



The 1985 Project Authority authorized the channel to a depth of 55 ft. At the time of construction of Phase 1 and Phase 2, impacted utilities would have been relocated to a depth greater than 55 ft. Subsequent to the 1985 authority, permit applications for new utility crossings would have required utilities to be placed at a depth greater than 55 ft, to allow for the future construction of the authorized project. Preliminary research suggests approximately 50 to 70 pipelines may be located within the dredging areas along the Mississippi River. Relocation data for these utilities was collected, tabulated and detailed in the Engineering Appendix C. At this time, it is unknown how many, if any, of these pipelines would require relocation as part of any alternatives under evaluation in this GRR..

The total project costs include \$40,000,000 as an estimated relocations cost to avoid underestimating total project cost. These relocation costs will be further refined to reflect utilities identified for relocation through further coordination with owners and feasibility design in the subsequent phase of the study. , In accordance with memorandum from the Director of Real Estate dated January 10, 2013 SUBJECT: “Real Estate Policy Guidance Letter No. 31 – Real Estate Support to Civil Works Planning Paradigm (3x3x3)”, a compensability determination, in the form of a preliminary attorney’s opinion of compensability, will be performed if the estimated relocation costs exceed 30% of the estimated total project cost. If the estimated total relocation costs do not exceed 30% of the estimated total project cost, the real estate assessment will address compensability.

5.5 OMRR&R Associated with the TSP

Information on the quantities and cost associated with OMRR&R for the TSP can be found in the Engineering Appendix, Appendix C. Comparison of alternatives and selection of the TSP used the incremental difference in OMRR&R cost from the current practices to anticipated requirements once the TSP is implemented.

Hydraulic model results indicated that there was no increase in the annual dredge quantities for the lower portion of the Mississippi from Venice, river mile 13.4 AHP, to the Gulf Mexico at river mile 22 BHP. Additionally, although the lower Mississippi River includes training works such as foreshore rock, jetties, and pile dikes, which must be maintained, the requirement to maintain these does not differ between each of the alternatives. Therefore, the incremental difference in operation and maintenance occurs only from the increase in estimated annual dredge quantities in the crossings.

With the TSP, the three crossings located within the Port of South Louisiana would be constructed and subsequently maintained to a depth of 50 ft MLLW. The three crossings Fairview, Belmont, and Richbend, are estimated to result in approximately 5 million cubic yards of dredge material



annually. This is an increase of 3.1 million cubic yards when compared to the current dredge quantities for the existing depth of 45 ft.

Table 5-1 provides the estimated annual dredge quantities for each of the crossings, and the Engineering Appendix (Appendix C) provides a detailed assessment of the modeling and assumptions used to determine the increase in annual dredge quantities. For all crossings, it is projected that O&M dredging would be accomplished via contract and Government operated dustpan dredges, with the material dredged from the crossings disposed of adjacent to the crossings and put back into the system for the material to be carried downstream and to fallout into deeper holes within the river.

It should be noted that although table 5-1 indicates 0 CY of annual dredge material for Fairview crossing, it is anticipated that this crossing will require dredging during construction to provide the 50 ft channel depth. It is not anticipated at this time that regular annual maintenance of the Fairview crossing will be required during the period of analysis.

Table 5-1 Increase in Annual Dredge Quantities for TSP

Crossing Sites	Average annual quantities for 50ft (CY)	Average annual quantities for 45ft (CY)	Increase in average annual quantities (CY)
RichbBend	1,046,694.00	15,041.00	1,031,653.00
Belmont	4,039,445.00	1,949,741.00	2,089,704.00
Fairview	0	0	0.00
Total	5,086,139.00	1,964,782.00	3,121,357.00

5.6 Benefit Analysis Associated with the TSP

The greatest net benefits would be achieved by implementing Alternative 3d.

Calculated at the FY17 Federal discount rate of 2.875 percent, total average annual costs would be \$21,650,806 and total average annual benefits are \$118,436,481. Total average annual benefits, minus total average annual costs, equals the average annual net benefits of the project. The TSP would have, average annual net benefits of \$96,785,675 and the benefit-to-cost ratio would be 5.47 to 1.0 (Table 5-2).

Table 5-2 Benefits and Cost Summary for TSP

Total Project Construction Cost	\$ 88,971,120
Interest During Construction	\$ 3,910,948
Total Investment Cost	\$ 92,882,068



Interest and Amortization of Initial Investment	\$ 3,524,697
Average Annual Incremental OMRR&R	\$ 18,126,110
Total Average Annual Cost	\$ 21,650,806
Total Average Annual Benefits	\$ 118,436,481
Net Annual Benefits	\$ 96,785,675
Benefit Cost Ratio	5.47

5.7 Risk and Uncertainty Associated with the TSP

Risk and uncertainty are intrinsic in water resources planning and design. This section describes various categories of risk and uncertainty pertinent to the study. Risk and uncertainty will be further considered during feasibility-level design and analysis.

5.7.1 Environmental Factors

Relative Sea Level Rise: There is uncertainty about how much sea level change (SLC) would occur in the region. The magnitude of sea level rise could have impacts on shoaling rates and safety in the navigation channel, particularly in the region of from Venice to the Gulf of Mexico (river mile 13.4 AHP to river mile 22 BHP).

As relative sea level rises, the slope of the river will decrease. This could increase the aggradation of the natural channel in the lower delta. In addition, with higher sea levels, flows could be lost to the bays. Currently, large amounts of flows are lost in the lower delta south of Pointe a la Hache. This condition would likely get worse in the future without closing off the large openings.

Saltwater Intrusion:

Deepening of the channel could have impacts on the frequency and location of the salt-water sill that occurs in the deep draft channel. Comparison of alternatives initially considered the frequency of implementation of the sill for salt-water intrusion impact. However, the evaluation determined that there would be limited, if any, change in the frequency of construction of the sill for all of the alternatives. The evaluation determined that historically through the process of using localized reference gages, as described in chapter 3, the channel has been deepened from a depth of 45 ft. to a depth 48 ft, without an apparent change in the frequency of the construction of the sill. Since the construction of Phase I the frequency of construction of the sill has not changed. The frequency of enacting the sill is still on a 10 yr. basis.

The USACE will continue to investigate salt water intrusion with additional modeling under feasibility design, but there is no risk to plan selection since all alternatives considered in the final array and optimization include an action of deepening the lower Mississippi from RM 22 BHP to RM 13.4 AHP from a 48 ft depth to a 50 ft depth. The mitigation plan as outlined in the 1983



Chief's Report, and as implemented in accordance with General Design Memorandum No. 1 supplement No. 6, if constructed, operated, and maintained as planned is adequate for all alternatives considered in this GRR. Therefore, this report does not presently provide for alternative mitigation measures. If the sponsor does not perform OMRR&R as required, the sponsor may choose alternative methods of potable water delivery at its own cost.

The TSP will be evaluated using a 3D model in order to determine the project's impact on salinity intrusion and shoaling. The 3D model will consider the impact of sea level rise and will focus on validating prior salinity intrusion evaluations and verify the increase in probability or frequency at which mitigation would be needed.

5.7.2 Engineering Factors

Hydraulic Modeling: As part of the analysis of proposed channel deepening in the Mississippi River, the AdH model (coupled to SEDLIB) that was developed for the Mississippi Hydrodynamic and Delta Management Study is being applied to address the potential dredging impacts associated with channel deepening in the Mississippi River below Baton Rouge. Selection of the TSP considered the sedimentation requirements for dredging based on results of a 1D model and historical dredge quantities. The risk of using the 1D model is that it does not consider the spatial distribution of the dredge quantities within the crossing. Further, the 1D model did not provide consistent results for some of the crossings when compared to the historical dredge quantities; therefore, a dredging index was applied to recent historical quantities to determine the anticipated increase in annual O&M dredging associated with a deeper channel.

A 2D model was used to address the effects of spatial heterogeneity on dredging requirements in the crossings. For example, if dredging in a particular crossing is a result of the encroachment of a point bar in to the dredge cut, rather than the (more) uniform filling of the cut by pure deposition, this non-uniform filling could alter the effect of deepening on the dredging requirements.

The results of the 2D and 3D model will be used in feasibility level design of the TSP, and may have impacts on the final selected plan.

Design of the Crossings: Selection of the TSP did not consider the use of training works such as "soft" dikes in the crossings. Further, it did not consider if there is a need to shift the crossings upriver or down river from the current location, or to change the length or alignment of the existing crossings.

Soft dikes are constructed with sand-filled geotextile material and may be beneficial in reducing long term OMRR&R cost. Soft dikes currently exist in the Redeye and Medora crossings, and may be considered for implementation in other crossings. A review of using dikes to reduce long-term



OMRR&R costs will be conducted on the TSP during the final feasibility design phase. There is uncertainty regarding whether or not there will be a perceptible difference using dikes. At each location, and at each depth, the upfront construction cost would have to be compared to long-term OMRR&R savings to determine if it is cost effective to include the dikes.

Preliminary Engineering Assessments of the crossings indicates there would not be a need to shift the crossings from their current alignments or lengths due to deepening. This will be investigated further in feasibility level design of the TSP.

5.8 Implementation Requirements

5.8.1 Preconstruction Engineering and Design

Cost for detailed design of the project will be shared between LaDOTD and USACE. All detailed design will be in accordance with USACE's regulations and standards.

5.8.1 Construction and LERRD

Construction would be in accordance with USACE's regulations and standards. Lands, easements, right-of-ways, relocations, and disposal areas (LERRD) would be the responsibility of the NFS (Appendix C).

5.8.2 Cost Sharing

The LaDOTD is the non-Federal NFS for the feasibility study. The cost-share during the feasibility phase is 50% Federal and 50% non-Federal. The cost share for construction of the project will be 50% Federal and 50% non-Federal. The NFS must provide all project LERRD required for the project. OMRR&R of the project would be a 100% Federal responsibility up to a depth of 50 ft. The reference to the 50 ft depth does not include advance maintenance and over depth. As of WRDA 1992 this depth is defined to MLLW in the reach described in this report as the Lower Mississippi River reach and in reference to the LWRP in the crossings within the Port of South Louisiana. A full description of the non-Federal and Federal responsibilities after the feasibility phase of the project is contained in Chapter 8 of this report.

5.9 Mitigation Plan & Adaptive Management & Monitoring (AM&M)

Dredge disposal of material associated with construction will be placed to the maximum extent practicable in lands and waters within the navigational servitude. There will be impacts to shallow open water and water bottoms and a level of reduction in ecological value of the existing condition. However, the end state of dredge disposal is a net increase of ecological benefits that far exceed those impacted by the disposal (refer to WVA located in Appendix A-7). The total benefits of the



emergent marsh provide net positive contributions to a large component of the ecosystem, and as described in Chapter 4, mitigation is not required.

The purpose of adaptive management is to insure performance of restoration plans in order to insure the benefits endure throughout the period of analysis and that the investment is secure. Since ecosystem restoration is not a purpose of the project there is no adaptive management for this component of the plan. Further, if the placed material subsidizes or erodes and loses the estimated ecological benefits, the end state would be to reestablish water bottoms returning the system to the pre-project condition.

5.10 Views of the Non-Federal Sponsor

The NFS, LaDOTD, supports and recognizes the importance of the deep draft navigation project for the Mississippi River Ship Channel. Their statement of intent provided verbally during the TSP milestone and subsequently provided in writing is as follows:

“While the Louisiana Department of Transportation and Development, as the non-federal sponsor of the Mississippi River Ship Channel, supports the next phase of the federal plan to deepen the Mississippi River Ship Channel to 50 feet through the Port of South Louisiana, the Department is surprised that the expectations, from a national benefits perspective, of going to Baton Rouge is not included in this phase.

The Department gives its support, provided that the Corps continue to validate through an IEPR, the data relative to benefits and cost for continuing the channel at 50 feet through Baton Rouge. This would include a facility by facility analysis of current and future needs for a channel to 50 feet.

The Department would like the Corps to include in its specific charges [of the IEPR] going through the Port of Baton Rouge at 50 feet in the next phase.

The Department would like the Corps to cite and include in its Tentative Selected Plan Report the total national benefits/costs figures from recognized economist studies as mentioned on slide 19 [of the TSP milestone presentation], which reads: ‘Although not reflected in this analysis, there are real and tangible benefits to be gained.’

The Department would like to have included in the TSP a brief explanation as to why the cost of dredging annual accumulation of sediment from 50



feet is significantly more than dredging the same amount of annual accumulation of sediment from the current 45 feet.

With these stipulations the Department supports moving forward with the IEPR process for the TSP.”

While LaDOTD indicated support for the TSP they also displayed hesitation in the ultimate implementation of a plan that does not include the Port of Baton Rouge. To that concern, they have requested further analysis of the potential to extend construction through the Port of Rouge. In response to this statement, MVN is committed to continue working with LaDOTD throughout public review of the draft report, Agency Technical Review (ATR), and Independent External Peer Review (IEPR) to continue evaluation of study data and to confirm the feasibility of the TSP. Those efforts will determine whether deepening to 50 ft beyond Port of Louisiana is justified as the NED plan. If further economic analysis is deemed warranted the FCSA would require amendment to include additional alternative analysis and funding. If a new analysis is deemed appropriate a second draft public review would be required.



6.0 ENVIRONMENTAL LAWS & COMPLIANCE (*NEPA REQUIRED)

Federal projects must comply with environmental laws, regulations, policies, rules, and guidance. The project delivery team coordinated with Federal and state resource agencies during planning for both the navigation dredging and disposal areas associated with the project. Compliance is achieved upon review of this report by appropriate agencies and the public, and with the signing of a Record of Decision by the Assistant Secretary of the Army for Civil Works.

6.1 Bald and Golden Eagle Protection Act of 1940 (Bald Eagles)

The Bald and Golden Eagle Protection Act of 1940 protects two eagle species. Bald eagles occur or occasionally occur in the project area. Based on a review of existing data and preliminary field surveys, the USACE finds that implementation of the TSP would have no effect on bald eagles.

6.2 Clean Air Act of 1972 (Air Quality)

The Clean Air Act of 1972 (CAA) sets goals and standards for the quality and purity of air. It requires the Environmental Protection Agency to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The project area occurs in four parishes considered non-attainment status for NAAQS: East Baton Rouge Parish, West Baton Rouge Parish, Iberville Parish, and Ascension Parish. The Louisiana Department of Environmental Quality (DEQ) is required by the CAA and Louisiana Administrative Code, Title 33 to grant a general conformity determination for work. Coordination with DEQ is scheduled to begin during the public comment period.

6.3 Clean Water Act of 1972 – Section 401 (Water Quality)

The Clean Water Act of 1972 (CWA) sets and maintains goals and standards for water quality and purity. Section 401 requires a Water Quality Certification from the DEQ stating that a proposed project does not violate established effluent limitations and water quality standards. Section 401 correspondence and compliance is scheduled to begin during the public comment period.

6.4 Clean Water Act of 1972 – Section 404(b)(1) (Wetlands)

The USACE administers regulations under Section 404(b)(1) of the CWA, which establishes a program to regulate the discharge of dredged and fill material into waters of the U.S., including wetlands. A 404(b)(1) evaluation and public notice are scheduled to be released during the public comment period.



6.5 Coastal Zone Management Act of 1972 (Coastal Zone Development)

The Coastal Zone Management Act of 1972 is a partnership structure allowing states and the Federal Government to work together for the protection of U.S. coastal zones from environmentally harmful over-development. Coordination with the Louisiana Department of Natural Resources on a Coastal Zone Consistency Determination is scheduled to begin during the public comment period.

6.6 Endangered Species Act of 1973 (Threatened & Endangered Species)

The Endangered Species Act (ESA) of 1973 is designed to protect and recover threatened and endangered (T&E) species of fish, wildlife, and plants. The USACE is scheduled to begin coordination with the USFWS and the NMFS to ensure the protection of those T&E species under their respective jurisdictions during the public comment period. Based on review of existing data and current CEMVN maintenance operations, the USACE finds that implementation of the TSP is not anticipated to adversely affect any listed species or their critical habitat.

6.7 Colonial Nesting Water Birds

Based on a review of existing data and preliminary field surveys, the USACE finds that implementation of the TSP would have no impact on colonial nesting water birds. Standardized best management practices (BMPs) currently used by CEMVN would be followed in order to avoid impacts. Implementation of the proposed project would require compensatory mitigation for unavoidable project-induced potential impacts to colonial nesting water bird habitat.

6.8 Farmland Protection Policy Act of 1981 (Farmland)

The Farmland Protection Policy Act of 1981 (FPPA) is intended to minimize the impact of Federal programs on the unnecessary and irreversible conversion of farmland to nonagricultural uses. The project is not anticipated to impact farmlands.

6.9 Fish and Wildlife Coordination Act of 1934 (Fish & Wildlife)

The Fish and Wildlife Coordination Act of 1934 (FWCA) provides authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It requires Federal agencies that construct, license or permit water resource development projects to first consult with the USFWS, NMFS, and state resource agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Section 2(b) requires the USFWS to produce a Coordination Act Report (FWCAR) that details existing fish and wildlife resources in a project area, potential impacts due to a proposed project, and recommendations for



a project. CEMVN has begun coordination with the USFWS and NMFS and a draft Coordination Act Report was received on October 11, 2016, and is appendicized as Appendix G.

6.10 Magnuson-Stevens Fishery Conservation and Management Act of 1976 and Magnuson-Stevens Act Reauthorization of 2006 (Essential Fish Habitat)

The Magnuson-Stevens Fishery Conservation and Management Act of 1976 and the Magnuson-Stevens Act Reauthorization of 2006 govern marine fisheries management in the U.S. Essential Fish Habitat (EFH) does not intersect the proposed project alignment or the disposal area in the near term. The USACE is scheduled to begin coordination with the NMFS on impacts (if any) that the TSP may have on EFH during the public comment period.

6.11 Marine Mammal Protection Act of 1972 (Marine Mammals)

The Marine Mammal Protection Act of 1972 protects whales, dolphins, sea lions, seals, manatees, and other species of marine mammals. The USACE finds the TSP would have no effect on marine mammals that may occasionally be found in the area. To avoid “takings” of the West Indian manatee and ensure compliance with the law, USACE commits that 1) all construction staff will be educated about the laws and manatees, 2) a search for manatees in work areas would be conducted before construction, and 3) appropriate best management practices to avoid or minimize potential entrapment of manatees during construction would be implemented.

6.12 Migratory Bird Treaty Act of 1918 & Migratory Bird Conservation Act of 1929 (Migratory Birds)

The Migratory Bird Treaty Act of 1918 and Migratory Bird Conservation Act of 1929 laws protect migratory birds and their habitat. Many important habitats in the area provide migratory bird shelter, nesting, feeding, and roosting habitat. USFWS recommendations and best management practices would be followed to avoid impacts to any protected birds.

6.13 National Historic Preservation Act of 1966 (Cultural and Historic Resources)

In compliance with Section 106 of the National Historic Preservation Act of 1966 and 36 CFR Part 800, Federal agencies must take into account the effects of their actions on historic properties and afford the Advisory Council on Historic Properties (ACHP) a reasonable opportunity to comment on such undertakings. Historic properties include any prehistoric or historic district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. A Federal agency shall consult with any Indian tribe that attaches religious and cultural significance to such properties. Agencies shall afford the State Historic Preservation Officer (SHPO) and Indian tribes a reasonable opportunity to comment before decisions are made.



Section 106 consultation with the SHPO and Indian tribes is scheduled to begin during the public review period.

6.13.1 Tribal Consultation (Tribal Interests)

In partial fulfillment of EO 13175 (“Consultation and Coordination With Indian Tribal Governments”), NEPA, Section 106 of the National Historic Preservation Act and 36 CFR Part 800, consultation is scheduled to begin with the following Federally-recognized Tribes: Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, Seminole Nation of Oklahoma, Seminole Tribe of Florida, and Tunica-Biloxi Tribe of Louisiana during the public comment period.

6.14 Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984

The discharge of dredged material into waters of the United States is regulated under the Clean Water Act (CWA). In the absence of a known Hazardous, Toxic, and Radioactive Waste (HTRW) concern, the proposed action would not qualify for an HTRW investigation.

The USACE Engineer Regulation, ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) for Civil Works Projects, states that dredged material and sediments beneath navigable waters proposed for dredging qualify as HTRW only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal or a remedial action) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or if they are a part of a National Priority List (NPL) site under CERCLA (NPL is also known as "Superfund").

Dredged material and sediments beneath the navigable waters proposed for dredging shall be tested and evaluated for their suitability for disposal in accordance with the appropriate guidelines and criteria adopted pursuant to Section 404 of the Clean Water Act and/or Section 103 of the Marine Protection Research and Sanctuaries Act (MPRSA) and supplemented by the Corps of Engineers Management Strategy for Disposal of Dredged Material: Containment Testing and Controls (or its appropriate updated version) as cited in Title 33 Code of Federal Regulations, Section 336.1.

The proposed dredge material disposal areas have historically been associated with oil and gas exploration. A review of state and national environmental and natural resources databases revealed the presence of numerous active, inactive, plugged and abandoned oil and gas wells, injection wells, and oil and gas pipelines within the proposed project area. Although they are not considered to be HTRW concerns, they are considered to be Recognized Environmental Conditions that shall be avoided during construction.



Dredge slurry was collected directly from the discharge lines of dustpan dredges performing maintenance on all maintained Deep Draft Crossings during Fiscal Year 2016. The solid and liquid fractions of the slurry were analyzed individually for the presence of EPA priority pollutants including metals, pesticides, PCBs, and semi-volatile organic compounds. Metals were common to both fractions, and were detected at or below background levels in the Mississippi River. Chlordane pesticides and hydrocarbon exhaust products were detected infrequently in the solid samples, but at levels generally at or below 1 part per billion. All contaminant detects in dredge slurry were below regulatory water quality criteria and ecological screening values, and dredging of the crossings is not expected to have a negative impact on human health or the environment.

Based upon a review of the NPL, CERCLA, and environmental databases, contaminant sampling data, the probability of encountering HTRW in connection with this project is low. No portion of the project area proposed for dredging and disposal is included in the NPL. The proposed construction and beneficial use-disposal action does not qualify for further HTRW investigation.

Numerous oil and gas pipelines, oil and gas well-heads (active, inactive, and plugged and abandoned), and oil and gas pipelines and related facilities are located within or near the footprint of the project areas. Care must be taken to avoid impacts to pipelines or oil and gas wells during construction of all features.

6.15 Executive Order 11514, Protection and Enhancement of Environmental Quality

Exexecutive Order (EO) 11514 directs Federal agencies to "initiate measures needed to direct their policies, plans, and programs so as to meet national environmental goals." The TSP complies with EO 11514.

6.16 Executive Order 11988, Floodplain Management

EO 11988 requires a Federal agency, when taking an action, to avoid short- and long-term adverse effects associated with the occupancy and the modification of a floodplain. The agency must avoid direct and indirect support of floodplain development whenever floodplain siting is involved. In addition, the agency must minimize potential harm to or in the floodplain and explain why the action is proposed. Additional floodplain management guidelines for EO 11988 were provided in 1978 by the Water Resources Council. The project is compliant with the order.

6.17 Executive Order 11990, Protection of Wetlands

EO 11990, Protection of Wetlands, directs Federal agencies to avoid to the extent possible, long and short-term adverse impacts associated with the destruction or modification of wetlands, and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Implementing the TSP requires compensatory mitigation for unavoidable impacts that



will require replacing or providing substitute resources. The annual beneficial use of dredged material into open water during river maintenance will result in approximately 528 acres of marsh and permanent impacts to wetlands will not occur. No impacts were identified for open water dredging and disposal that would require mitigation.

6.18 Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

EO 12898 requires agencies to make achieving environmental justice (EJ) part of their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of programs, policies and activities on minority and low-income populations. Potential EJ issues were considered in planning and determined as not applicable due to the isolated nature of the project-related impacts.

6.19 Executive Order 13112, Invasive Species

EO 13112 requires agencies to prevent the introduction of invasive species; provide for their control; and minimize their economic, ecological and human health impacts. The TSP is consistent with the EO to the extent practicable and permitted by law and subject to the availability of appropriations, and within Administration budgetary limits. Relevant programs and authorities to prevent invasive species introductions would be used during construction. The USACE will not authorize, fund, or carry out actions likely to cause or promote the introduction or spread of invasive species unless it has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm; and that all feasible and prudent measures to minimize risk of harm would be taken in conjunction with the actions.

6.20 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

EO 13186 requires agencies to take actions to further implement the Migratory Bird Treaty Act. The TSP has been evaluated for effects on migratory birds, with emphasis on species of concern. Habitats in the project area provide migratory bird shelter, nesting, feeding and roosting habitat. The TSP would increase the availability of shelter and feeding habitat.

6.21 Land and Water Conservation Act of 1965

The Land and Water Conservation Act of 1965 established a fund from which Congress can make appropriations for outdoor recreation. The USACE must coordinate with the Secretary of the Interior to insure that no property acquired or developed with assistance from this Act will be converted to other purposes other than outdoor recreation uses. CEMVN is scheduled to begin coordination with USFWS and LDWF to ensure the beneficial use of dredge material on Pass a



Loutre Wildlife Management Area and Delta National Wildlife Refuge is consistent with the planning objectives of each area.



7.0 PUBLIC INVOLVEMENT

Public involvement is an important part of planning and decision-making. Agencies, non-governmental organizations, and citizens provided valuable input for TSP.

7.1 Public Meetings and Other Coordination Efforts

Public meetings and coordination were conducted while developing the scope of the project. Additional public meetings may be held after publication of the draft report, if warranted.

On 18 May 2015, a scoping meeting public notice fact sheet was mailed to approximately 407 individual mailing addresses compiled from an internal CEMVN mailing database. These individual addresses included various Federal, State of Louisiana, and local agencies and officials, parish and city government representatives, non-governmental organizations, individual stakeholders, and members of the public.

In addition to the individual letters, scoping meeting publications were run in three local newspapers on the following dates:

- *19 May and 26 May 2015* – Plaquemines Gazette
- *24 May 24 and 28 May 2015* – New Orleans Advocate
- *24 May 24 2015* – Baton Rouge Advocate

The 13 May 2015 Notice of Intent (volume 80, number 92, pp 27296-27298) identified the NEPA public scoping meeting dates, locations, times, and meeting formats. The first scoping meeting was held on 26 May 2015, at the Belle Chasse Branch Library, in Belle Chasse, LA, and began at 6:00 p.m. with an Open House wherein the public was invited to visit a series of poster stations staffed by the project delivery team members and subject matter experts. The second scoping meeting was held at the New Orleans District, in New Orleans, LA, and began at 8:30 a.m. The third scoping meeting was held at the Louisiana State Police Training Academy, in Baton Rouge, LA, and began at 6:00 p.m.

Details on public coordination, scoping meetings, pertinent comments, and resolution of comments can be found in Appendix G “Scoping Report.”

7.2 Draft Report Recipients

This report was distributed to Federal, state, and local agencies; businesses, libraries, and universities; and others. Additionally, these stakeholders received a copy of the report (Table 7-1).



Table 7-1 Report Recipients

Louisiana Congressional Delegation		
Senator Bill Cassidy	1st District Congressman Steve Scalise	4th District John C. Fleming
Senator David Vitter	2nd District Congressman Cedric Richmond	5th District Ralph Abraham
	3rd District Congressman Charles Boustany	6th District Garret Graves
LaDOTD		
Dr. Shawn Wilson	Sharon Balfour	Phil Jones
Tommy Clark	Chris Collins	
Louisiana State Senators & Representatives		
Ascension Parish	Iberville Parish	East Baton Rouge Parish
Senator: Eddie Lambert, and Troy E. Brown;	Senator: Robert Marionneaux;	Senator: Dan Claitor, Yvonne Colomb, Regina Barrow, Dale M. Erdey, Rick Ward, III, Mack "Bodi" White;
Representative: Tony Bacala, John A. Berthelot, Edward J. Price, Clay Schexnayder	Representatives: Elton Aubert, Karen St. Germain	Representative: Barbara W. Carpenter, Stephen F. Carter, Paula P. Davis, Rick Edmonds, Franklin J. Foil, Kenneth E. Havard, Valarie Hodges, Barry Ivey, Edward C. "Ted" James, II, Edmond Jordan, C. Denise Marcelle, Haynes Smith,
Jefferson Parish	Orleans Parish	St. Charles Parish
Senator: Troy Carter, Conrad Appel, Senator Daniel "Danny" Martiny, John A. Alario, Jr., Jean-Paul J. Morrell, Karen Carter Peterson, Gary Smith;	Senator: Karen Carter Peterson, Jean-Paul J. Morrell, Conrad Appel, Troy Carter, Wesley Bishop, Sharon Hewitt;	Senator: Gary Smith, Troy E. Brown;
Representative: Robert E. Billiot, Patrick Connick, Jerry Gisclair, Cameron Henry, Stephanie Hilferty, Christopher J. Leopold, Rodney Lyons, Joseph A. Marino, III, Julie Stokes, Kirk Talbot, Polly Thomas, Thomas P. Willmott	Representative: Neil C. Abramson, John H. Bagneris, Joseph Bouie, Jr., Gary M. Carter, Jr., Raymond E. Garofalo, Jr., Jimmy Harris, Stephanie Hilferty, Walt Leger, III, Christopher J. Leopold, Helena N. Moreno	Representative: Edward J. Price, Clay Schexnayder
St. James Parish	Plaquemines Parish	St. Bernard Parish
Senator: Eddie Lambert, Troy E. Brown;	Senator: Sharon Hewitt, Troy Carter, John A. Alario, Jr.;	Senator: Sharon Hewitt
Representative: Edward J. Price, Clay Schexnayder	Representative: Raymond E. Garofalo, Jr., Christopher J. Leopold, Jean-Paul J. Morrell;	Representative: Raymond E. Garofalo, Jr.



St. John the Baptist Parish	West Baton Rouge Parish	
Senator: Gary Smith, Troy E. Brown;	Senator: Rick Ward, III, Troy E. Brown; Representative: Major Thibaut	
Representative: Randal L. Gaines, Gregory A. Miller, Clay Schexnayder	Representative: Major Thibaut	
Federal Agencies		
Advisory Council on Historic Preservation	Department of Energy: Office of Environmental Compliance	Department of Transportation: Division Administrator, Federal Highway Administration; Southwest Region, Federal Aviation Administration
Department of Agriculture: Natural Resources Conservation Service; Louisiana State Conservationist; District Conservationist	Department of Homeland Security: Federal Emergency Management Agency, Region VI	Environmental Protection Agency: Office of Federal Activities, EIS Filing Section: Region VI, Marine and Wetlands Section; Region VI - Office of Planning and Coordination
Department of the Army: Mississippi Valley Division	Department of the Interior: Office of Environmental Policy and Compliance; U.S. Fish and Wildlife Service: Lacombe Office; Lafayette Field Office	Department of Commerce: National Oceanic and Atmospheric Administration; Protected Species Division; Habitat Conservation Division; NEPA Coordinator, Office of Program, Planning & Integration
Waterways Council Inc.	Eighth Coast Guard District	United States Department of the Navy
State Agencies and Offices		
Office of the Governor of Louisiana	Louisiana Department of Agriculture & Forestry: Office of Forestry; Office of Agriculture & Environmental Science	Louisiana Department of Public Works
Louisiana Office of Lieutenant Governor	Louisiana Department of Environmental Quality: Office of the Secretary; Environmental Planning Division	Louisiana Department of Transportation & Development
Louisiana Secretary of State	Louisiana Department of Health & Hospitals: Office of Public Health, Center for Environmental Health	Louisiana Department of Wildlife and Fisheries: Office of the Secretary; Natural Heritage Program
Louisiana Attorney General's Office	Louisiana Department of Natural Resources: Interagency Affairs; Lafayette Field Office; Division of State Lands; Office of Conservation, Surface Mining Division; Consistency Coordinator, Coastal Resources Program	Louisiana Division of Administration: State Land Office; State Planning Office



Governor's Office for Coastal Activities	Coastal Protection and Restoration Authority Board	Louisiana Office of Cultural Development: State Historic Preservation Officer; Division of Outdoor Recreation
Coastal Protection and Restoration Authority		Louisiana State Board of Commerce & Industry
Native American Tribes		
Alabama Coushatta Tribe of Texas	Coushatta Tribe of Louisiana	Seminole Tribe of Florida
Caddo Nation of Oklahoma	Jena Band of Choctaw Indians	Seminole Nation of Oklahoma
Chitimacha Tribe of Louisiana Band	Mississippi Band of Choctaw Indians	Tunica-Biloxi Tribe of Louisiana
Choctaw Nation of Oklahoma	Muscogee (creek) Nation	
Media Outlets		
The New Orleans District, Public Affairs Office will provide a news release to several hundred news media outlets including contact information for requesting copy of the report, and where to provide comments on the report.		
Libraries & Universities		
Louisiana State University: Geographic Information Center; Office of Sea Grant Development; Department of Geography; Government Documents	Parish Libraries: Ascension, East Baton Rouge, Iberville, Jefferson, Orleans, Plaquemines St. Bernard, St. Charles, St. James Parish, St. John the Baptist, West Baton Rouge	Earl K. Long Library
		Tulane University
Navigation, Dredging and River Related		
Associated Federal Pilots	Entergy	New Orleans-Baton Rouge Steamship Pilot Association
Bean Corporation	Hydro consultants, Inc.	Plaquemines Port Harbor & Terminal
Big River Coalition	Louisiana Department of Transportation & Development	Port of Greater Baton Rouge
C&M Contractors, Inc.	Louisiana Maritime Association (LAMA)	Port of New Orleans
Capt. K.C. Siverd	Louisiana Maritime Association (LAMA)	Port of South Louisiana
Carr Oil Company, Inc.	Lower Mississippi River Committee (LOMRC)	South Louisiana Environmental Council
Crescent River Port Pilots Association	Maritime Navigation Safety Association (MNSA)	Associated Branch Pilots (Bar Pilots)
Cresent River Port Pilots Association	Maritime Navigation Safety Association (MNSA)	South Louisiana Port Commission
Engineering Development Group, Inc.	New Orleans Board of Trade	Wally Landry, Crucial, Inc.



Ports		
Port of New Orleans	Port of South Louisiana	Greater Port of Greater Baton Rouge
Plaquemines Port, Harbor & Terminal		
Levee Districts		
Orleans Levee District	North Lafourche Basin Levee District	Pontchartrain Levee District
East Jefferson Levee District	West Jefferson Levee District	Lafitte Area Independent Levee District
Southeast Louisiana Flood Protection Authority - West	Plaquemines Levee District	Lake Borgne Levee District
Southeast Louisiana Flood Protection Authority - East		
Floodplain Management Agencies		
FEMA Region VI	LADOTD, Public Works and Water Resources Division;	
Ascension Parish Government	East Baton Rouge Parish Government	Iberville Parish Government
Parish President Parish Council	Parish President Parish Council	Parish President Parish Council
Jefferson Parish Government	Orleans Parish Government	Plaquemines Parish Government
Parish President Parish Council	Parish President Parish Council	Parish President Parish Council
St. Bernard Parish Government	St. Charles Parish Government	St. James Parish Government
Parish President Parish Council	Parish President Parish Council	Parish President Parish Council
St. John the Baptist Government	West Baton Rouge Parish	
Parish President Parish Council	Parish President Parish Council	

7.3 Views of the Public

This report is available for public review and comment for 45 days. The final report will include comments received from public review and public meetings



8.0 RECOMMENDATION

Information found in this document may be subject to change and further development during final feasibility analysis, to include analysis of training works, refinement of relocation and real estate requirements, to include additional hydraulic modeling, as well as from review and resolution of comments received from both the public and other agencies; the Agency Technical Review (ATR); and Independent External Peer Review (IEPR), all of which will help refine the Tentatively Selected Plan (TSP). The information provided in this chapter is based on the TSP, as currently defined and may be refined and/or changed prior to publication of the final report.

8.1 Tentatively Selected Plan

The Tentatively Selected Plan (TSP) for the next phase of construction, is Alternative 3d. This alternative is to deepen the MRSC to a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South of Louisiana and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the footprint of the Port of Baton Rouge would remain at 45 ft LWRP.

The portions of the river in between RM 13.4 AHP to RM 115 AHP, and in between the crossings historically have depths in excess of 55 ft. Evaluation indicated this will remain the case through the period of analysis. If future conditions result in changes in the naturally deep condition of these excluded reaches, an economic and environmental analysis and reassessment of the project will be needed in order to address the channel depth in those reaches.

8.2 Plan Implementation

The following describes the NFS financing and the division of plan responsibilities.

8.2.1 Federal and non-Federal Cost-Sharing

The Louisiana Department of Transportation (LaDOTD) is the NFS during the development of the GRR for the project and the cost-share during this phase is 50 percent Federal and 50 percent non-Federal. LaDOTD will continue to be the NFS through preliminary engineering and design (PED), construction, and Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R). The cost share for the PED and construction of Phase III of the project will be 50 percent Federal and 50 percent non-Federal since the deepening of the channel, as described in this TSP, is limited to depths in excess of 45 feet MLLW. Per WRRDA 2014 the cost share for OMRR&R, deep draft navigation for a channel up to 50 ft is 100 percent Federal. Among other responsibilities, the NFS must provide all project LERRDs required for the construction and OMRR&R of the general navigation features of the project and submit any work-in-kind request to the Federal government for the PED of the project. Table 8-1 provides a breakdown of the estimated cost and cost share



requirements for both Federal and non-Federal based on the TSP. The below tables reflect the cost as provided in the micro-computer aided cost estimating system (MCACES) estimate which was prepared on the TSP and is included in Appendix C. The cost in the MCACES estimates, including the relocations cost, were refined from what has been reflected in the alternative and comparison development. The relocations cost of \$40M was a conservative estimate, which was refined after identification of the TSP. This estimate will be further refined during Feasibility level design.

Table 8-1 Cost Sharing

	Federal Cost (50%) ¹	Non-Federal Cost (50%)	Total Cost
PED	\$2,583,000	\$2,583,000	\$5,166,000
Construction	\$47,349,000	\$33,279,000	\$80,658,000
Relocations	\$0	\$11,600,000	\$11,600,000
Lands, Easements, & ROW	\$0	\$2,500,000	\$2,500,000
Construction Management	\$3,697,500	\$3,697,500	\$7,395,000
Total Project First Costs	\$53,659,500	\$53,659,500	\$107,319,000

Table 8-2 General Navigation Feature Payback

Total Project First Cost	107,319,000
Real Estate	(2,500,000)
Relocations	(11,600,000)
Total General Navigation Features	93,219,000
After construction there is a 10% payback over 30 years. This is applied to the GNF ¹ only. Sponsor expenditures for LERR's are deducted from this.	$93,219,000 \times 10\% = 9,322,000$
Sponsor will have a net overpayment	(18,642,000)
	9,321,000



8.2.2 Federal Responsibilities

The Federal government will be responsible for PED and construction of the general navigation features of the project in accordance with the applicable provisions of Public Law 99-662 (WRDA of 1986), as amended. The Government, subject to Congressional authorization and the availability of funds, and using those funds provided by the NFS, shall expeditiously construct the project, applying those procedures usually applied to Federal projects, pursuant to Federal laws, regulations, and policies. In addition, the Government is responsible for 100 percent of the cost of the OMRR&R of the general navigation features of the project since all of the considered alternatives are less than or equal to a depth of 50 feet.

8.2.3 Non-Federal Responsibilities

The non-Federal sponsor shall be required to to comply with all applicable Federal laws and policies and to provide the following items of local cooperation, including, but not limited to, the following:

1. The Non-Federal Sponsor shall contribute fifty (50) percent of the total costs of construction of the general navigation features (GNF) of the Project attributable to dredging to a depth in excess of -45 feet.
2. The Non-Federal Sponsor shall pay, with interest, over a period not to exceed 30 years following completion of the period of construction of the GNFs, an additional amount equal to 10 percent of the total cost of the construction of the GNFs.
3. The Non-Federal Sponsor shall not use Federal program funds to meet any of its obligations for the Project unless the Federal agency providing the funds verifies in writing that such funds are authorized to be used to carry out the Project.
4. The Non-Federal Sponsor shall provide to the Government all lands, easements, servitudes, and rights-of-way, including lands suitable for the borrowing of materials or the placement of dredged or excavated material disposal areas, and perform, or assure performance of, all alterations and relocations of facilities and utilities, including deep-draft facility/utility relocations (excluding the cost of alteration, lowering, raising, or replacement and attendant demolition of any lawful bridge over the navigable waters of the United States, and the approaches thereto, which is used and operated for the purpose of railroad traffic or which represents a part of is a government-owned public highway), determined by the Government to be necessary for construction, operation, or maintenance of the Project.
5. For so long as the Project remains authorized, the Non-Federal Sponsor shall ensure that lands, easements, and rights-of-way that the Government determines to be required for the



operation and maintenance of the general navigation features and that were provided by the Non-Federal Sponsor are retained in public ownership for uses compatible with the authorized purposes of the Project.

6. The Non-Federal Sponsor shall comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 C.F.R. Part 24, in acquiring lands, easements, and rights-of-way necessary for construction or operation and maintenance of the general navigation features, relocations, deep draft utility relocations, the borrowing of material, or the placement of dredged or excavated material, and shall inform all affected persons of applicable benefits, policies, and procedures in connection with said Act.
7. Non-Federal Sponsor shall provide, operate, and maintain at no cost to the Government, all Project features other than the general navigation features, including, but not limited to, any local service facilities, in a manner that is compatible with the project's authorized purposes and in accordance with applicable federal and state laws and regulations and any specific directions prescribed by the Government.
8. For so long as the Project remains authorized, the Non-Federal Sponsor shall ensure that lands, easements, and rights-of-way that the Government determines to be required for the construction, operation and maintenance of the general navigation features and that were provided by the Non-Federal Sponsor are retained in public ownership for uses compatible with the authorized purposes of the Project.
9. The Non-Federal Sponsor shall hold and save the Government free from all damages arising from construction or operation and maintenance of the Project except for damages due to the fault or negligence of the Government or its contractors.
10. In accordance with 32 C.F.R. Section 33.26, the Non-Federal Sponsor is responsible for complying with the Single Audit Act Amendments of 1996 (31 U.S.C. 7501-7507), as implemented by Office of Management and Budget (OMB) Circular No. A-133 and Department of Defense Directive 7600.10.
11. The Non-Federal Sponsor shall maintain such books, records, documents, or other evidence in accordance with these procedures and for a minimum of three years after completion of the accounting for which such books, records, documents, or other evidence were required.



12. The Non-Federal Sponsor shall authorize and give the Government the right to enter upon, at reasonable times and in a reasonable manner, property that the Non-Federal Sponsor owns or controls for the purpose of constructing, completing, operating and maintaining the general navigation features.
13. The Non-Federal Sponsor shall comply with all applicable Federal and State laws and regulations, including, but not limited to: Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d) and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled “Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army”; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)).
14. The Non-Federal Sponsor shall be solely responsible for any increase in costs resulting from betterments requested by the Non-Federal Sponsor, and all such increased costs must be paid in advance by the Non-Federal Sponsor.
15. Accomplish all removals determined necessary by the federal government other than those removals specifically assigned to the federal government;
16. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 USC 9601–9675, that may exist in, on, or under lands, easements and rights of way that the federal government determines to be necessary for the construction or operation and maintenance of the GNFs. However, for lands, easements, or rights-of-way that the Government determines to be subject to the navigation servitude, only the Government shall perform such investigations unless the federal government provides the sponsor with prior specific written direction, in which case the sponsor shall perform such investigations in accordance with such written direction.
17. Assume complete financial responsibility, as between the federal government and the sponsor, for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements and rights of way that the federal government determines to be necessary for the construction or operation and maintenance of the project.



18. Agree, as between the federal Government and the non-Federal Sponsor, that the non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability.
19. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA.



APPENDIX A

Environmental

Appendix A-1. Southwest Pass NEPA Documentaion

SW Pass NEPA DOCUMENTATION	FONSI	PUBLIC NOTICE	WATER QUALITY CERTIFICATION		404 Evaluation
FEIS 40-Foot Channel	19-Jul -74	18-Oct -74		13-Dec-78	5 Jan 82
FEIS Supplement I	19-Mar-76				
FEIS Supplement II	1-Mar-85	14-Jun-84	840629-09	9-Aug-84	Oct 84
SIR #14 40-Foot Channel Advance Maint & Allow Overdepth	10-Dec-85				
FEIS Deep Draft Channel	2-Jul-82	31-May-84	840504-09	4-Jun-84	19 Oct 84 27 Jan 86
SIR #9 Deep Draft Channel Advance Maint & Allow Overdepth					19 Oct 84
EA #62	21-Apr-87	17-Sep-87	WQC 870917-06	24-Nov-87	19 Feb 87
EA #267 Dustpan Dredge	22-Apr-97	2-Dec-96	WQC 840629-09*	12-Mar-97	3 Apr 97
EA #268 Management HDDA Pass-à-Loutre	17-Apr-97	13-Nov-96	WQC 840504-09*	13-Nov-96	9 Mar 97
EA #268A Pass-a-Loutre Hopper Disposal Area Modification	4-Jun-02				27 Mar 02
EA #268B Pass-a-Loutre Hopper Disposal Area Additional Disposal Area	3-Oct-08	13-Nov-07	WQC 070620-04 AI 101235 CER 20070007	30-Aug-07	28 may 08
FEIS West Bay Sediment Diversion	18-Mar-02		WQC 900620-12 WQC 900620-12*	10-Aug-90 28-Jun-02	26 Oct 05
Dustpan Dredge Demonstration		15-May-96			
EA #393 Burrwood Bayou Flow Control Features	8-Dec-03	10-Apr-03 4-Sep-03	TR 030404-01 AI 101235 CER20030001	5-May-03 4-Nov-03*	1 Dec 03
EA #393-A Burrwood Bayou Flow Control Structure Repairs	28-Apr-05	10-Dec-04	WQC JP041201-01 AI126035 CER20040001	7-Mar-05	14 Jan 05
EA #393-B Burrwood Bayou Flow Control Structure			WW 080107-01/AI 101235/CER 20080001	11 Mar 08	4 Mar 08
EA #517 Additional Disposal Areas for Southwest Pass	22 Nov 13	12 Sep 12	WQC 121003-02/AI 101235/CER 20120007	1 Nov 12	8 Dec 12
		12 Jun 12	WQC 120521-03/AI 101235/CER 20120003	21 Jun 12	25 Jun 13

*WQC Revisions

Appendix A-2. 1996-2015 Dredging totals for CEMVN.

Mississippi River Maintenance Dredging in New Orleans District

Fiscal Year	SDX Cubic Yards	DDX Cubic Yards	NO Harbor Cubic Yards	SWP Cubic Yards
2015	566,580	16,762,344	482,195	19,245,648
2014	0	11,199,110	883,373	13,798,960
2013	375,000	15,842,357	778,389	15,783,302
2012	1,926,194	24,523,153	669,469	17,672,605
2011	814,478	21,822,885	675,266	14,580,247
2010	348,180	22,994,560	1,106,763	23,065,397
2009	579,040	26,270,682	1,003,474	18,229,009
2008	325,695	28,123,851	731,611	13,348,156
2007	623,878	11,762,086	1,228,325	10,886,560
2006	441,035	9,953,606	858,673	6,427,429
2005	824,628	19,368,940	1,088,234	13,911,798
2004	452,464	8,656,512	884,503	12,233,284
2003	623,692	13,104,433	1,346,418	9,382,331
2002	489,182	14,130,524	940,843	18,068,221
2001	628,451	10,694,759	1,313,108	13,509,054
2000	0	5,918,539	385,500	3,847,413
1999	0	12,914,990	1,183,133	19,530,236
1998	1,153,179	19,104,278	1,790,892	15,554,911
1997	1,105,121	23,098,962	1,581,881	25,575,406
1996	3,636,800	11,819,079	1,753,542	17,178,571
Totals	14,913,597	328,065,650	20,685,592	301,828,538
Averages	745,680	16,403,283	1,034,280	15,091,427

SDX = shallow draft crossings

DDX = deep draft crossings

NO = New Orleans

SWP = Southwest Pass

SP = South Pass

HDDA = hopper dredge disposal area (located at Head of Passes)

FY = Fiscal Year

SP Cubic Yards	HDDA Cubic Yards	Total Miss River Cubic Yards	Total FY Contract Cost
0	9,646,404	46,703,171	
0	0	25,881,443	\$89,718,364
0	7,235,381	40,014,429	\$78,187,640
0	787,274	45,578,695	\$107,023,588
0	1,805,022	39,697,898	\$84,004,278
0	6,527,685	54,042,585	\$130,672,533
0	0	46,082,205	\$89,352,236
0	4,013,912	46,543,225	\$98,288,840
4,488,377	4,266,078	33,255,304	\$67,023,572
0	0	17,680,743	\$33,294,675
0	0	35,193,600	\$50,704,830
0	4,124,598	26,351,361	\$38,900,768
0	0	24,456,874	\$33,242,566
0	0	33,628,770	\$47,672,109
0	0	26,145,372	\$31,441,137
0	0	10,151,452	\$12,040,486
6,126,300	0	39,754,659	\$45,235,217
0	1,051,661	38,654,921	\$45,210,572
0	0	51,361,370	\$55,225,438
0	0	34,387,992	\$33,690,368
10,614,677	39,458,015	715,566,069	\$1,170,929,217
530,734	1,972,901	35,778,303	\$61,627,854

Appendix A-3. NEPA documentation for ship channel dimensions.

PROJECT		AUTHORIZED DIMENSIONS (Depth x Width)	ADVANCE MAINTENANCE	ALLOWABLE OVERDEPTH	NEPA COMPLIANCE DOCUMENT
Mississippi River	Baton Rouge to New Orleans (Deep Draft Crossings)	-55' (-45') LWRP x 500'	2'	2'	Miss River Deep Draft FEIS 1982 (55' channel) EA # 68 Adv. Maint. & Overdepth (17 Dec 87)
	New Orleans to Mile 12 AHP (Southwest Pass)	-55' (-45') LWRP x 750'	2'	2'	Miss River Deep Draft FEIS 1982 (55' channel) SIR #9 Deep Draft Adv. Maint. & Overdepth (23 Aug 85)
	Mile 12 AHP to Mile 18 BHP (Southwest Pass)	-55' (-48') MLLW x 750'	6'	2'	Miss River Deep Draft FEIS 1982 (55' channel) SIR #9 Deep Draft Adv. Maint. & Overdepth (23 Aug 85) NEPA Categorical Exclusion SWP Adv. Maint. (13 Jan 16)

	Mile 18 BHP to Mile 22 BHP (Southwest Pass)		-55' (-48') MLLW x 600'	6'	2'	Miss River Deep Draft FEIS 1982 (55' channel) SIR #9 Deep Draft Adv. Maint. & Overdepth (23 Aug 85) NEPA Categorical Exclusion SWP Adv. Maint. (13 Jan 16)
	South Pass	Inland	-30'(-17') MLLW x 450' (300')	-	-	Miss River Baton Rouge to Gulf FEIS 1974 (40' channel) (Adv. Maint. & Overdepth not covered in any existing NEPA document)
		Bar	-30'(-17') MLLW x 600' (300')	-	-	
Mississippi River						
	New Orleans Harbor		-40' (-15' to -35') LWRP x 500'	2'	2'	Miss River Deep Draft FEIS 1982 (55' channel) EA #68 (17 Dec 87)

Appendix A-4. History of deep draft crossing dredging (1980-2015)

[illegible]

Appendix A-5. Southwest Pass Beneficial Use Acreages from 2009-2015.

Year	BU Site	BU Type	Year 0 Acres	Year 1 Acres	Year 2 Acres	Year 3 Acres	Year 4 Acres	Year 5 Acres	Year 6 Acres	Total Acres Lost	% Land Lost
2009	12.7R BHP	WD	24	20	19	14	14	14	13	11	46
	10.2R BHP	WD	33	15	7	7	7	7	7	26	79
	7.9R BHP	WD	6	0.5	0	0	0	0	0	6	100
	6.5R BHP	WD	37	12	12	12	12	12	12	25	68
2010	15.5R BHP	WD	8	2	1	1	1	0.5		7.5	94
	14.3R BHP	WD	12	6	5	5	3	2		10	83
	13.0R BHP	WD	14	10	8	7	7	8		6	43
	11.2L BHP	WD	33	23	15	17	18	19		14	42
2011	2.0R BHP	WD	10	10	10	10	9			1	10
	3.4R BHP	BS	15	15	15	15	15			0	0
	5.3R BHP	BS	93	92.5	92.5	92	91			2	2
	6.2L BHP	BS	0.3	0.3	0.3	0.3	0.3			0	0
	6.5L BHP	BS	4	4	4	4	4			0	0
	8.2L BHP	BS	4	4	4	4	4			0	0
	9.9L BHP	BS	9	9	9	9	9			0	0
	11.2L BHP	BS	13	13	13	13	13			0	0
	11.8L BHP	BS	20	20	20	19.5	19			1	5
	14.2L BHP	BS	7	7	6.5	6.5	6.5			0.5	7
	14.6L BHP	BS	5	5	5	5	5			0	0
	16.5L BHP	BS	18	18	18	18	17.5			0.5	3
	17.6L BHP	BS	0.4	0	0	0	0			0.4	100
2012	17.3R BHP	WD	114	114	105	101				13	11
	14.3R BHP	WD	273	255	255	252				21	8
	10.7L BHP	WD	70	70	68	67				3	4
	10.5R BHP	WD	65	65	65	62				3	5
	4.1R AHP	WD	26	18	21	17				9	35
	2.9R AHP	WD	67	67	66	61				6	9
2013	8.0R BHP	BS	2	2	2					0	0
	8.0R BHP	WD	16	14	11					5	31
	10.8R BHP	WD	185	185	147					38	21
	12.0R BHP	WD	78	78	76					2	3
	14.1R BHP	WD	305	301	298					7	2
	16.6R BHP	WD	20	20	11					9	45
	17.1R BHP	WD	4	4	2					2	50
	17.5L BHP	BN	2	2	2					0	0

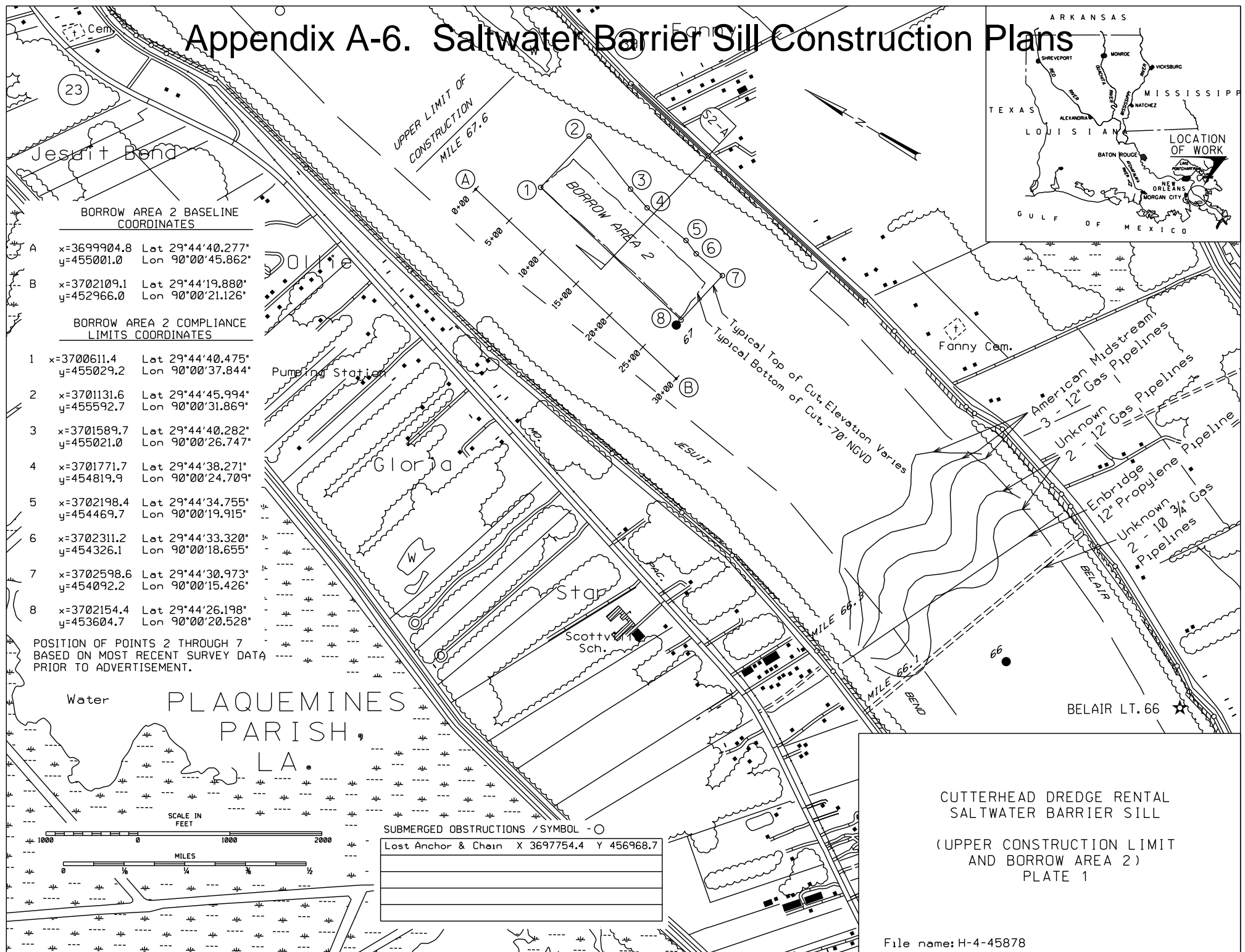
2014	17.8L BHP	WD	21	3						18	18
	15.7L BHP	WD	5	2						3	3
	14.0L BHP	WD	103	86						17	17
	12.6L BHP	WD	68	63						5	5
	11.1L BHP	WD/BN	129	123						6	6
	10.2R BHP	WD	61	19						42	42
	8.2L BHP	WD	116	97						19	19
	5.3R BHP	WD	69	53						16	16
2015	17.3R BHP	WD	49								
	12.7R BHP	WD	35								
	9.0L BHP	WD	17								
	8.04R BHP	WD	0								
	7.19R BHP	WD	9								
	3.8R BHP	WD	4								
	1.5R BHP	WD	73								
	4.0R AHP	WD	100								
	2.9R AHP	WD	45								
	1.5R AHP	WD	371								

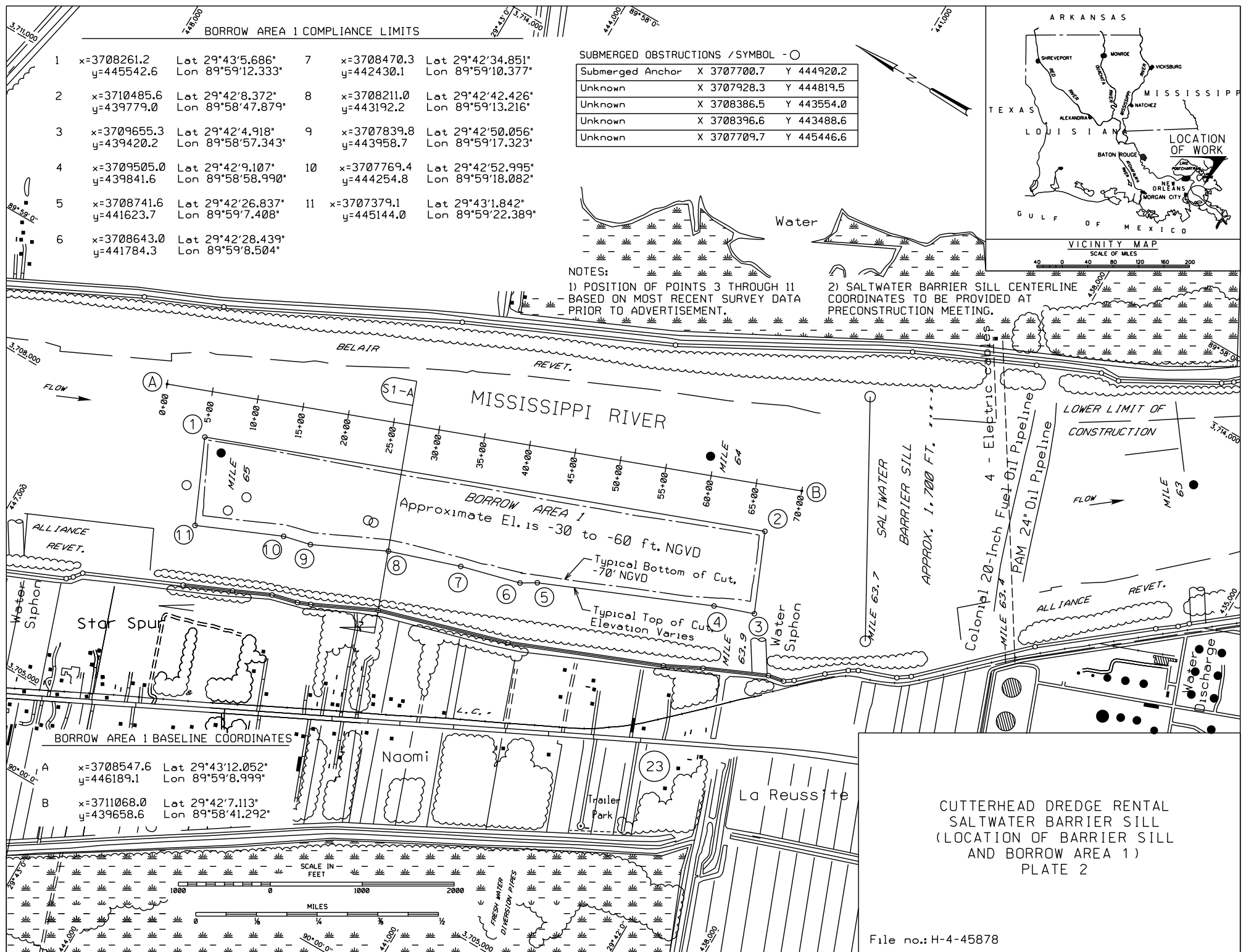
WD = Wetlands Development

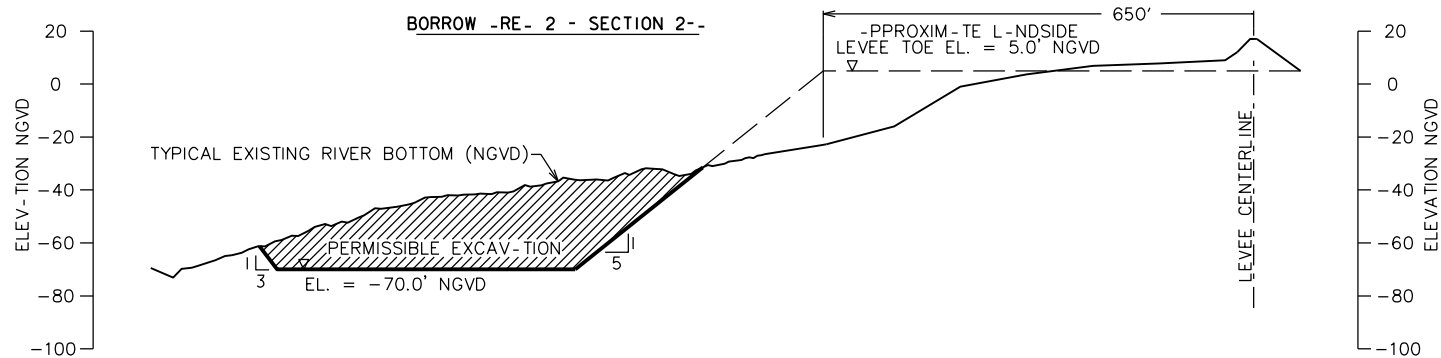
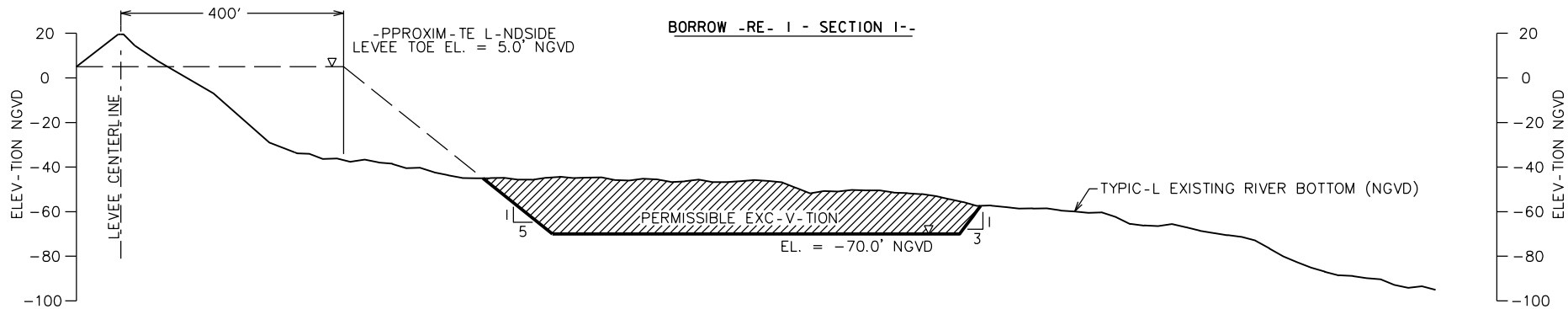
BS = Bank Stabilization

BN = Beach Nourishment

Appendix A-6. Saltwater Barrier Sill Construction Plans



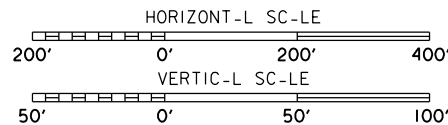




NOTES:

1. The gauge is in Alliance, La. and its location is L-T 29-41-04.36, LONG 89-58-11.64 on upstream end of coke dock of Alliance Refinery, right bank at Mile 62.5 (1962 survey) (Sta. 0139004.). The gauge is automatic wire weight and set at 0.0 Gage Datum and shall be used in lieu of benchmarks. 2011 datum relationships are as follows:
 0.00' Gage = -0.14' N-VD88 (2004.65) = 0.52' NGVD29

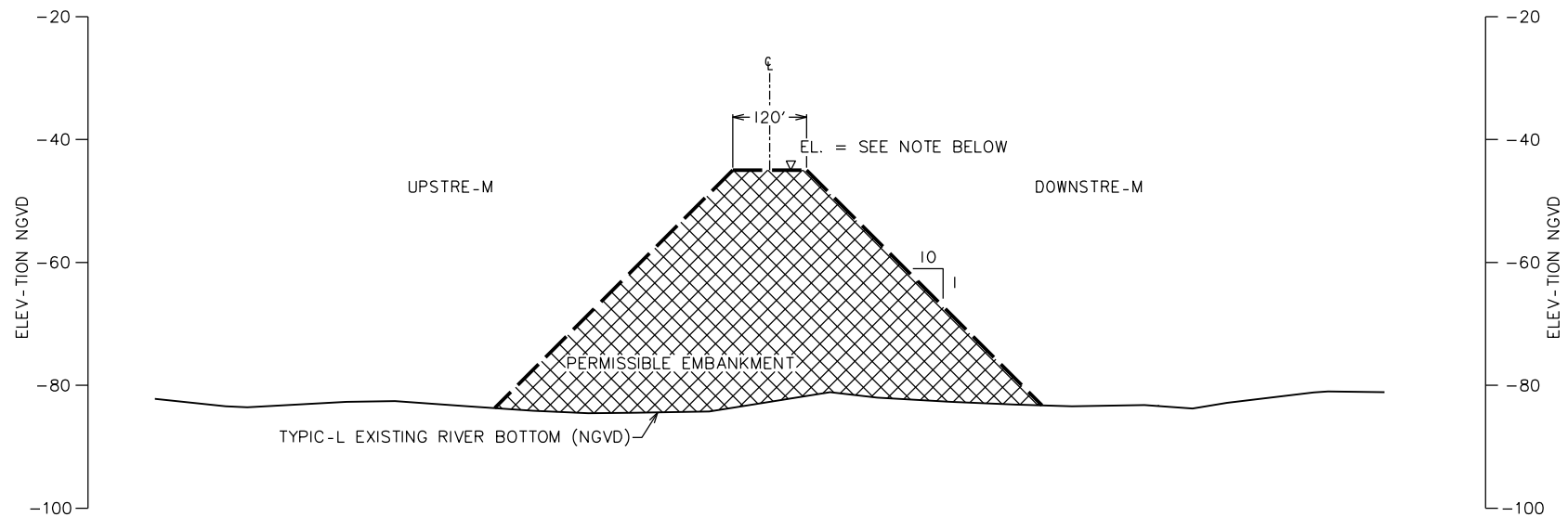
2. All elevations are in N.G.V.D.



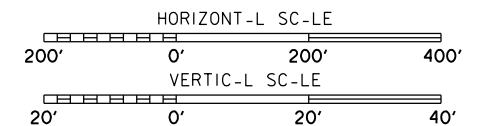
**CUTTERHEAD DREDGE RENTAL
 SALTWATER BARRIER SILL**

**(TYPICAL SECTIONS
 FOR BORROW AREAS)
 PLATE 3**

File name: H-4-45878



NOTE:
Saltwater Barrier Sill height will range between -45.0' to -50.0' NGVD.
Final height of sill will be determined in the field by the Contracting Officer.



CUTTERHEAD DREDGE RENTAL
SALTWATER BARRIER SILL

(TYPICAL SECTION FOR
SALTWATER BARRIER SILL)
PLATE 4

File name: H-4-45878

Appendix 7. Marsh Creation Value Assessment.

WETLAND VALUE ASSESSMENT COMMUNITY MODEL Fresh/Intermediate Marsh

V2.4

Project: Area A-Delta

AAHUs = 190.10

FWOP

Project Area (ac)	365	365	365	365	365	365	365					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	25	25	25	25	25	25	8					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	1.16	1.16	1.16	1.16	1.16	1.16	1.16					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	365	37	93	375	377	405	431					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	25	100	100	100	100					
V2: % Aquatic	25	0	0	25	29	29	13					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.16	1.16	1.16	1.16	1.16	1.16					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.33	0.33	0.33	0.33	0.33	0.33	0.17				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.87	0.87	0.87	0.87	0.87	0.87	0.87				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.24	0.24	0.24	0.24	0.24	0.24				
Open Water HSI =	0.44	0.44	0.44	0.44	0.44	0.44	0.32				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.33	1.00	1.00	1.00	1.00				
% Aquatic	0.33	0.10	0.10	0.33	0.36	0.36	0.21				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.87	0.87	0.87	0.87	0.87	0.87	0.87				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.27	0.39	0.95	0.99	0.94	0.92				
Open Water HSI =	0.44	0.22	0.24	0.50	0.55	0.52	0.41				

AAHU CALCULATION - EMERGENT MARSH

Project: Area A-Delta

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	365	0	0	0.24	0.00	
2	365	1	0	0.24	0.00	0.00
3	365	3	0	0.24	0.00	0.00
4	365	5	0	0.24	0.00	0.00
5	365	6	0	0.24	0.00	0.00
6	365	25	0	0.24	0.00	0.00
7	365	50	0	0.24	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	365	0	0	0.24	0.00	
	37	1	3.7	0.27	0.99	0.48
	93	3	23.25	0.39	9.08	9.26
	375	5	375	0.95	357.00	300.22
	377	6	377	0.99	371.47	364.22
	405	25	405	0.94	381.06	7152.98
	431	50	431	0.92	395.95	9714.97
	Max=		50		AAHUs 350.84	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	350.84
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	350.84

AAHU CALCULATION - OPEN WATER

Project: Area A-Delta

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.44	161.18	
365	1	365	0.44	161.18	161.18
365	3	365	0.44	161.18	322.36
365	5	365	0.44	161.18	322.36
365	6	365	0.44	161.18	161.18
365	25	365	0.44	161.45	3064.95
365	50	365	0.32	115.34	3459.89
Max= 50				AAHUs = 149.84	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.44	161.18	
37	1	33.3	0.22	7.28	71.90
93	3	69.75	0.24	16.79	23.80
375	5	0	0.50	0.00	22.71
377	6	0	0.55	0.00	0.00
405	25	0	0.52	0.00	0.00
431	50	0	0.41	0.00	0.00
Max= 50				AAHUs 2.37	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	2.37
B. Future Without Project Open Water AAHUs	=	149.84
Net Change (FWP - FWOP)	=	-147.47

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	350.84
B. Open Water Habitat Net AAHUs	=	-147.47
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	=	190.10

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

V2.4

Project: Area A-Delta With Maintenance

AAHUs = 1549.67

FWOP

Project Area (ac)	130	130	130	130	130	130	130					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	25	25	25	25	25	25	8					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	1.16	1.16	1.16	1.16	1.16	1.16	1.16					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	130	13	165	265	398	2916	6226					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	42	40	50	88	94					
V2: % Aquatic	25	0	0	25	29	29	13					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.16	1.16	1.16	1.16	1.16	1.16					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	0.38	0.48	0.87	0.94					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.33	0.33	0.33	0.33	0.33	0.33	0.17				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.87	0.87	0.87	0.87	0.87	0.87	0.87				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.24	0.24	0.24	0.24	0.24	0.24				
Open Water HSI =	0.44	0.44	0.44	0.44	0.44	0.44	0.32				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.48	0.46	0.55	0.89	0.95				
% Aquatic	0.33	0.10	0.10	0.33	0.36	0.36	0.21				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.87	0.87	0.87	0.87	0.87	0.87	0.87				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	0.57	0.64	0.91	0.96				
intermediate											
Emergent Marsh HSI =	0.24	0.27	0.48	0.54	0.65	0.86	0.88				
Open Water HSI =	0.44	0.22	0.24	0.45	0.51	0.51	0.41				

AAHU CALCULATION - EMERGENT MARSH

Project: Area A-Delta With Maintenance

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	130	0	0	0.24	0.00	
2	130	1	0	0.24	0.00	0.00
3	130	3	0	0.24	0.00	0.00
4	130	5	0	0.24	0.00	0.00
5	130	6	0	0.24	0.00	0.00
6	130	25	0	0.24	0.00	0.00
7	130	50	0	0.24	0.00	0.00
8						
9						
10						
11						
12						
		Max=	50	AAHUs = 0.00		

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	130	0	0	0.24	0.00	
	13	1	1.3	0.27	0.35	0.17
	165	3	69.3	0.48	33.60	29.01
	265	5	106	0.54	57.73	90.60
	398	6	199	0.65	128.52	91.55
	2916	25	2566.08	0.86	2204.46	#####
	6226	50	5852.44	0.88	5139.70	#####
		Max=	50	AAHUs 2246.32		

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	2246.32
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	2246.32

AAHU CALCULATION - OPEN WATER

Project: Area A-Delta With Maintenance

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.44	57.41	
130	1	130	0.44	57.41	57.41
130	3	130	0.44	57.41	114.81
130	5	130	0.44	57.41	114.81
130	6	130	0.44	57.41	57.41
130	25	130	0.44	57.50	1091.62
130	50	130	0.32	41.08	1232.29
Max= 50				AAHUs = 53.37	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.44	57.41	
13	1	11.7	0.22	2.56	25.58
165	3	95.7	0.24	23.04	24.97
265	5	159	0.45	71.71	90.31
398	6	199	0.51	100.75	85.86
2916	25	349.92	0.51	177.37	2641.86
6226	50	373.56	0.41	152.72	4135.79
Max= 50				AAHUs 140.09	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	140.09
B. Future Without Project Open Water AAHUs	=	53.37
Net Change (FWP - FWOP)	=	86.72

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	2246.32
B. Open Water Habitat Net AAHUs	=	86.72
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		1549.67

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

V2.4

Project: Area B-PAL

AAHUs = 99.30

FWOP

Project Area (ac)	365	365	365	365	365	365	365					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	25	25	25	25	25	25	8					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	1.03	1.03	1.03	1.03	1.03	1.03	1.03					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	365	36	90	358	356	320	229					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	25	98	98	88	63					
V2: % Aquatic	25	0	0	25	29	29	13					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.03	1.03	1.03	1.03	1.03	1.03					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.33	0.33	0.33	0.33	0.33	0.33	0.17				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.89	0.89	0.89	0.89	0.89	0.89	0.89				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.24	0.24	0.24	0.24	0.24	0.24				
Open Water HSI =	0.44	0.44	0.44	0.44	0.44	0.44	0.32				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.33	0.98	0.98	0.89	0.67				
% Aquatic	0.33	0.10	0.10	0.33	0.36	0.36	0.21				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.89	0.89	0.89	0.89	0.89	0.89	0.89				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.27	0.39	0.94	0.98	0.87	0.70				
Open Water HSI =	0.44	0.22	0.24	0.50	0.55	0.52	0.41				

AAHU CALCULATION - EMERGENT MARSH

Project: Area B-PAL

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	365	0	0	0.24	0.00	
2	365	1	0	0.24	0.00	0.00
3	365	3	0	0.24	0.00	0.00
4	365	5	0	0.24	0.00	0.00
5	365	6	0	0.24	0.00	0.00
6	365	25	0	0.24	0.00	0.00
7	365	50	0	0.24	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	365	0	0	0.24	0.00	
	36	1	3.6	0.27	0.97	0.47
	90	3	22.5	0.39	8.85	9.04
	358	5	350.84	0.94	330.91	279.57
	356	6	348.88	0.98	340.69	335.82
	320	25	281.6	0.87	245.87	5550.33
	229	50	144.27	0.70	100.81	4233.78
	Max=		50		AAHUs 208.18	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	208.18
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	208.18

AAHU CALCULATION - OPEN WATER

Project: Area B-PAL

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.44	161.88	
365	1	365	0.44	161.88	161.88
365	3	365	0.44	161.88	323.76
365	5	365	0.44	161.88	323.76
365	6	365	0.44	161.88	161.88
365	25	365	0.44	162.15	3078.30
365	50	365	0.32	116.05	3477.47
Max= 50				AAHUs = 150.54	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.44	161.88	
36	1	32.4	0.22	7.14	72.15
90	3	67.5	0.24	16.38	23.26
358	5	7.16	0.50	3.56	25.06
356	6	7.12	0.55	3.89	3.73
320	25	38.4	0.52	19.87	228.66
229	50	84.73	0.41	35.02	706.19
Max= 50				AAHUs 21.18	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	21.18
B. Future Without Project Open Water AAHUs	=	150.54
Net Change (FWP - FWOP)	=	-129.36

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	208.18
B. Open Water Habitat Net AAHUs	=	-129.36
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	=	99.30

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

V2.4

Project: Area B-PAL With Maintenance

AAHUs = 1525.81

FWOP

Project Area (ac)	130	130	130	130	130	130	130					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	25	25	25	25	25	25	8					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	1.03	1.03	1.03	1.03	1.03	1.03	1.03					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	130	13	164	259	390	2886	6154					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	42	39	50	88	93					
V2: % Aquatic	25	0	0	25	29	29	13					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.03	1.03	1.03	1.03	1.03	1.03					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	0.38	0.48	0.87	0.94					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.33	0.33	0.33	0.33	0.33	0.33	0.17				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.89	0.89	0.89	0.89	0.89	0.89	0.89				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.24	0.24	0.24	0.24	0.24	0.24				
Open Water HSI =	0.44	0.44	0.44	0.44	0.44	0.44	0.32				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.48	0.45	0.55	0.89	0.94				
% Aquatic	0.33	0.10	0.10	0.33	0.36	0.36	0.21				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.89	0.89	0.89	0.89	0.89	0.89	0.89				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	0.57	0.64	0.91	0.96				
intermediate											
Emergent Marsh HSI =	0.24	0.27	0.49	0.54	0.65	0.86	0.88				
Open Water HSI =	0.44	0.22	0.24	0.45	0.51	0.51	0.41				

AAHU CALCULATION - EMERGENT MARSH

Project: Area B-PAL With Maintenance

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	130	0	0	0.24	0.00	
2	130	1	0	0.24	0.00	0.00
3	130	3	0	0.24	0.00	0.00
4	130	5	0	0.24	0.00	0.00
5	130	6	0	0.24	0.00	0.00
6	130	25	0	0.24	0.00	0.00
7	130	50	0	0.24	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	130	0	0	0.24	0.00	
	13	1	1.3	0.27	0.35	0.17
	164	3	68.88	0.49	33.60	29.04
	259	5	101.01	0.54	54.69	87.71
	390	6	195	0.65	126.50	88.91
	2886	25	2539.68	0.86	2189.11	#####
	6154	50	5723.22	0.88	5009.26	#####
	Max=		50		AAHUs 2208.48	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	2208.48
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	2208.48

AAHU CALCULATION - OPEN WATER

Project: Area B-PAL With Maintenance

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.44	57.66	
130	1	130	0.44	57.66	57.66
130	3	130	0.44	57.66	115.31
130	5	130	0.44	57.66	115.31
130	6	130	0.44	57.66	57.66
130	25	130	0.44	57.75	1096.38
130	50	130	0.32	41.33	1238.55
Max= 50				AAHUs = 53.62	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.44	57.66	
13	1	11.7	0.22	2.58	25.72
164	3	95.12	0.24	23.08	25.04
259	5	157.99	0.45	71.55	90.23
390	6	195	0.51	99.10	84.99
2886	25	346.32	0.51	176.21	2615.19
6154	50	430.78	0.41	176.95	4448.95
Max= 50				AAHUs 145.80	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	145.80
B. Future Without Project Open Water AAHUs	=	53.62
Net Change (FWP - FWOP)	=	92.19

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	2208.48
B. Open Water Habitat Net AAHUs	=	92.19
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		1525.81

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

V2.4

Project: Area C-SWP

AAHUs = 180.35

FWOP

Project Area (ac)	365	365	365	365	365	365	365					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	8	8	8	8	8	8	2					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	100	100	100	100	100	50	0					
V3: Interspersion Class 4	0	0	0	0	0	50	100					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	15	15	15	15	15	15	10					
V5: Salinity (ppt) - Fresh	1.27	1.27	1.27	1.27	1.27	1.27	1.27					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	365	37	92	368	369	371	364					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	25	100	100	100	99					
V2: % Aquatic	8	0	0	8	9	9	4					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	100	0	100	50	0	0	100					
V3: Interspersion Class 4	0	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	15	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.27	1.27	1.27	1.27	1.27	1.27					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs												
Target Year (TY)	0	1	3	5	6	25	50					
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
% Aquatic	0.17	0.17	0.17	0.17	0.17	0.17	0.12					
Interspersion												
Class 1	0.40	0.40	0.40	0.40	0.40	0.30	0.20					
Class 2												
Class 3												
Class 4												
Class 5												
%OW <= 1.5ft	0.27	0.27	0.27	0.27	0.27	0.27	0.21					
Salinity (ppt)												
fresh	0.85	0.85	0.85	0.85	0.85	0.85	0.85					
intermediate												
Access Value												
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
intermediate												
Emergent Marsh HSI =	0.25	0.25	0.25	0.25	0.25	0.24	0.23					
Open Water HSI =	0.32	0.32	0.32	0.32	0.32	0.31	0.25					
FWP SIs												
Target Year (TY)	0	1	3	5	6	25	50					
% Emergent	0.10	0.19	0.33	1.00	1.00	1.00	0.99					
% Aquatic	0.17	0.10	0.10	0.17	0.18	0.18	0.14					
Interspersion												
Class 1	0.40	0.10	0.40	0.70	1.00	0.60	0.40					
Class 2												
Class 3												
Class 4												
Class 5												
%OW <= 1.5ft	0.27	0.60	0.60	0.60	0.60	0.60	1.00					
Salinity (ppt)												
fresh	0.85	0.85	0.85	0.85	0.85	0.85	0.85					
intermediate												
Access Value												
fresh	1.00	0.30	0.30	1.00	1.00	1.00	1.00					
intermediate												
Emergent Marsh HSI =	0.25	0.26	0.39	0.95	0.98	0.94	0.91					
Open Water HSI =	0.32	0.22	0.24	0.37	0.40	0.37	0.34					

AAHU CALCULATION - EMERGENT MARSH

Project: Area C-SWP

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	365	0	0	0.25	0.00	
2	365	1	0	0.25	0.00	0.00
3	365	3	0	0.25	0.00	0.00
4	365	5	0	0.25	0.00	0.00
5	365	6	0	0.25	0.00	0.00
6	365	25	0	0.24	0.00	0.00
7	365	50	0	0.23	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	365	0	0	0.25	0.00	
	37	1	3.7	0.26	0.98	0.48
	92	3	23	0.39	8.92	9.11
	368	5	368	0.95	349.44	293.77
	369	6	369	0.98	362.69	356.06
	371	25	371	0.94	348.16	6753.35
	364	50	360.36	0.91	328.07	8451.62
	Max=		50		AAHUs 317.29	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	317.29
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	317.29

AAHU CALCULATION - OPEN WATER

Project: Area C-SWP

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.32	116.78	
365	1	365	0.32	116.78	116.78
365	3	365	0.32	116.78	233.55
365	5	365	0.32	116.78	233.55
365	6	365	0.32	116.78	116.78
365	25	365	0.31	114.07	2193.06
365	50	365	0.25	92.48	2581.97
Max= 50				AAHUs = 109.51	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	365	0.32	116.78	
37	1	33.3	0.22	7.22	56.30
92	3	69	0.24	16.50	23.46
368	5	0	0.37	0.00	19.43
369	6	0	0.40	0.00	0.00
371	25	0	0.37	0.00	0.00
364	50	3.64	0.34	1.24	15.90
Max= 50				AAHUs 2.30	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	2.30
B. Future Without Project Open Water AAHUs	=	109.51
Net Change (FWP - FWOP)	=	-107.21

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	317.29
B. Open Water Habitat Net AAHUs	=	-107.21
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		180.35

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

V2.4

Project: Area C-SWP With Maintenance

AAHUs = 1532.43

FWOP

Project Area (ac)	130	130	130	130	130	130	130					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	8	8	8	8	8	8	2					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	1.27	1.27	1.27	1.27	1.27	1.27	1.27					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	130	13	165	263	395	2904	6202					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	42	40	50	88	94					
V2: % Aquatic	8	0	0	8	9	9	4					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	1.27	1.27	1.27	1.27	1.27	1.27					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	0.38	0.48	0.87	0.94					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.17	0.17	0.17	0.17	0.17	0.17	0.12				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.85	0.85	0.85	0.85	0.85	0.85	0.85				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.24	0.24	0.24	0.24	0.24	0.24	0.24				
Open Water HSI =	0.31	0.31	0.31	0.31	0.31	0.31	0.27				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.48	0.46	0.55	0.89	0.95				
% Aquatic	0.17	0.10	0.10	0.17	0.18	0.18	0.14				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.85	0.85	0.85	0.85	0.85	0.85	0.85				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	0.57	0.64	0.91	0.96				
intermediate											
Emergent Marsh HSI =	0.24	0.26	0.48	0.54	0.64	0.86	0.88				
Open Water HSI =	0.31	0.22	0.24	0.34	0.37	0.36	0.34				

AAHU CALCULATION - EMERGENT MARSH

Project: Area C-SWP With Maintenance

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	130	0	0	0.24	0.00	
2	130	1	0	0.24	0.00	0.00
3	130	3	0	0.24	0.00	0.00
4	130	5	0	0.24	0.00	0.00
5	130	6	0	0.24	0.00	0.00
6	130	25	0	0.24	0.00	0.00
7	130	50	0	0.24	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	130	0	0	0.24	0.00	
	13	1	1.3	0.26	0.34	0.17
	165	3	69.3	0.48	33.43	28.84
	263	5	105.2	0.54	57.03	89.75
	395	6	197.5	0.64	127.07	90.49
	2904	25	2555.52	0.86	2189.14	#####
	6202	50	5829.88	0.88	5105.63	#####
	Max=		50		AAHUs 2230.89	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	2230.89
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	2230.89

AAHU CALCULATION - OPEN WATER

Project: Area C-SWP With Maintenance

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.31	40.68	
130	1	130	0.31	40.68	40.68
130	3	130	0.31	40.68	81.35
130	5	130	0.31	40.68	81.35
130	6	130	0.31	40.68	40.68
130	25	130	0.31	40.77	773.77
130	50	130	0.27	34.69	943.23
Max= 50				AAHUs = 39.22	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
130	0	130	0.31	40.68	
13	1	11.7	0.22	2.54	19.71
165	3	95.7	0.24	22.88	24.80
263	5	157.8	0.34	53.52	74.33
395	6	197.5	0.37	73.85	63.45
2904	25	348.48	0.36	126.25	1906.56
6202	50	372.12	0.34	126.04	3155.95
Max= 50				AAHUs 104.90	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	104.90
B. Future Without Project Open Water AAHUs	=	39.22
Net Change (FWP - FWOP)	=	65.67

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	2230.89
B. Open Water Habitat Net AAHUs	=	65.67
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	=	1532.43

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

V2.4

Project: Area D-West Bay

AAHUs = 106.78

FWOP

Project Area (ac)	365	365	365	365								
% Fresh	100	100	100	100								
% Intermediate												
Target Year (TY)	0	10	20	50								
V1: % Emergent	2	5	21	21								
V2: % Aquatic	32	32	34	34								
V3: Interspersion Class 1	0	0	0	0								
V3: Interspersion Class 2	0	0	50	50								
V3: Interspersion Class 3	0	50	50	50								
V3: Interspersion Class 4	100	50	0	0								
V3: Interspersion Class 5	0	0	0	0								
V4: %OW <= 1.5ft	10	15	25	25								
V5: Salinity (ppt) - Fresh	0.75	0.75	0.75	0.75								
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00								
V6: Fish Access - INT												

FWP

Project Area (ac)	365	36	91	362	361	340	286					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	2	10	25	99	99	93	78					
V2: % Aquatic	32	0	0	32	37	37	16					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	0	0	100	50	0	0	100					
V3: Interspersion Class 4	100	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	10	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	0.75	0.75	0.75	0.75	0.75	0.75					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs												
Target Year (TY)	0	10	20	50								
% Emergent	0.12	0.15	0.29	0.29								
% Aquatic	0.39	0.39	0.41	0.41								
Interspersion												
Class 1	0.20	0.30	0.50	0.50								
Class 2												
Class 3												
Class 4												
Class 5												
%OW <= 1.5ft	0.21	0.27	0.38	0.38								
Salinity (ppt)												
fresh	0.95	0.95	0.95	0.95								
intermediate												
Access Value												
fresh	1.00	1.00	1.00	1.00								
intermediate												
Emergent Marsh HSI =	0.26	0.29	0.44	0.44								
Open Water HSI =	0.48	0.49	0.53	0.53								
FWP SIs												
Target Year (TY)	0	1	3	5	6	25	50					
% Emergent	0.12	0.19	0.33	0.99	0.99	0.94	0.80					
% Aquatic	0.39	0.10	0.10	0.39	0.43	0.43	0.24					
Interspersion												
Class 1	0.20	0.10	0.40	0.70	1.00	0.60	0.40					
Class 2												
Class 3												
Class 4												
Class 5												
%OW <= 1.5ft	0.21	0.60	0.60	0.60	0.60	0.60	1.00					
Salinity (ppt)												
fresh	0.95	0.95	0.95	0.95	0.95	0.95	0.95					
intermediate												
Access Value												
fresh	1.00	0.30	0.30	1.00	1.00	1.00	1.00					
intermediate												
Emergent Marsh HSI =	0.26	0.28	0.40	0.96	0.99	0.91	0.80					
Open Water HSI =	0.48	0.22	0.25	0.55	0.60	0.57	0.44					

AAHU CALCULATION - EMERGENT MARSH

Project: Area D-West Bay

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	365	0	7.3	0.26	1.89	
2	365	10	18.25	0.29	5.37	35.67
3	365	20	76.65	0.44	33.54	180.64
4	365	50	76.65	0.44	33.54	1006.15
5						
6						
7						
8						
9						
10						
11						
12						
		Max=	50		AAHUs =	24.45

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	365	0	7.3	0.26	1.89	
	36	1	3.6	0.28	0.99	1.45
	91	3	22.75	0.40	9.09	9.29
	362	5	358.38	0.96	342.35	289.25
	361	6	357.39	0.99	353.32	347.84
	340	25	316.2	0.91	287.41	6076.52
	286	50	223.08	0.80	177.83	5772.07
		Max=	50		AAHUs	249.93

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	249.93
B. Future Without Project Emergent Marsh AAHUs	=	24.45
Net Change (FWP - FWOP)	=	225.48

AAHU CALCULATION - OPEN WATER

Project: Area D-West Bay

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	357.7	0.48	172.87	
365	10	346.75	0.49	171.59	1722.55
365	20	288.35	0.53	153.18	1627.43
365	50	288.35	0.53	153.18	4595.51
Max= 50				AAHUs = 158.91	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
365	0	357.7	0.48	172.87	
36	1	32.4	0.22	7.28	76.05
91	3	68.25	0.25	16.84	23.86
362	5	3.62	0.55	1.99	25.34
361	6	3.61	0.60	2.18	2.08
340	25	23.8	0.57	13.67	152.49
286	50	62.92	0.44	27.94	541.42
Max= 50				AAHUs 16.42	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	16.42
B. Future Without Project Open Water AAHUs	=	158.91
Net Change (FWP - FWOP)	=	-142.49

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	225.48
B. Open Water Habitat Net AAHUs	=	-142.49
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		106.78

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

V2.4

Project: Area D-WB With Maintenance

AAHUs = 1553.42

FWOP

Project Area (ac)	131	131	131	131	131	131	131					
% Fresh	100	100	100	100	100	100	100					
% Intermediate												
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	0	0	0	0	0	0					
V2: % Aquatic	25	25	25	25	25	25	8					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	30	30	30	30	30	35	40					
V3: Interspersion Class 4	70	70	70	70	70	65	60					
V3: Interspersion Class 5	0	0	0	0	0	0	0					
V4: %OW <= 1.5ft	19	19	19	19	19	19	19					
V5: Salinity (ppt) - Fresh	0.75	0.75	0.75	0.75	0.75	0.75	0.75					
V5: Salinity (ppt) - INT												
V6: Fish Access - Fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	131	13	165	262	394	2894	6174					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0											
Target Year (TY)	0	1	3	5	6	25	50					
V1: % Emergent	0	10	42	40	50	88	94					
V2: % Aquatic	25	0	0	25	29	29	13					
V3: Interspersion Class 1	0	0	0	50	100	0	0					
V3: Interspersion Class 2	0	0	0	0	0	100	0					
V3: Interspersion Class 3	30	0	100	50	0	0	100					
V3: Interspersion Class 4	70	0	0	0	0	0	0					
V3: Interspersion Class 5	0	100	0	0	0	0	0					
V4: %OW <= 1.5ft	19	100	100	100	100	100	83					
V5: Salinity (ppt) - Fresh	1	0.75	0.75	0.75	0.75	0.75	0.75					
V5: Salinity (ppt) - INT	0											
V6: Fish Access - Fresh	1.00	0.00	0.00	0.38	0.48	0.87	0.94					
V6: Fish Access - INT	0.00											

Computed SIs - do not enter data here !

FWOP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
% Aquatic	0.33	0.33	0.33	0.33	0.33	0.33	0.17				
Interspersion											
Class 1	0.26	0.26	0.26	0.26	0.26	0.27	0.28				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.31	0.31	0.31	0.31	0.31	0.31				
Salinity (ppt)											
fresh	0.95	0.95	0.95	0.95	0.95	0.95	0.95				
intermediate											
Access Value											
fresh	1.00	1.00	1.00	1.00	1.00	1.00	1.00				
intermediate											
Emergent Marsh HSI =	0.25	0.25	0.25	0.25	0.25	0.25	0.25				
Open Water HSI =	0.45	0.45	0.45	0.45	0.45	0.45	0.32				
FWP SIs											
Target Year (TY)	0	1	3	5	6	25	50				
% Emergent	0.10	0.19	0.48	0.46	0.55	0.89	0.95				
% Aquatic	0.33	0.10	0.10	0.33	0.36	0.36	0.21				
Interspersion											
Class 1	0.26	0.10	0.40	0.70	1.00	0.60	0.40				
Class 2											
Class 3											
Class 4											
Class 5											
%OW <= 1.5ft	0.31	0.60	0.60	0.60	0.60	0.60	1.00				
Salinity (ppt)											
fresh	0.95	0.95	0.95	0.95	0.95	0.95	0.95				
intermediate											
Access Value											
fresh	1.00	0.30	0.30	0.57	0.64	0.91	0.96				
intermediate											
Emergent Marsh HSI =	0.25	0.28	0.49	0.55	0.65	0.87	0.89				
Open Water HSI =	0.45	0.22	0.25	0.46	0.51	0.51	0.41				

AAHU CALCULATION - EMERGENT MARSH

Project: Area D-WB With Maintenance

	FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	131	0	0	0.25	0.00	
2	131	1	0	0.25	0.00	0.00
3	131	3	0	0.25	0.00	0.00
4	131	5	0	0.25	0.00	0.00
5	131	6	0	0.25	0.00	0.00
6	131	25	0	0.25	0.00	0.00
7	131	50	0	0.25	0.00	0.00
8						
9						
10						
11						
12						
	Max=		50		AAHUs = 0.00	

	FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
	131	0	0	0.25	0.00	
	13	1	1.3	0.28	0.36	0.17
	165	3	69.3	0.49	34.24	29.66
	262	5	104.8	0.55	58.03	91.56
	394	6	197	0.65	129.02	91.97
	2894	25	2546.72	0.87	2211.03	#####
	6174	50	5803.56	0.89	5149.64	#####
	Max=		50		AAHUs 2252.11	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs	=	2252.11
B. Future Without Project Emergent Marsh AAHUs	=	0.00
Net Change (FWP - FWOP)	=	2252.11

AAHU CALCULATION - OPEN WATER

Project: Area D-WB With Maintenance

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
131	0	131	0.45	58.64	
131	1	131	0.45	58.64	58.64
131	3	131	0.45	58.64	117.29
131	5	131	0.45	58.64	117.29
131	6	131	0.45	58.64	58.64
131	25	131	0.45	58.74	1115.14
131	50	131	0.32	42.19	1261.66
Max= 50				AAHUs = 54.57	

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
131	0	131	0.45	58.64	
13	1	11.7	0.22	2.63	26.20
165	3	95.7	0.25	23.62	25.63
262	5	157.2	0.46	71.85	91.16
394	6	197	0.51	100.94	86.03
2894	25	347.28	0.51	178.14	2650.94
6174	50	370.44	0.41	153.70	4157.42
Max= 50				AAHUs 140.75	

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs	=	140.75
B. Future Without Project Open Water AAHUs	=	54.57
Net Change (FWP - FWOP)	=	86.17

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs	=	2252.11
B. Open Water Habitat Net AAHUs	=	86.17
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		1553.42

Appendix A-8. Draft Fish and Wildlife Coordination Act report



United States Department of the Interior

FISH AND WILDLIFE SERVICE

646 Cajundome Blvd.

Suite 400

Lafayette, Louisiana 70506

November 8, 2016

Colonel Michael N. Clancy
District Engineer
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Clancy:

Please reference the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project. The U.S. Fish and Wildlife Service (Service) provided recommendations on the above proposed plan to the Corps of Engineers, New Orleans District (Corps) in an October 11, 2016, Fish and Wildlife Coordination Act (FWCA) Report. The Louisiana Department of Wildlife and Fisheries (LDWF) and National Marine Fisheries Service (NMFS) have provided their comments to the Service for inclusion in the FWCA Report. Therefore, this report supplements the October 2016 report by including those comments and is submitted in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA; 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This supplemental draft report contains a description of the fish and wildlife resources of the project area, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the Tentatively Selected Plan (TSP) to help conserve those resources. This report does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

We appreciate the cooperation of your staff on this study. Should your staff have any questions regarding the enclosed report, please have them contact Ms. Catherine Breau (504/862-2689) of this office.

Sincerely,

Joe Ranson
Supervisor
Louisiana Field Office

Attachment

cc: FWS, SE LA Refuges, Lacombe, LA

EPA, Dallas, TX

NMFS, Baton Rouge, LA

CPRA, Baton Rouge, LA

LDWF, Baton Rouge, LA

LDWF, Natural Heritage Program, Baton Rouge, LA

**MISSISSIPPI RIVER SHIP CHANNEL, GULF TO
BATON ROUGE, LOUISIANA**

**DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT**



U.S. FISH AND WILDLIFE SERVICE

ECOLOGICAL SERVICES

LAFAYETTE, LOUISIANA

NOVEMBER 2016

**MISSISSIPPI RIVER SHIP CHANNEL, GULF TO
BATON ROUGE, LOUISIANA**

**DRAFT
FISH AND WILDLIFE COORDINATION ACT REPORT**

**SUBMITTED TO
NEW ORLEANS DISTRICT
U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS, LOUISIANA**

**PREPARED BY
CATHERINE BREAUX, FISH AND WILDLIFE BIOLOGIST**

**U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
LAFAYETTE, LOUISIANA**

November 2016

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (Corps), Mississippi River Valley Division, Regional Planning and Environment Division South, is preparing a General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) for the New Orleans District (MVN) for The Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, Project (MR Deepening Project). The 1981 Feasibility Study entitled "Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana" recommended deepening the Mississippi River's navigation channel to a 55-foot depth from Baton Rouge to the Gulf of Mexico. The 1981 project was authorized for construction by Section 101 of the 1985 Supplemental Appropriations Act (Public Law 99-88). Phase I and Phase II deepened the Mississippi navigation channel to 45 feet from Baton Rouge to the Gulf of Mexico. Construction was completed in December 1994. The current MR Deepening Project will evaluate the depth that creates the greatest net benefits up to a depth of 50 feet in order to implement the deepening of the Mississippi River channel from the current depth of 45 feet.

MVN proposes to designate additional disposal areas for the beneficial use-placement of dredged material removed during construction and maintenance of the Southwest Pass portion of the MR Deepening Project to 50 feet.

In concert with the early above mentioned feasibility and construction efforts to deepen the River to 45 feet, The Fish and Wildlife Service (Service) prepared a May 07, 1978 Planning Aid Report (PAR), a June 1981 Final Fish and Wildlife Coordination Act Report (FWCAR), an October 1984 Supplemental FWCAR, and an October 2016 Draft FWCAR addressing the impacts on fish and wildlife resources from implementation of the Selected Plan, and also providing recommendations to mitigate adverse impacts on those resources (herein incorporated by reference).

This supplemental report, which compliments the GRR and SEIS, incorporates and supplements our May 1978 PAL and June 1981, October 1984, and October 2016 FWCARs. This report contains descriptions of the existing fish and wildlife resources of the project area, discusses future with- and without-project habitat conditions, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the TSP including mitigation requirements for adverse impacts to those resources. This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report has been provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF) and their comments have been incorporated into this Supplemental Draft report.

Overall, there would be positive net benefits to wetland resources in the project area, with the creation of emergent wetland habitat of higher value to fish and wildlife resources than the existing open water. Construction of the Mississippi River Deepening would result in

approximately 12,323 Average Annual Habitat Units (AAHUs) and 24,291 acres of fresh-intermediate marsh habitat over the 50 year project life (See Appendix A for WVA Project Information and Assumptions). The Service supports the beneficial use of dredged material obtained from constructing and maintaining the MR Deepening Project, provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Service recommends that to the extent feasible all dredged material should be used beneficially to restore coastal habitats that are in decline.
2. The Service and NMFS recommend the Corps evaluate options to enhance the sediment loads of proposed diversion projects or existing breaches in the vicinity of Mardi Gras Pass and Fort St. Phillip if dredging south of New Orleans is proposed in the future.
3. The Service and NMFS recommend the Corps expand the beneficial use areas to include areas near Spanish Pass.
4. The Service recommends avoiding and/or minimizing impacts to wetlands, including submerged aquatic vegetation in the study area.
5. The Service recommends avoiding and/or minimizing impacts to coastal restoration efforts in the study area and continued coordination with those efforts to avoid or minimize impacts to their effectiveness.
6. The Service recommends avoiding impacts to endangered or threatened species and their habitats, migratory birds, and colonial wading birds within and upstream of the study area as specified in this Fish and Wildlife Coordination Act Report. The service also recommends the Corps investigate the possibility of using dredged material to restore/create habitat for threatened or endangered species.
7. The Service recommends the Corps coordinate with the Service and other natural resource agencies in the planning of disposal areas and techniques and assessment of impacts and mitigation.
8. The created wetlands should be monitored over the project life to help evaluate the effectiveness of these features and to document both the elevation and acreage of wetland areas created.
9. The Service and other resource agencies shall be provided an opportunity to review and submit recommendations on future detailed planning reports (e.g., Design Document Report, Engineering Document Report, etc.) and the draft plans and specifications on the Mississippi River Deepening Project addressed in this report.

10. The Service recommends Special Use Permits be requested of the Delta National Wildlife Refuge (NWR) for any expected or proposed work on the Delta NWR. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by NWR. The Refuge Manager for the Delta NWR is Ms. Shelly Stiaes, (Shelly_Stiaes@fws.gov or 337-882-2000).
11. Louisiana Department of Wildlife and Fisheries (LDWF) and the Service recommend contacting the LDWF office, Mr. Shane Granier (504-284-5264), for further information regarding any additional permits or coordination that may be required to perform work on the Pass a Loutre Wildlife Management Area (WMA).
12. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service.

Provided that the above recommendations are included in the feasibility report and related authorizing documents, the Service will support further planning and implementation of the TSP.

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INTRODUCTION

The U.S. Army Corps of Engineers (Corps), Mississippi River Valley Division, Regional Planning and Environment Division South, is preparing a General Reevaluation Report (GRR) and Supplemental Environmental Impact Statement (SEIS) for the New Orleans District (MVN) for The Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, Project (MR Deepening Project). The 1981 Feasibility Study entitled "Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana" recommended deepening the Mississippi River's navigation channel to a 55-foot depth from Baton Rouge to the Gulf of Mexico. The 1981 project was authorized for construction by Section 101 of the 1985 Supplemental Appropriations Act (Public Law 99-88). Phase I and Phase II deepened the Mississippi navigation channel to 45 feet from Baton Rouge to the Gulf of Mexico. Construction was completed in December 1994. The current MR Deepening Project will evaluate the depth that creates the greatest net benefits up to a depth of 50 feet in order to implement the deepening of the Mississippi River channel from the current depth of 45 feet.

MVN proposes to designate additional disposal areas for the beneficial use-placement of dredged material removed during construction and maintenance of the Southwest Pass portion of the MR Deepening Project to 50 feet.

In concert with the early above mentioned feasibility and construction efforts to deepen the River to 45 feet, The Fish and Wildlife Service (Service) prepared a May 07, 1978 Planning Aid Report (PAR), a June 1981 Final Fish and Wildlife Coordination Act Report (FWCAR), an October 1984 Supplemental FWCAR, and an October 2016 Draft FWCAR addressing the impacts on fish and wildlife resources from implementation of the Selected Plan, and also providing recommendations to mitigate adverse impacts on those resources (herein incorporated by reference).

This supplemental report, which compliments the GRR and SEIS, incorporates and supplements our May 1978 PAL and June 1981, October 1984, and October 2016 FWCARs. This report contains descriptions of the existing fish and wildlife resources of the project area, discusses future with- and without-project habitat conditions, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the TSP including mitigation requirements for adverse impacts to those resources. This document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report has been provided to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF) and their comments have been incorporated into this Supplemental Draft report.

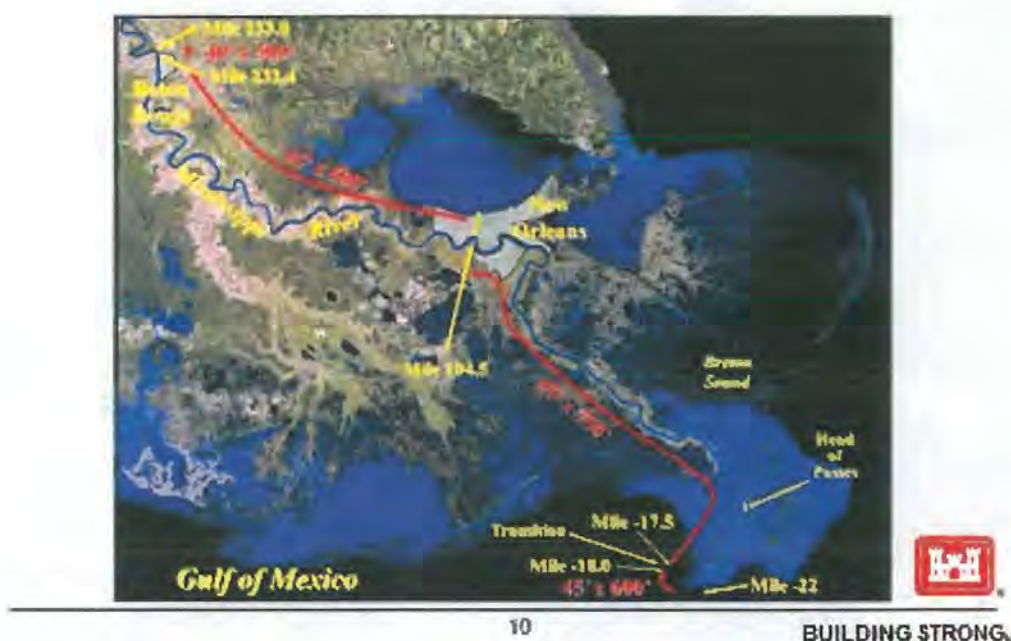
DESCRIPTION OF STUDY AREA

The study area is located in southeastern Louisiana and consists of the Mississippi River below Baton Rouge and its major outlet to the Gulf of Mexico, Southwest Pass. The area includes the 45 foot channel of the Mississippi River. The Mississippi River, Gulf of Mexico to Baton

Rouge Louisiana project authorized the construction of the channel to a depth of 55 feet. The project has been constructed and maintained to dimensions of 45 feet x 750 feet from New Orleans to Mile 18 below head of passes (BHP) and 45 feet x 600 feet from Mile 18 BHP to Gulf of Mexico allowing for transfer of over 400,000,000 tons of cargo each year. See Figure 1.

Figure 1. The Project Area for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project.

Mississippi River Ship Channel, Gulf to Baton Rouge, LA Current Channel Dimensions



Surrounding Southwest Pass on either side of the channel is the location of additional disposal areas for the placement and beneficial use of dredged material removed during construction and maintenance of deepening the Mississippi River and Southwest Pass to 50 feet. The proposed disposal areas are located in Plaquemines Parish in southeastern Louisiana in the active delta of the Mississippi River (See Figure 2). The dredged material would be placed within the boundaries designated in Figure 2 and adjacent to the Southwest Pass navigation channels, with-in the Pass a Loutre Wildlife Management Area (Pass a Loutre WMA), and within the Delta National Wildlife Refuge (Delta NWR) located north of Pass a Loutre. It is anticipated the disposal areas will naturally vegetate through colonization of species from adjacent vegetated areas, consistent with experience at other beneficial use-disposal areas in the Mississippi River Delta.

Figure 2. The potential disposal area for dredged material resulting from the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project.



FISH AND WILDLIFE RESOURCES

The primary area of project impacts on fish and wildlife resources is the sparsely populated active delta of the Mississippi River, located generally south of Venice, Louisiana. The Mississippi River splits into three main channels within the delta region: Pass a Loutre, South Pass, and Southwest Pass. The active delta of the Mississippi includes the lower Mississippi River and its distributaries; subsiding natural levees along these water courses; dredged spoil disposal areas; large expanses of fresh and intermediate marsh and associated shallow ponds and lakes; and large open water bodies. Land elevations range from sea level along the Gulf coast, to approximately +10 feet above sea level along the natural levee ridges.

The marshes and natural levees of the project area were formed by river borne sediments deposited in shallow open water. Engineering works in the delta, coupled with upstream diversions, reservoirs, and bank stabilization work, have resulted in a greatly reduced quantity

of sediments reaching the marshes and shallow open waters of the delta. Consequently, sediment deposition has not kept pace with subsidence and erosion and a surprisingly rapid rate of marsh loss is occurring in the area. However numerous crevasses constructed by the Service and LDWF and several crevasses as well as the West Bay diversion were constructed under Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) along with the Louisiana Coastal Area (LCA) Beneficial Use of Dredged Material Program (BUDMAT) are helping to combat marsh loss in parts of the delta.

The proposed disposal areas encompass a total of approximately 163,492 acres (Table 1) of mainly open water with some eroded freshwater and intermediate marsh. The 2016 USGS data shows that the total acreage of marsh in the project area has lost between 100ac to 200acs a year from 1984 to 2016 however there have been land gains in Areas A due to ongoing beneficial use of dredged material and Service, LDWF, and CWPPRA crevasse projects.

Table 1. 2016 Acres of land and water (acres and %) by area for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project. Refer to Figure 2 for Area A-D. 1984 through 2016 data provided by USGS.

	Land Acres (acres)	Water (acres)	Total (acres)	% Land	% Water
Area A	10,987	16,656	27,643	39.7%	60.3%
Area B	16,986	55,631	72,617	23.4%	76.6%
Area C	11,337	25,831	37,168	30.5%	69.5%
Area D	2,670	23,394	26,064	10.2%	89.8%
TOTAL	41,980	121,512	163,492	25.7%	74.3%

Description of Habitats

The major habitat types within the project area include natural levee forest, fresh and intermediate marsh, scrub/shrub, river, and estuarine water bodies.

Natural Levee Forest - These forested wetlands are located on subsiding natural levees along Tiger, Grand, and Raphael Passes and along the west bank of the Mississippi River between Venice and Head of Passes. Typical vegetation includes black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), persimmon (*Diospyros* spp.), red maple (*Acer rubrum*), and scattered bald cypress (*Taxodium distichum*).

Fresh and Intermediate Marsh - Marsh in the project area is dominated by fresh marsh and receives continuous riverine input, with areas of intermediate marsh near the gulfward open water areas of West Bay, East Bay, and portions of the Delta NWR. The marshes in the project area are strongly influenced by freshwater discharges from the Mississippi River and associated distributary outlets. Salinity in areas of the project areas have an average annual growing season salinity of 0.75-1.27 parts per thousand (ppt) based on CRMS stations CRMS2634, CRMS0154, CRMS0159, and CRMS2608 for time periods from 2007 to 2016 (Louisiana Office of Coastal Protection and Restoration, 2013). Emergent plant species include: smooth cordgrass (*Spartina alterniflora*), Walter's millet (*Echinochloa walteri*), *Schoenoplectus pungens*, and *Nelumbo lutea*. Submerged aquatic vegetation, such as *Myriophyllum spicatum*, *Heteranthera dubia*, *Ceratophyllum demersum*, *Najas guadalupensis*, and *Potamogeton nodosus* are also common in the lower elevation intertidal and shallow subtidal portions of the project area. The two

major soil types in the project area are commonly found together and are classified as Balize and Larose soils (BA). Both soil types are level and very poorly drained. They are flooded by Mississippi River water most of the time and support freshwater marshes.

Scrub/Shrub - This habitat type is synonymous with dredged spoil disposal areas in the project area. This dredged material consists of silt, clay, and sand taken from the Mississippi River and its distributary channels. These areas are typically, but not exclusively, limited to elevations above 2.0 feet North American Vertical Datum 1988 (NAVD88). Though spoil areas are initially barren, they are eventually colonized with a scrub/shrub complex of vegetation including rattlebox (*Crotalaria* spp.), goldenrod (*Solidago* spp), Bermuda grass (*Cynodon dactylon*), black willow, and eastern baccharis (*Baccharis halimifolia*).

River - This freshwater habitat type includes that portion of the Mississippi River and Southwest Pass which lies between the foreshore dikes and the existing bank.

Estuarine Water Bodies - This habitat type includes marsh ponds and lakes, estuarine bays and lakes, and aquatic beds characterized by stands of Eurasian watermilfoil (*Myriophyllum spicatum*), coontail (*Ceratophyllum demersum*), and fanwort (*Cabomba caroliniana*); and estuarine aquatic beds characterized by stands of widgeongrass (*Ruppia maritima*) and Eurasian watermilfoil (*Myriophyllum spicatum*). Water levels fluctuate from six to twelve inches or more in the vegetated areas and five to six feet in open water areas.

Fisheries Resources

Freshwater species occur in the Mississippi River and its distributaries, in petroleum industry access canals, and in the ponds and lakes within the fresh and intermediate marshes. Primary freshwater sportfishes include largemouth bass (*Micropterus salmoides*), yellow bass (*Morone mississippiensis*), black and white crappie (*Pomoxis* spp.), bluegill (*Lepomis macrochirus*), freshwater drum (*Aplodinotus grunniens*), warmouth (*Lepomis gulosus*), channel catfish (*Ictalurus punctatus*), and blue catfish (*Ictalurus furcatus*). The commercial freshwater fishery is also important in the project area. Primary species harvested are alligator gar (*Atractosteus spatula*), blue catfish, and channel catfish.

The diverse sport and commercial estuarine and marine fisheries of the study area are of great importance. The nutrient-rich water in the Mississippi River in conjunction with the tidal marshes, aquatic vegetation beds, and shallow estuarine waters provide productive habitat to a variety of crustaceans and finfishes.

The importance of coastal marshes to estuarine-dependent fisheries production cannot be over-emphasized. Estuaries are among the most productive habitats in the world because they support high primary and fisheries production (Whittaker and Likens 1973; Walme 1972). These marshes produce vast amounts of organic detritus which are transported into adjacent estuarine waters. This detritus is extremely important in the maintenance of fish and shellfish productivity (Odum et al. 1973). Most of the economically important saltwater fishes and crustaceans harvested in Louisiana spawn offshore and then use estuarine areas for nursery habitat (Herke 1995). Marshes and associated shallow waters are also extremely important as

nursery habitat for many estuarine-dependent species such as for Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*) (Rogers 1979), gulf menhaden (*Brevoortia patronus*) (Simoneaux 1979), for immature white (*Litopenaeus setiferus*) and brown shrimp (*Farfantepenaeus aztecus*) (brown and white), as habitat for blue crabs (*Callinectes sapidus*) (More 1969), and as prime habitat for shrimp, gulf menhaden, Atlantic croaker, sand seatrout (*Cynoscion nebulosus*) and southern flounder (*Paralichthys lethostigma*) (Conner and Truesdale 1973).

There is growing evidence that the acreage of marsh is the most important factor influencing the production of estuarine-dependent fishes of sport and commercial importance. Turner (1979) reported that the Louisiana commercial inshore shrimp catch is directly proportional to the area of intertidal wetlands and that the area of estuarine water does not seem to be directly linked to shrimp yields.

Essential Fish Habitat

The project is located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, Magnuson-Stevens Act; P.L. 104-297). The updated and revised 2006 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council, identifies EFH in the project area to be estuarine emergent wetlands, submerged aquatic vegetation, mud, sand, shell, and rock substrates, and estuarine water column. Under the MSFCMA, wetlands and associated estuarine waters in the project area are identified as EFH for various Federally managed species including larvae/postlarvae and juvenile brown and white shrimp; eggs, larvae/postlarvae, and juvenile Gulf stone crab (*Menippe adina*); larvae/postlarvae, juvenile, and adult red drum; larvae and juvenile lane snapper (*Lutjanus synagris*); and juvenile dog snapper (*Lutjanus novemfasciatus*).

In addition to being designated as EFH for these species, water bodies and wetlands in the project area provide nursery and foraging habitats supportive of a variety of economically important marine fishery species, such as striped mullet (*Mugil cephalus*), Atlantic croaker, gulf menhaden, spotted seatrout (*Cynoscion nebulosus*), sand seatrout, southern flounder, black drum (*Pogonias cromis*), and blue crab. Some of these species also serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks) (<http://www.gulfcouncil.org>).

Wildlife Resources

The marshes and estuarine bays provide excellent nesting, foraging, breeding and nursery habitats, as well as, wintering and stopover habitat for wildlife species. The Mississippi River Delta provides important nesting and brooding habitat for mottled ducks, wading birds, and shore birds. Migratory and resident waterfowl are also abundant in the area. The National Audubon Society designated the Mississippi River Delta an Important Bird Area. The active delta provides habitat for wintering waterfowl, wading birds, marsh birds, and shore birds. The higher elevations of shrub-dominated spoil banks and willow-dominated uplands provide important stopover habitat for numerous Neotropical migratory songbird species which breed in North America and spend the winter in Mexico, the Caribbean, and Central or South America. Neotropical migrants expected in

the project area include warblers, vireos, wrens, flycatchers, and many other species. Resident species include the blue jay (*Cyanocitta cristata*), cardinal (*Cardinalis cardinalis*), and mourning dove (*Zenaida macroura*). Woodpeckers, such as red-headed woodpecker (*Melanerpes erythrocephalus*), red-bellied woodpecker (*Melanerpes carolinus*), and yellow-bellied sapsucker (*Sphyrapicus varius*), are also typical in the project area forested habitat. Seabirds using the adjacent openwater areas may include laughing gull (*Leucophaeus atricilla*) and several species of terns.

Small game mammals that may be present in the project area include fox squirrel (*Sciurus niger*), eastern cottontail (*Sylvilagus floridanus*), and raccoon (*Procyon lotor*); and common furbearers include the raccoon, mink, nutria, and muskrat. Nongame mammals that occur in the study area include Virginia opossum (*Didelphis virginiana*), nine-banded armadillo (*Dasypus novemcinctus*), and several species of bats, rodents and insectivores. Reptiles include the common snapping turtle (*Chelydra serpentina*), red-eared turtle (*Trachemys scripta elegans*), various water snakes, five-lined skink (*Plestiodon inexpectatus*), and green anole (*Anolis carolinensis*). Representative amphibians include the green treefrog (*Hyla cinerea*), southern leopard frog (*Rana sphenoccephala*), and northern spring peeper (*Pseudacris crucifer*).

Threatened and Endangered Species

Below is a list of federally-listed threatened and endangered species that could potentially be affected by the Corps' proposed channel deepening. In addition, a brief description of basic information regarding those species is provided along with means to reduce the likelihood of any potential impact to those species. Should the proposed action directly or indirectly affect any of the listed species further consultation with this office will be necessary.

West Indian Manatee

The endangered West Indian manatee (*Trichechus manatus*) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Natural Heritage Program (LNHP), over 80 percent of reported manatee sightings (1999-2011) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana appear to be increasing and they have been infrequently observed in the Mississippi River. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.

During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable.

- All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). We recommend the following to minimize potential impacts to manatees in areas of their potential presence:
- All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in-water work can resume under careful observation for manatee(s).
- If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at "no wake/idle" speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.
- If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.
- Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8½" X 11" reading language similar to the following: "CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT". A second temporary sign measuring 8½" X 11" should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: "CAUTION: MANATEE AREA/ EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION".
- Collisions with, injury to, or sightings of manatees should be immediately reported to the Service's Louisiana Ecological Services Office (337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an incident, manatee sighting, etc.); time of incident/sighting; and the approximate location, including the latitude and longitude coordinates, if possible.

Pallid Sturgeon

The pallid sturgeon (*Scaphirhynchus albus*) is an endangered, bottom-oriented, fish that inhabits large river systems from Montana to Louisiana. Within this range, pallid sturgeon tend to select main channel habitats in the Mississippi River and main channel areas with islands or sand bars in the upper Missouri River. In Louisiana it occurs in the Mississippi River. The pallid sturgeon is adapted to large, free-flowing, turbid rivers with a diverse

assemblage of physical characteristics that are in a constant state of change. Many life history details and subsequent habitat requirements of this fish are not known. However, the pallid sturgeon is believed to utilize Louisiana riverine habitat during reproductive stages of its life cycle. Habitat loss through river channelization and dams has adversely affected this species throughout its range.

Entrainment issues associated with dredging operations in the Mississippi River is a potential effect that should be addressed in analyzing current proposed project effects. We recommend the following to minimize potential impacts to pallid sturgeon associated with dredging to ensure protection of the pallid sturgeon: (1) the cutterhead should remain completely buried in the bottom material during dredging operations. If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate should be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increased; (2) during dredging, the pumping rates should be reduced to the slowest speed feasible while the cutterhead is descending to the channel bottom.

Red Knot

The red knot (*Calidris canutus rufa*), federally listed as a threatened species, is a medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through March).

During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation.

Because red knots are known to utilize the Mississippi River Delta we recommend that the Corps investigate the feasibility of creating foraging and roosting areas for red knots in association with dredged material disposal operations. Such habitat restoration/creation could be incorporated into an ESA Section 7(a)(1) Conservation Program that could aid the Service in recovery efforts for that species.

The Corps Mississippi Valley Division (MVD) finalized a July 23, 2013, Conservation Plan for the Interior Least Tern, Pallid Sturgeon, and Fat Pocketbook Mussel in the Lower Mississippi River (Endangered Species Act, Section 7(a)(1)) that addressed conservation of those species via features of the Channel Improvement Program (CIP). The Service's assessment and

recommendations for the CIP in the Lower Mississippi River (LMR) was provided to the Corps in our December 12, 2013 Biological Opinion (USFWS 2013). In that opinion we recommended that dredging activities avoid and/or minimize impacts on gravel bars, tributary mouths, backwater habitats, and affected species life cycle timing; those habitat features are not found in the project area.

Migratory Birds

Please be advised that the project area is located in habitats which are commonly inhabited by colonial nesting waterbirds and/or seabirds may be present; these species are protected by the Migratory Bird Treaty Act of 1918 (as amended).

Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries. That database is updated primarily by (1) monitoring previously known colony sites and (2) augmenting point-to-point surveys with flyovers of adjacent suitable habitat. Although several comprehensive coast-wide surveys have been recently conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season because some waterbird colonies may change locations year-to-year. To minimize disturbance to colonial nesting birds, the following restrictions on activity should be observed:

1. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Louisiana's brown pelican colonies, however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. Brown pelicans are known to nest on barrier islands and other coastal islands in St. Bernard, Plaquemines, and Jefferson, parishes.
2. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).
3. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

In addition, we recommend that on-site contract personnel be trained to identify colonial nesting birds and their nests, and avoid affecting them during the breeding season (i.e., the time period outside the activity window).

Areas of Special concern

Public Lands - NWR and WMA

The Service's 49,000 acre Delta National Wildlife Refuge (NWR) is within the study area and currently material dredged from routine maintenance of the Mississippi River is disposed beneficially on that NWR. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a NWR will require the Corps to obtain a Special Use Permit from the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager for further information on and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit. The Refuge Manager for the Delta NWR is Ms. Shelly Stiaes, (Shelly_Stiaes@fws.gov or 337.882.2000).

Louisiana Department of Wildlife and Fisheries' (LDWF) Pass a Loutre Wildlife Management Area (WMA) encompasses approximately 115,000 acres and is located within the Mississippi River Delta. Please contact Shane Granier at the LDWF Office (504-284-5264) for further information regarding any additional permits or coordination that may be required to perform work on that WMA.

Both of these public lands could be impacted by any reduced flows of sediment laden water currently being delivered by adjacent distributaries. During planning the Service was concerned that a reduction of the water surface elevation via deepening of the channel could potentially result in decreased water flows down distributaries and an increase in erosion of these areas. However, modeling done by the Corps has shown that there will not be reduced flows or sediment from the river, thus not impacting the Delta NWR and Pass a Loutre WMA.

Coastal Restoration Efforts

The State of Louisiana and the Corps conducted modeling of the Mississippi River for the Louisiana Coastal Area, Mississippi River Hydrodynamic Study, Main Channel of the Mississippi River. That study is attempting to identify the best potential coastal restoration measures that can be developed using the Mississippi River. Restoration alternatives focus on sediment diversions from the Mississippi River. In addition the Coastal Wetlands Planning, Protection and Restoration program, (CWPPRA) has funded restoration projects that involve dredging sediments from shoals in the river to restore eroded coastal marshes. Other restoration activities in the project area include Coastal Wetlands Planning, Protection and Restoration Act projects such as crevasses and the West Bay diversion. According to modeling done by the Corps lowering of the river bed due to dredging will not have an effect on river stages or the quantity and duration of flows. However coordination of these projects should continue to insure there are no other potential impacts to those coastal restoration efforts.

EVALUATION METHODOLOGY

The WVA operates under the assumption that optimal conditions for general fish and wildlife

habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values, and 3) a mathematical formula that combines Suitability Index for each variable into a single value for wetland habitat quality; that single value is referred to as the Habitat Suitability Index, or HSI.

The WVA model for marsh habitat attempts to assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. While the model does not specifically assess other wetland functions and values such as storm-surge protection, floodwater storage, water quality improvement, nutrient import/export, and aesthetics, it can be generally assumed that these functions and values are positively correlated with fish and wildlife habitat quality.

The procedure for evaluating project benefits on fish and wildlife habitats, the WVA model, uses a series of variables that are intended to capture the most important conditions and functional values of a particular habitat. Values for these variables are derived for existing conditions and are estimated for conditions projected into the future if no project efforts are applied (i.e., future-without-project), and for conditions projected into the future if the proposed project is implemented (i.e., future-with-project), providing an index of quality or habitat suitability of the habitat for the given time period. The HSI is combined with the acres of habitat to get a number that is referred to as "habitat units".

Expected project benefits are estimated as the difference in habitat units between the future-with-project (FWP) and future-without project (FWOP). To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as Average Annual Habitat Units (AAHUs).

The change (increase or decrease) in AAHUs for FWP scenario, compared to FWOP conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the habitat being evaluated; a net loss of AAHUs indicates that the project is damaging to that habitat type.

DESCRIPTION OF TENTATIVELY SELECTED PLAN

The alternatives evaluated for this project include Alternatives 1, 2, and 3. Alternative 1 is the no action/base condition. It consist of a 45 foot (ft) deep Mississippi River channel at river crossings (there are 12 crossings in total within the project area) and the channel lowering to 48 ft in Lower Mississippi River. Alternative 2 would maintain a 48 ft depth at both the crossings and the lower river. The Tentatively Selected Plan (TSP) consists of Alternative 3, constructing and maintaining the river channel and its crossings at 50ft.

Existing maintenance on the Mississippi River channel includes the beneficial use of dredged material in disposal areas adjacent to the lower river; there is no feasible beneficial use sites for material dredged at the crossings. Alternative 3 includes an approximately 16% expansion of the existing disposal area. This expansion was in anticipation of the need for additional capacity associated with construction, and at the time of alternative development, an assumed/expected increase in annual operation and maintenance (O&M) (Figure 2).

Total Expansion of Disposal Areas in lower river = 24,053 acres
Previously Cleared Disposal Areas in lower river= 142,858 acres

PROJECT IMPACTS

During construction, the beneficial use of dredged material into open water habitat will initially result in approximately 1,462 acres of fresh marsh (with a final target elevation of 2 feet or less). These will be evenly distributed among the four areas seen in Figure 2. Therefore, the WVA evaluated an initial construction of 365 acres of marsh creation in Areas A, B, C, and D (Figure 2).

The annual beneficial use of dredged material in open water during river maintenance will result in approximately 528 acres of marsh distributed evenly across all four areas. The WVA evaluated an annual 132 acres in each Area for 50 years.

Using the WVA methodology, impact assessments were conducted by the Service based on data from the CWPPRA Pass a Loutre Restoration Candidate Project, the LCA West Bay project, DELFT 3D hydrologic model runs, the BUDMAT project, and knowledge of the area and experience with similar projects. The WVA results are listed in Table 2. Appendix A contains the WVA Project Information Sheet.

Approximately 12,323 Average Annual Habitat Units (AAHUs) and 24,291 acres of fresh marsh habitat are anticipated to be remaining via construction and maintenance through beneficial use over the 50 year project life (Table 2).

Table 2. Wetland Value Assessment Results for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project.

	Construction	Maintenance	Construction	Maintenance
	AAHUs (year 50 fwp-fwop)	AAHUs (year 50 fwp-fwop)	Net Marsh Acres (year 50 fwp-fwop)	Net Marsh Acres (year 50 fwp-fwop)
Area A	190.1	1549.7	431.0	5852.4
Area B	99.3	1525.8	144.3	5723.2
Area C	180.4	1532.4	360.4	5829.9
Area D	106.8	1553.4	146.4	5803.6
TOTAL	6161.3	6161.3	1082.1	23209.1

With implementation of the proposed action there would be some minimal and insignificant impacts to wetland resources. A small, undetermined amount of wetland habitat would be temporarily impacted during the excavation of channels to provide equipment access to the proposed disposal areas. The resulting loss of wetland function would be temporary, as these areas would be backfilled to pre-project marsh elevations and eventually revegetated (naturally) and restored upon completion of the project. Direct placement of dredged material on existing marsh would be avoided. With implementation of the proposed action, there would be mainly positive impacts to wetlands in the project area. During construction, the beneficial use of dredged material into open water habitat will result in approximately 1,462 acres of intermediate marsh (with a final target elevation of 2 feet or less). The beneficial use of dredged material into open water during river maintenance will result in approximately 528 acres of marsh annually.

Wildlife Resources

Wildlife species, if present, would be only temporarily displaced from the project area during placement of dredged material. The placement of dredge material for beneficial use would reduce some shallow open water habitat by converting it to marsh, thereby reducing available foraging habitat for some avian species. However, the reduction in the amount of shallow open water is negligible compared to that remaining in the project area. Some positive indirect impacts to wildlife in the project area are anticipated with the proposed action. At the end of 50 years there would be 24,291 more acres of productive fresh and intermediate marsh than would be present without the project. Submerged and emergent vegetation potentially colonizing these areas would provide valuable and diverse habitat for foraging, refuge, breeding, nesting, nursery, and loafing of terrestrial wildlife, migratory waterfowl, and other avian species. Thus, it is anticipated that wildlife in and near the project area will ultimately benefit from the proposed activities.

Fisheries Resources

It is anticipated that fishery species would avoid proposed areas of disposal activities during the project period, thereby minimizing direct and indirect impacts to those species. Sessile organisms may be buried during deposition for marsh creation. The expansive emergent wetland vegetation expected to colonize this area would enhance primary and secondary productivity in the area and provide substantial fisheries benefits resulting from valuable foraging, refuge, breeding, and nursery habitat for finfish and shellfish. Creation of new marsh would provide highly productive fisheries habitat, increase detrital food material, and likely contribute to overall increased fisheries productivity in the project area. Benefits to both commercial and recreational fisheries are expected.

Essential Fish Habitat

With implementation of the proposed action, initially some EFH for brown shrimp, white shrimp, and red drum would be directly impacted in the project area during the beneficial use of dredged material for wetlands development in the shallow open waters of the proposed disposal areas. Approximately 1,462 acres resulting from construction and 528 acres annually for maintenance of shallow open water bottom and associated EFH habitat (e.g., mud/sand substrates, SAV) would be potentially impacted by the placement of dredged material in the proposed disposal areas; however, these areas would be converted to generally more productive categories of EFH (e.g., estuarine emergent marsh, marsh edge, inner marsh, marsh/water interface) as they eventually become colonized by emergent vegetation. Thus, the proposed action would provide mainly positive

indirect impacts to EFH in the project area, and any direct or temporary adverse impacts would be sufficiently offset by the net benefits from creating marsh, new shallow open water habitat, and associated EFH.

Additional, short term EFH impacts would include a temporary and localized increase in estuarine water column turbidity during the placement of dredged material in shallow open water areas; however, the project area is a naturally turbid environment and increased turbidity is not expected to significantly affect EFH needs within the project area.

Threatened and Endangered species

The Corps is responsible for determining whether the selected alternative is likely (or not likely) to adversely affect any listed species and/or critical habitat, and for requesting the Service's concurrence with that determination. If the Corps determines, and the Service concurs, that the selected alternative is likely to adversely affect listed species and/or critical habitat, a request for formal consultation in accordance with Section 7 of the Endangered Species Act should be submitted to the Service. That request should also include the Corps rationale supporting their determination.

SERVICE POSITION AND RECOMMENDATIONS

Overall, there would be positive net benefits to wetland resources in the project area, with the creation of emergent wetland habitat of higher value to fish and wildlife resources than the existing open water. Construction of the Mississippi River Deepening would result in approximately 12,323 Average Annual Habitat Units (AAHUs) and 24,291 acres of fresh-intermediate marsh habitat over the 50 year project life (See Appendix A for WVA Project Information and Assumptions). The Service supports the beneficial use of dredged material obtained from constructing and maintaining the MR Deepening project, provided the following fish and wildlife conservation recommendations are implemented concurrently with project implementation:

1. The Service recommends that to the extent feasible all dredged material should be used beneficially to restore coastal habitats that are in decline.
2. The Service and NMFS recommend the Corps evaluate options to enhance the sediment loads of proposed diversion projects or existing breaches in the vicinity of Mardi Gras Pass and Fort St. Phillip if dredging south of New Orleans is proposed in the future.
3. The Service and NMFS recommend the Corps expand the beneficial use areas to include areas near Spanish Pass. The Service recommends avoiding and/or minimizing impacts to wetlands, including submerged aquatic vegetation in the study area.
4. The Service recommends avoiding and/or minimizing impacts to coastal restoration efforts in the study area and continued coordination with those efforts to avoid or minimize impacts to their effectiveness.

5. The Service recommends avoiding impacts to endangered or threatened species and their habitats, migratory birds, and colonial wading birds within and upstream of the study area as specified in this Fish and Wildlife Coordination Act Report. Investigate the possibility of using dredged material to restore/create habitat for threatened or endangered species.
6. The Service recommends coordinate with the Service and other natural resource agencies in the planning of disposal areas and techniques and assessment of impacts and mitigation.
7. The created wetlands should be monitored over the project life to help evaluate the effectiveness of these features and to document both the elevation and acreage of wetland areas created.
8. The Service and other resource agencies shall be provided an opportunity to review and submit recommendations on future detailed planning reports (e.g., Design Document Report, Engineering Document Report, etc.) and the draft plans and specifications on the Mississippi River Deepening Project addressed in this report.
9. The Service recommends Special Use Permits be requested of the Delta National Wildlife Refuge (NWR) for any expected or proposed work on the Delta NWR. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by NWR. The Refuge Manager for the Delta NWR is Ms. Shelly Stiaes, (Shelly_Stiaes@fws.gov or 337-882-2000).
10. Louisiana Department of Wildlife and Fisheries' (LDWF) and the Service recommend contacting the LDWF office, Mr. Shane Granier (504-284-5264), for further information regarding any additional permits or coordination that may be required to perform work on the Pass a Loutre Wildlife Management Area (WMA).
11. If the proposed project has not been constructed within 1 year or if changes are made to the proposed project, the Corps should re-initiate Endangered Species Act consultation with the Service.

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APPENDIX A

WETLAND VALUE ASSESSMENTS PROJECT INFORMATION SHEET FOR MISSISSIPPI RIVER SHIP CHANNEL, GULF TO BATON ROUGE, LOUISIANA

Wetland Value Assessment Project Information Sheet

September 26, 2016

Prepared for:
Mississippi River Deepening PDT

Prepared by
U.S. Fish and Wildlife Service

Project Name: Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project

Project Type(s): Marsh Creation

Project Area: Plaquemines Parish, Louisiana (Figure 1).



Figure 1. Mississippi River Deepening Project Area.

Project Goal:

This Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project is intended deepen the Mississippi River Ship Channel up to a 50 foot depth from Baton Rouge to the Gulf of Mexico and to create tidal freshwater marsh in the Mississippi River Delta with material dredged during construction and annual maintenance. Existing survey data shows that the proposed marsh creation sites in the delta have existing bottom elevations of approximately -2.5 feet NAVD88. The initial target elevation for dredge fill is between +4.0 and +4.5 feet NAVD88 which is expected to settle to an elevation between +2.5 and +3.0 feet NAVD88. Existing average marsh elevation, in the immediate vicinity is approximately +1.85 feet NAVD88.

Habitat Assessment Method

The WVA operates under the assumption that optimal conditions for general fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated or expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index graph for each variable, which defines the assumed relationship between habitat quality (Suitability Index) and different variable values, and 3) a mathematical formula that combines Suitability Index for each variable into a single value for wetland habitat quality; that single value is referred to as the Habitat Suitability Index, or HSI.

The WVA model for marsh habitat attempts to assess the suitability of each habitat type for providing resting, foraging, breeding, and nursery habitat to a diverse assemblage of fish and wildlife species. While the model does not specifically assess other wetland functions and values such as storm-surge protection, floodwater storage, water quality improvement, nutrient import/export, and aesthetics, it can be generally assumed that these functions and values are positively correlated with fish and wildlife habitat quality.

The procedure for evaluating project benefits on fish and wildlife habitats, the WVA model, uses a series of variables that are intended to capture the most important conditions and functional values of a particular habitat. Values for these variables are derived for existing conditions and are estimated for conditions projected into the future if no project efforts are applied (i.e., future-without-project), and for conditions projected into the future if the proposed project is implemented (i.e., future-with-project), providing an index of quality or habitat suitability of the habitat for the given time period. The habitat suitability index (HSI) is combined with the acres of habitat to get a number that is referred to as "habitat units".

Expected project benefits are estimated as the difference in habitat units between the future-with- project (FWP) and future-without project (FWOP). To allow comparison of WVA benefits to costs for overall project evaluation, total benefits are averaged over a 50-year period, with the result reported as Average Annual Habitat Units (AAHUs).

Existing – The project area is the open water and surrounding fresh marsh of the Lower Mississippi River Delta. The vegetation is classified as fresh marsh and receives continuous riverine input. Emergent plant species include: smooth cordgrass (*Spartina alterniflora*), Walter's millet (*Echinochloa walteri*), *Schoenoplectus pungens*, *Nelumbo lutea*. Submerged aquatic vegetation, such as *Myriophyllum spicatum*, *Heteranthera dubia*,

Ceratophyllum demersum, *Najas guadalupensis*, and *Potamogeton nodosus* are also common in the lower elevation intertidal and shallow subtidal portions of the project area. The two major soil types in the project area are commonly found together and are classified as Balize and Larose soils (BA). Both soil types are level and very poorly drained. They are flooded by Mississippi River water most of the time and support freshwater marshes.

Land Loss/Gain*

- USGS calculated a historical loss rate for the disposal polygons (Figure 2) using a hyper-temporal analysis for the period 1984 to 2016. That analysis utilized TM satellite scenes and OLI imagery. The Fish and Wildlife Service calculated land loss rate using the same USGS Land/Water data, but with a different regression (land acres: time). That rate was used to calculate land/water values over the life of the project.

Area A-Delta NWR Disposal Area (Delta)

- FWOP gain rate: 0.54 %
- FWP loss rate: 0.54% (Gain rate is assumed to stay the same as FWOP for the life of the project).

Area B-Pass a Loutre WMA Disposal Area (PAL)

Area B subunits (B1 and B2) were combined for the land loss analysis and the WVA.

- FWOP loss rate: -0.78 %
- FWP loss rate: -0.39% (resumes to background loss rate at TY27).

Area C-Southwest Pass Disposal Area (SWP)

Area C subunits (C1, C2, and C3) were combined for the land loss analysis and the WVA.

- FWOP gain rate: 0.17 %
- FWP gain rate: 0.17% (Gain rate is assumed to stay the same as FWOP for the life of the project).

Area D-West Bay Disposal Area (West Bay)

- FWOP loss rate: -0.35 %
- FWP loss rate: -0.175% (resumes to background loss rate at TY27).

All Areas

For FWP we used the standard Civil Works WVA assumption of a 50% loss rate reduction for created marsh (but rate reverts back to FWOP rate when accretion equals 10 inches). Land loss rates were adjusted by the projected effects of three Relative Sea Level Rise (RSLR) scenarios. The medium RSLR scenario was chosen for these analyses. Additionally, FWP with Maintenance (FWPWM) accounts for an additional 132 acres added to each disposal site annually throughout the project life with respective loss/gain rates applied.

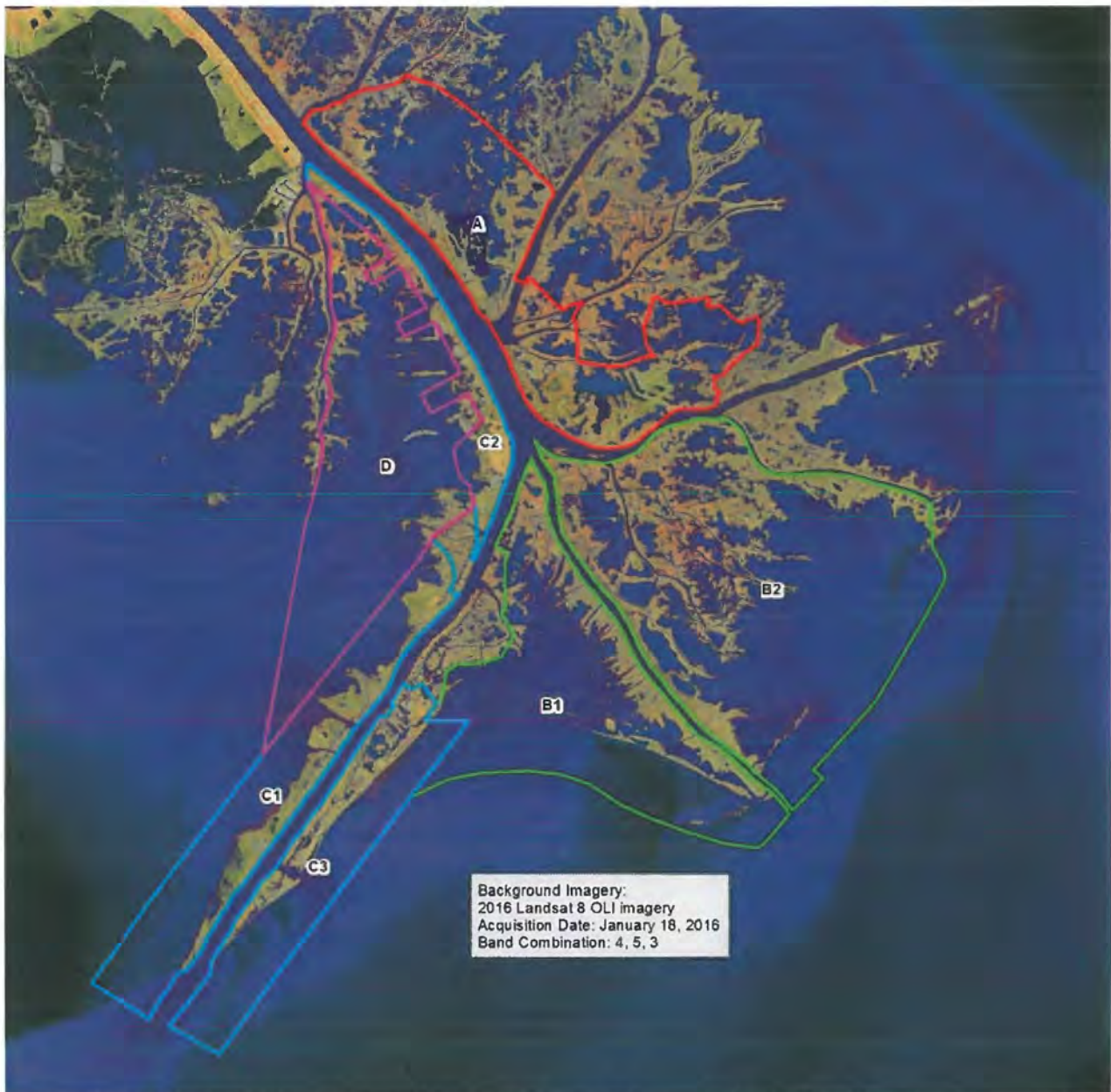


Figure 2. Mississippi River Deepening Land Loss Polygon Calculation Areas.

Sea Level Rise Effects*

Land loss rates estimated by the Service were adjusted by the projected effects of the medium relative sea level rise (RSLR) scenario for these analyses. The nearest water level gauge to the project area that is listed for use with the sea-level change curve calculator on the corpsclimate.us website is the one at Grand Isle. Therefore, we assumed the subsidence rate from Pahl et. al 2015: subsidence in Miss Delta = 5 feet/100 years. (1,524 millimeters/100 years) or about 15 mm/yr. Shinkle and Dokka (2004) estimated a subsidence rate of about 24 mm/yr, but recent CORS measurements at Boothville from 2002 to 2007 are much lower at about 3.5 mm/year (Morton & Bernier 2010). We used the earlier subsidence estimate from Britsch 2007 because the newer estimates were calculated from a comparatively limited period of time. Eustatic sea level rise was assumed to be 1.7 mm/yr.

(*) Subsequent to the Service's initial analyses, hydraulic modelling was conducted by The Water Institute of the Gulf (TWI) to determine the potential effects of the 4 mid-bay marsh creation alternatives. The analysis predicted substantial sediment infilling of West Bay during the 20 year period beginning at TY0 with each alternative and in the absence of any added land forms (FWOP). TWI used 19 mm/year as the subsidence rate and assumed an intermediate sea level rise scenario. Based upon estimates of substrate elevations at which marsh and submerged aquatic vegetation (SAV) are expected to grow (between 0.0 and +1.85 feet NAVD88 for SAV and between +1.85 and +4.5 feet NAVD88 for emergent marsh) the expected acreages of each were predicted after 20 years. The four (two from the environmental team and two proposed by TWIG during modelling) proposed mid-bay marsh creation alternatives had differential effects on the amount of sediment expected to build up within West Bay over 20 years. The DELFT 3D model results only extended to target year 20. Because of the uncertainty of diversion functioning or its potential purposeful closure, the resulting effects on perpetuating emergent marsh were not projected past TY20. Considering the potential increase in land loss that could occur versus the positive effects of the diversion, we held the TY 20 values constant to TY50. This assumption was used for the West Bay (Area D) FWOP portion of the WVA analyses.

Variable V₁ - Percent of wetland area covered by emergent vegetation

FWOP—West Bay disposal area analysis considers the whole range (18,850 acres) of the hydrologic model as the project area. The remaining 3 disposal sites only consider project footprint and assumed that marsh creation polygons would be open water habitat.

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
	% Emergent		% Emergent		% Emergent		% Emergent
TY0	0	TY0	0	TY0	0	TY0	2
TY1	0	TY1	0	TY1	0	TY10	5
TY3	0	TY3	0	TY3	0	TY20	21
TY5	0	TY5	0	TY5	0	TY50	25
TY6	0	TY6	0	TY6	0		
TY25	0	TY25	0	TY25	0		
TY50	0	TY50	0	TY50	0		

FWP—Created marsh platform has limited marsh function until material settlement, flooding and channel development. The assumption document suggests 0%, 15%, 50%, and 100% for TY years 1, 3, 5, and 6 respectively for unplanted marsh. Because this area is in close proximity to the freshwater and nutrients of the Mississippi River Delta, we adjusted the assumptions to 10%, 25%, 100%, and 100% for TY years 1, 3, 5, and 6 respectively to reflect a more rapid vegetative response.

Area A (Delta)				Area B (PAL)				Area C (SWP)				Area D (West Bay)			
		acre s	%			acre s	%			acre s	%			acre s	%
TY0	Constr.	0	0	TY0	Constr.	0	0	TY0	Constr.	0	0	TY0	Constr.	0	0

	Maint.	0	0
TY1	Constr	37	10
	Maint.	13	10
TY3	Constr	93	25
	Maint.	165	42
TY5	Constr	375	103
	Maint.	265	40
TY6	Constr	377	103
	Maint.	398	50
TY25	Constr	405	111
	Maint.	2916	88
TY50	Constr	431	118
	Maint.	6226	94

	Maint.	0	0
TY1	Constr	36	10
	Maint.	13	10
TY3	Constr	90	25
	Maint.	164	42
TY5	Constr	358	98
	Maint.	259	39
TY6	Constr	356	98
	Maint.	390	50
TY25	Constr	320	88
	Maint.	2886	88
TY50	Constr	229	63
	Maint.	6154	93

	Maint.	0	0
TY1	Constr	37	10
	Maint.	13	10
TY3	Constr	92	25
	Maint.	165	42
TY5	Constr	368	101
	Maint.	263	40
TY6	Constr	369	101
	Maint.	395	50
TY25	Constr	371	102
	Maint.	2904	88
TY50	Constr	364	99
	Maint.	6202	94

	Maint.	0	0
TY1	Constr	36	10
	Maint.	13	10
TY3	Constr	91	25
	Maint.	165	42
TY5	Constr	362	99
	Maint.	262	40
TY6	Constr	361	99
	Maint.	394	50
TY25	Constr	340	93
	Maint.	2894	88
TY50	Constr	286	78
	Maint.	6174	94

Variable V₂ - Percent of open water covered by aquatic vegetation

Existing Conditions – SAV coverage estimation was determined for West Bay by optical area estimation and transect rake sampling for presence or absence conducted on September 26, 2014 by USFWS, NOAA, Arcadis, and Corps personnel. For PAL and Delta, SAV coverage information was derived from the Pass a Loutre Restoration CWPPRA PPL18 Candidate WVA analysis. The Southwest Pass disposal area SAV coverage was estimated by LDWF and Corps personnel.

Area A & B: SAV coverage was derived from the CWPPRA Pass a Loutre Restoration Candidate Project WVA.

Area C: Jeff Corbino, NOD Corps of Engineers biologist, and Shane Granier, LDWF Biologist and Pass a Loutre WMA Manager, provided the SAV data for the Southwest Pass disposal area.

Area D: SAV coverage was taken from the West Bay LCA BUDMAT project which was collected by field reconnaissance in September of 2014.

FWOP

According to the DELFT 3D hydrologic model run for Area D, SAV coverage is expected to increase as sediment from the West Bay diversion increases water bottom elevation and creates conditions conducive to SAV colonization. Standard Civil Works WVA assumptions applied to the other disposal sites with a 30% reduction in baseline SAV coverage at TY50.

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
	% SAV		% SAV		% SAV		% SAV
TY0	25	TY0	25	TY0	8	TY0	32
TY1	25	TY1	25	TY1	8	TY10	32

TY3	25	TY3	25	TY3	8	TY20	34
TY5	25	TY5	25	TY5	8	TY50	34
TY6	25	TY6	25	TY6	8		
TY25	25	TY25	25	TY25	8		
TY50	8	TY50	8	TY50	2		

FWP & FWPWM

When the marsh land platform is constructed, all existing SAV will be buried. Until the created marsh platform settles to marsh elevation it is assumed that very little open water exists to support SAV growth. Only the disposal area footprint is considered in FWP for all disposal sites.

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
	% SAV		% SAV		% SAV		% SAV
TY0	25	TY0	25	TY0	8	TY0	32
TY1	0	TY1	0	TY1	0	TY1	0
TY3	0	TY3	0	TY3	0	TY3	0
TY5	25	TY5	25	TY5	8	TY5	32
TY6	29	TY6	29	TY6	9	TY6	37
TY25	29	TY25	29	TY25	9	TY25	37
TY50	12.5	TY50	12.5	TY50	4	TY50	16

Variable V₃ – Marsh edge and interspersions

Existing Conditions – Interspersion classes varied between areas and were determined utilizing aerial imagery and ArcMap GIS 10.3.1 software.

FWOP

Marsh growth predicted by the DELFT 3D model at TY20 was used to interpret interspersions. TYs before and after TY20 were interpolated or extrapolated using the hydrologic model results and the existing conditions.

Area A (Delta)			Area B (PAL)			Area C (SWP)			Area D (West Bay)		
	Class	%		Class	%		Class	%		Class	%
TY0	3	30	TY0	3	30	TY0	3	100	TY0	4	100
	4	70		4	70	TY1	3	100		3	50
TY1	3	30	TY1	3	30	TY3	3	100	TY10	4	50
	4	70		4	70	TY5	3	100		2	50
TY3	3	30	TY3	3	30	TY6	3	100	TY20	3	50
	4	70		4	70	TY25	3	50		2	50
TY5	3	30	TY5	3	30		4	50	TY50	3	50
	4	70		4	70	TY50	4	100			

TY6	3	30	TY6	3	30
	4	70		4	70
TY25	3	35	TY25	3	35
	4	65		4	65
TY50	3	40	TY50	3	40
	4	60		4	60

FWP & FWPWM

Baseline conditions were applied at TY0 for all areas. Standard Civil Works assumptions were applied for TY1–TY50.

Area A (Delta)			Area B (PAL)			Area C (SWP)			Area D (West Bay)		
Class		%	Class		%	Class		%	Class		%
TY0	3	30	TY0	3	30	TY0	3	100	TY0	4	100
	4	70		4	70	TY1	5	100		5	100
TY1	5	100	TY1	5	100	TY3	3	100	TY3	3	100
TY3	3	100	TY3	3	100	TY5	1	50	TY5	1	50
TY5	1	50	TY5	1	50		3	50		3	50
	3	50		3	50	TY6	1	100	TY6	1	100
TY6	1	100	TY6	1	100	TY25	2	100	TY25	2	100
TY25	2	100	TY25	2	100	TY50	3	100	TY50	3	100
TY50	3	100	TY50	3	100						

Variable V₄ – Percent of open water area <=1.5 feet deep in relation to marsh surface

Existing Conditions–

Area A & B: Water depths from field reconnaissance were collected by CWPPRA personnel for the Pass a Loutre Restoration Candidate Project. These data were gleaned from the CWPPRA WVA and utilized for both Areas A and B as the analysis incorporated both the Pass a Loutre WMA and the Delta NWR.

Area C: Water depths were taken from bathymetry data, provided by the Corps, collected by the Great Lakes Dredge and Dock Company in 2012.

Area D: Water depths were taken from the West Bay LCA BUDMAT project which was collected by field reconnaissance in September of 2014.

FWOP

Future estimates for Area D-West Bay were based on the results of the DELFT 3D hydrologic model utilized in the West Bay LCA BUDMAT analysis. The model included factors such as RSLR and the effects of sedimentation and land building due to the West Bay Diversion. The assumed range of water bottom level for SAV existence was 0 to 1.85 feet NAVD88. A subset (approximately +0.5 feet to 1.85 feet NAVD88) of that range was used as a guide to estimate shallow water areas using best professional judgment based on the 3D model 20 year results and the existing conditions for the TY10-TY50 values. The TY20 value was carried over for TY50 because the model was only run for a 20 year interval. Assumptions after that time are very difficult and depend on many unknowns, including the functionality of the diversion at that time in the future.

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)	
TY0	19	TY0	19	TY0	15	TY0	10
TY1	19	TY1	19	TY1	15	TY1	15
TY3	19	TY3	19	TY3	15	TY3	25
TY5	19	TY5	19	TY5	15	TY5	25
TY6	19	TY6	19	TY6	15		
TY25	19	TY25	19	TY25	15		
TY50	19	TY50	19	TY50	10		

FWP & FWPWM

Marsh that is lost is not assumed to become shallow open water ≤ 1.5 feet deep until TY50. According to the Civil Works standard assumptions applied for marsh creation, 1/6 of the SOW would become non-shallow.

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)		Water ≤ 1.5ft (%)	
TY0	19	TY0	19	TY0	15	TY0	10
TY1	100	TY1	100	TY1	100	TY1	100
TY3	100	TY3	100	TY3	100	TY3	100
TY5	100	TY5	100	TY5	100	TY5	100
TY6	100	TY6	100	TY6	100	TY6	100
TY25	100	TY25	100	TY25	100	TY25	100
TY50	83	TY50	83	TY50	83	TY50	83

Variable V₅ - Salinity

Existing conditions – Salinity values represent mean growing season salinity (March 1–November 30).

Area A: Salinity was derived from data recorded at the CRMS2634 for the period of February 2008 to June 2016.

Area B: Salinity was derived from data recorded at the CRMS0154, 0157, and 0159 for the period of June 2007 to June 2016. The annual salinities were averaged and used for analysis.

Area C: Salinity was derived from data recorded at the CRMS0159 for the period of June 2007 to June 2016.

Area D: Salinity was derived from data recorded at the CRMS2608 for the period of July 2009 to June 2016.

FWOP, FWP, & FWPWM

Area A (Delta)		Area B (PAL)		Area C (SWP)		Area D (West Bay)	
Salinity (ppt)		Salinity (ppt)		Salinity (ppt)		Salinity (ppt)	
TY0-TY50	1.16	TY0-TY50	1.03	TY0-TY50	1.27	TY0-TY50	0.75

Variable V₆ – Aquatic organism access

Existing conditions – The four proposed marsh creation areas are not currently impounded or hydrologically controlled by any structures. Access to all parts of project area is assumed to be equal and existing conditions are expected to persist.

FWOP

All Areas	
TY0-TY50	1.00

FWP

The marsh creation area is considered to have no access at TY1 due to the elevation of the marsh platform and containment dikes. Based on Standard Civil Works assumptions, at TY5 the marsh creation area receives an access value of 1.0 due to settling of the marsh platform, formation of tidal channels, and gapping of the containment dikes.

All Areas	
TY0	1.00
TY1	0
TY3	0
TY5	1.00
TY6	1.00
TY25	1.00
TY50	1.00

FWPWM

The marsh creation area receives an additional 132 acres of maintenance annually. Based on Standard Civil Works assumptions full access is given at TY5 however, with annual maintenance full credit is never attained.

All Areas		
TY0	1.00	
TY1	0	
TY3	0	
TY5	0.38	(~260 acres of credit/685 acres built)
TY6	0.48	(~390 acres of credit/817 acres built)
TY25	0.87	(~2890 acres of credit/3325 acres built)
TY50	0.94	(~6200 acres of credit/6625 acres built)

Literature Cited

- Pahl, James, Barb Kleiss, and Gary Brown 2015. Proposal for Addressing Relative Sea Level Rise in the LCA Mississippi River Hydrodynamic and Delta Management Feasibility Study. Figure 2 developed by Britsch. Pg 5.
- Morton, R.A. and Bernier, J.C., 2010. Recent subsidence-rate reductions in the Mississippi Delta and their geological implications. Journal of Coastal Research, 26(3), 555–561. West Palm Beach (Florida), ISSN 0749-0208.
- Shinkle, K.D. and R.K. Dokka. 2004. Rate of Vertical Displacement at Benchmarks in the Lower Mississippi Valley and the Northern Gulf Coast. NOAA TECHNICAL REPORT NOS/NGS 50.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

Appendix A-9. Draft 404 Public Notice

Regional Planning and
Environment Division South
Environmental Planning Branch

PUBLIC NOTICE

**Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana
Project, Phase III**

**DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
(EIS-15)**

Introduction. This Public Notice is issued in accordance with provisions of Title 33 CFR Parts 336.1(b)(1) and 337.1, which establish policy, practices, and procedures to be followed concerning federal actions involving the disposal of dredged or fill material into waters of the United States.

This notice addresses project-related impacts to waters of the United States for the next phase of construction in deepening the Mississippi River Ship Channel to a depth of 50 feet (Mean Lower Low Water, i.e., MLLW) in the lower Mississippi from river mile 10 Above Head of Passes to river mile 22 below head of passes, and to deepen the three crossings, (Richbend, Belmont, and Fairview) located within the Port of South Louisiana to a depth of 50 feet at the low water reference plane.

The 30-day public review of this notice will run concurrently with the review period for the associated Supplemental Environmental Impact Assessment #15-1 that addresses...

Project Authority. A feasibility report entitled "Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana" was prepared in 1981 recommending deepening the Mississippi River navigation channel to a 55 ft depth from Baton Rouge to the Gulf of Mexico. The final Chief's Report for the project was signed in 1983. The project was authorized for construction by the 1985 Supplemental Appropriations Act, and the Water Resources and Development Act of 1986 (PL 99-662) and the Water Resource Reform and Development Act of 2014 (H.R. 3080) provided additional authorization by formalizing the cost-sharing provisions of the project for both construction and operations.

During the pre-construction planning, a construction sequence was developed that would implement the authorized project in three construction phases, to obtain the fully authorized project. Construction of Phase I was completed in December of 1987 and

provided a depth of 45 ft from Donaldsonville, LA (River Mile 181.0) to the Gulf of Mexico. Construction of Phase II was completed in December 1994 and involved deepening of the MRSC to a depth of 45 ft between Donaldsonville, LA (River Mile 181.0) to Baton Rouge and included dredging eight river crossings to an equivalent depth.

Phase III, which has not been constructed as of publication of this report, was originally defined as deepening of the MRSC from the Gulf to Baton Rouge from a depth of 45 ft to a depth of 55 ft.

To proceed with the evaluation of alternatives for the next phase of construction, this study was initiated with the issuance of Federal funds to initiate a GRR, following execution of the Feasibility and Cost Sharing Agreement (FCSA), signed on the 2nd of April 2015.

Location. Construction activities would occur at three crossings in the vicinity of the Port of South Louisiana, in St. James and St. Charles Parishes. Construction would also occur in the lower river and Southwest Pass in Plaquemines Parishes Parish, Louisiana (**Figures 1-3**).

Project Description. This plan would deepen portions of the Mississippi River (RM 22 BHP to RM 60 AHP) including deepening and maintaining 3 river crossings (Rich Bend (Mile 160-155), Belmont (Mile 156-151), Fairview (Mile 117-111)) from 45 feet to 50 feet. This would also include deepening and maintain the lower river (RM 13.4 AHP to RM 22 BHP) to the Gulf of Mexico (via Southwest Pass) from 48 feet to 50 feet.

Material dredged during construction (sand/silt/clay loam) at the 3 crossings would occur via dustpan, hopper dredges, and occasionally cutterhead would total approximately 616,600 cubic yards, and would be placed in areas adjacent and downstream, as is current maintenance practice. The material dredged during construction of the lower river would be via cutterhead dredge, would total 19,900,000 cubic yards, and would be placed in open water habitat to create approximately 1462.5 acres of coastal marsh habitat.

Material dredged by hopper and dustpan dredges (sand/silt/clay loam) during the O&M of the 3 crossings would total approximately 5,087,000 cubic yards and would be placed in areas adjacent and downstream, as is current practice. In emergency situations cutterhead dredges may also be utilized for crossings. Maintenance of the lower river/Southwest Pass is not anticipated to increase from current practice and would include a combination of cutterhead, hopper and dustpan dredges. Approximately 38 percent of the suitable/available material dredged in the lower river/Southwest Pass under the O&M program (approximately 22,250,000 annually) will be used beneficially, equating to approximately 528 acres of intermediate marsh annually. It is anticipated the disposal

areas will naturally vegetate through colonization of species from adjacent vegetated areas, consistent with experience at other MVN beneficial use-disposal areas in the Mississippi River Delta. The remainder of the material will be disposed of in the Hopper Dredge Disposal Area at the Head of Pass or in the Ocean Dredge Material Disposal Site west of the Bar Channel (RM 19-22 BHP).

Placement sites are expected to become vegetated by colonization from adjacent vegetated areas, consistent with experience at other MVN beneficial use-disposal areas in the Mississippi River Delta.

Flotation access dredging may be required to allow construction equipment and pipeline to reach discharge sites within the disposal area. Flotation access channel material would be placed on adjacent shallow open water bottom to a maximum initial height of about +4.5 feet MLG or be used to backfill the flotation access channels when disposal operations have been completed. Flotation access channels would be limited to a maximum bottom width of about 80 feet and a maximum depth of about -8.0 feet MLG.

Access corridors across existing marsh and upland areas may be required to allow construction equipment and pipeline to reach discharge sites within the disposal area. Adverse impacts to areas of existing emergent marsh would be avoided to the maximum extent practicable. Such access corridors would be limited to a maximum width of about 150 feet. These access corridors may be backfilled with dredged material to a maximum elevation of about 3 feet above existing, adjacent marsh upon completion of dredging and disposal activities to restore these degraded corridors to pre-project marsh elevations. Access to the site would be via previously-cleared (i.e., NEPA-cleared) disposal areas.

Discharge of dredged material into the proposed disposal area would be performed by a hydraulic dredge. Excavation and discharge of flotation access channel material, of access corridor material would be performed by a mechanical dredge.

Status of Draft Supplemental Environmental Impact Statement (SEIS) and Other Environmental Documents. Environmental compliance for the proposed action would be achieved upon: coordination of the Draft SEIS 15-1 with appropriate agencies, organizations, and individuals for their review and comments; public review of the Section 404(b)(1) Public Notice; signing of the Section 404(b)(1) Evaluation; receipt and acceptance or resolution of all U.S. Fish and Wildlife Service Fish and Wildlife Coordination Act recommendations; Louisiana Department of Natural Resources concurrence with the determination that the proposed action is consistent with the Louisiana Coastal Zone program, and that there are no direct or indirect impacts to resources within the coastal zone; and receipt and acceptance or resolution of all Louisiana Department of Environmental Quality comments on the air and water quality impact analysis documented in the SEA. The Record of Decision will not

be signed until the proposed action achieves environmental compliance with applicable laws and regulations, as described above.

Coordination. The following is a partial list of agencies to which a copy of this notice is being sent: U.S. Environmental Protection Agency, Region VI

- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- U.S. Coast Guard, Eighth District
- Louisiana Department of Environmental Quality
- Louisiana Department of Natural Resources
- Louisiana Department of Wildlife and Fisheries
- Louisiana Department of Transportation and Development
- Louisiana State Historic Preservation Officer

This notice is being distributed to these and other appropriate Congressional, Federal, Tribal, state, and local interests, environmental organizations, and other interested parties.

Evaluation Factors. Evaluation includes application of the Section 404(b)(1) guidelines promulgated by the Administrator of the USEPA, through 40 CFR 230.

Public Involvement. Interested parties may express their views on the disposal of material associated with the proposed action or suggest modifications. All comments postmarked on or before the expiration of the comment period for this notice will be considered. Any person who has an interest that may be affected by deposition of excavated or dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within the comment period of this notice and must clearly set forth the interest that may be affected and the manner in which the interest may be affected by the proposed action. You are requested to communicate the information contained in this notice to any parties who may have an interest in the proposed action. For further information regarding the proposed action, please contact Mr. Steve Roberts at (504) 862-2517; FAX number (504) 862-1892 and E-mail address steve.w.roberts@usace.army.mil.

Sandra Stiles
Acting Chief, Environmental Planning

COMMENT PERIOD FOR THIS PUBLIC NOTICE EXPIRES: _____



Figure 1.

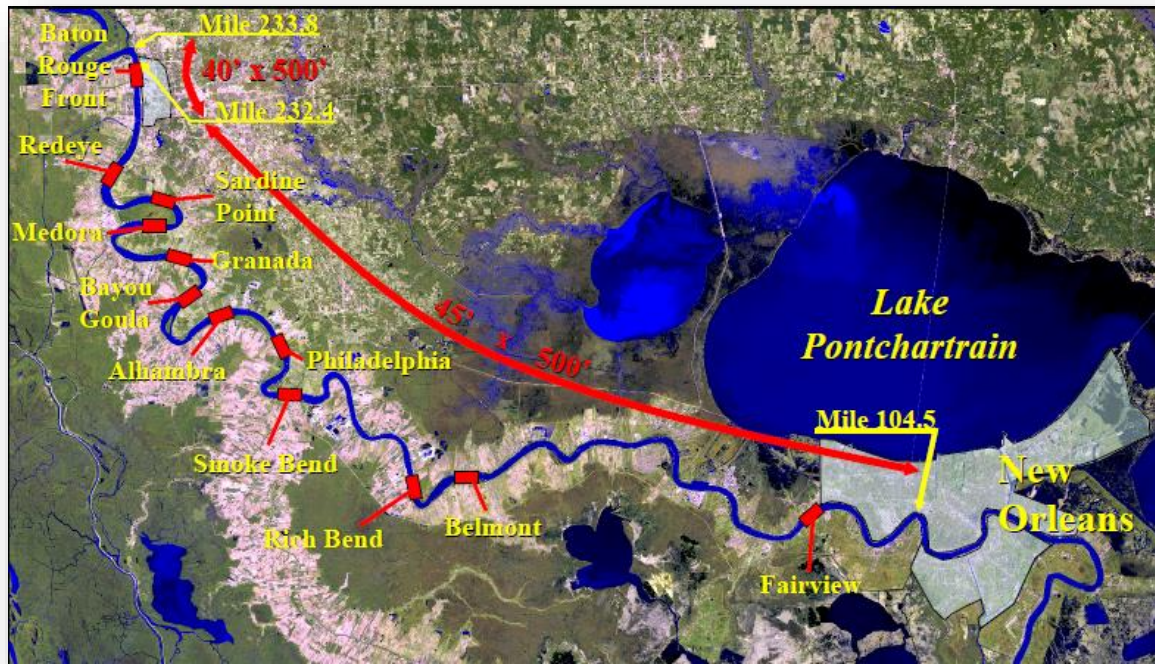


Figure 2.

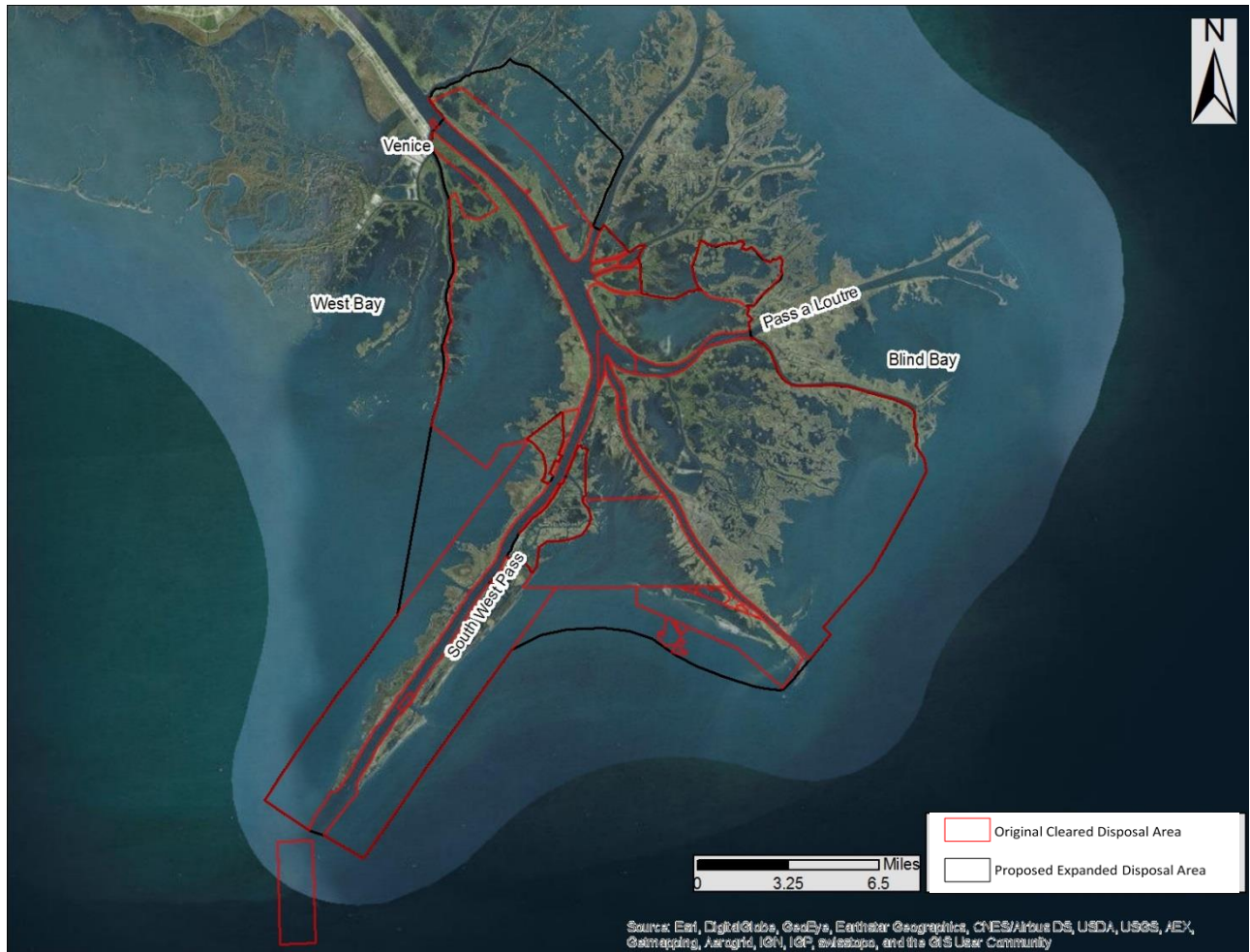


Figure 3 Disposal area long term plan

Appendix A-10. Draft 404(b)(1) evaluation.

SECTION 404(b)(1) EVALUATION

The following short form 404(b)(1) evaluation follows the format designed by the Office of the Chief of Engineers. As a measure to avoid unnecessary paperwork and to streamline regulation procedures while fulfilling the spirit and intent of environmental statutes, the New Orleans District is using this format for all proposed project elements requiring 404 evaluation, but involving no significant adverse impacts.

PROJECT TITLE. Supplemental EIS 15-1 “Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project, Phase III.”

PROJECT DESCRIPTION.

The proposed action would require construction and maintenance of three river crossings to 50 ft (LWRP) and the lower river (RM 13.4 AHP – RM 22 BHP) to a depth of 50 feet (MLLW). Construction and O&M quantities for the proposed work are exhibited in Table 4-1. Construction activities would occur at three crossings in the vicinity of the Port of South Louisiana, in St. James and St. Charles Parishes. Construction would also occur in the lower river and Southwest Pass in Plaquemines Parishes Parish, Louisiana

	Crossings Construction	Lower River Construction	Annual O&M Crossings	Annual O&M Lower River	Acres created
Proposed action	616,600	19,900,000	5,087,000	0	1462.5

Table 1.

Depending on need and availability, both construction and Operations and maintenance activities would utilize dustpan, hopper and cutterhead dredges to maintain the crossings and the lower river under. It is anticipated that construction and maintenance would occur across 3 crossings specifically Rich Bend crossing (Mile 160-155), Belmont crossing (Mile 156-151), and Fairview crossing (Mile 117-111). Material dredged during both construction and maintenance of crossings would be placed immediately downstream, (via agitation dredging from dustpan, direct deposit from hoppers, or pumping via cutterhead), in areas greater than 50 ft MLLW. Deepening this subset of crossings would allow for deep draft access up to the Port of South Louisiana.

Construction of the lower river would occur at various shoals from RM 13.4 AHP to RM 19 BHP with cutterhead dredges over 4 years and that material would be used beneficially. It is anticipated that construction from RM 13.4 to RM 19 BHPB would result in 1462.5 acres of fresh marsh habitat over the 4-year construction period. It is also anticipated that construction of the bar channel would occur at shoals from RM 19 BHP to RM 22 BHPB with hopper

dredges utilizing the Ocean Dredge Material Disposal Site (ODMDS) over 4 years. One dimensional sedimentation modeling concludes that shoaling in the lower river are not anticipated to increase as a result of deepening from 48 ft to 50 ft (Appendix C of the associated SEIS). As such, maintenance of the lower river is not anticipated to increase.

During the early stages of alternative development, a need for additional beneficial use capacity for construction and O&M over 50 years was anticipated. As such, the previously cleared beneficial use disposal areas (142,858 acres) were expanded by 24,054 acres to 166,911 acres at early stages of alternative development (Figure 4-1) for Alternative 3. An ancillary benefit of the additional capacity would also allow for beneficial use in some future circumstances (vs. open water disposal) under the federal standard.

The proposed actions consist of measures to minimize the adverse effects of storm water erosion and thus require no separate measures or controls for compliance with CWA Section 402(p) and LAC 33:IX.2341.B.14.j.

1. Review of Compliance (330.10 (a)-(d)).

Preliminary¹

Final²

A review of this project indicates that:

a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and information gathered for environmental assessment alternative);

☐ YES

NO*

☐ YES

NO

b. The activity does not appear to: (1) violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act; (2) jeopardize the existence of Federally listed endangered or threatened species or their habitat; and (3) violate requirements of any Federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies);

☐ YES

NO*

☐ YES

NO

c. The activity will not cause or contribute to significant degradation of waters of the United States including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, esthetic, and economic values (if no, see section 2);

☐ YES

NO*

☐ YES

NO

d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5).

☐ YES

NO*

☐ YES

NO

N/A Not Significant Significant*

2. Technical Evaluation Factors (Subparts C-F).

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C).

- (1) Substrate impacts.
- (2) Suspended particulates/turbidity impacts.
- (3) Water column impacts.
- (4) Alteration of current patterns and water circulation.
- (5) Alteration of normal water fluctuations/hydro period.
- (6) Alteration of salinity gradients.

		x
	x	
	x	
		x
	x	
		x

b. Biological Characteristics of the Aquatic Ecosystem (Subpart D).

- (1) Effect on threatened/endangered species
- (2) Effect on the aquatic food web.
- (3) Effect on other wildlife (mammals, birds, reptiles, and amphibians).

	x	
	x	
	x	

c. Special Aquatic Sites (Subpart E).

- (1) Sanctuaries and refuges.
- (2) Wetlands.
- (3) Mud flats.
- (4) Vegetated shallows.
- (5) Coral reefs.
- (6) Riffle and pool complexes.

	x	
	x	
x		
	x	
x		
x		

d. Human Use Characteristics (Subpart F).

- (1) Effects on municipal and private water supplies.
- (2) Recreational and commercial fisheries impacts.
- (3) Effects on water-related recreation.
- (4) Esthetic impacts.
- (5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.

	x	
	x	
	x	
	x	
	x	

Remarks. Where a check is placed under the significant category, preparer has attached explanation.

2.a.(1), (4), and (6). This action is not expected to contribute to the toxicity of benthic organisms in the beneficial use disposal area. The project will convert open water to fresh marsh habitat. The conversion will change water circulation, depth, and current patterns along with benthic communities by converting shallow open water to intermediate marsh. This alteration is intended to create/replace marsh that has degraded over time is not expected to negatively impact the area. The creation of fresh marsh using dredged material is expected to alter the substrate elevation, which would result in changes in water circulation and current pattern. As a result, changes in: location, structure, and dynamics of aquatic communities; substrate erosion and deposition rates; the deposition of suspended particulates; and the rate and extent of mixing of dissolved and suspended components of the water body are expected. These alterations are desired, and are considered to be beneficial effects of wetland restoration. At this time, 3D hydraulic (salinity) modeling is ongoing. However, Since the construction of Phase I, the frequency of construction of the sill has not changes. The frequency of enacting the sill is still on a 10 yr. basis. Further, impacts to salinity below the sill by deepening to a depth of 50 ft (MLLW) is expected to be less than dredging to the authorized depth of 55 ft. Further, compromising drinking water supplies by deepening the river from 48.5 (MLLW) to 50 ft (MLLW) is not anticipated due to prior success with the saltwater sill mitigation feature. Only upon confirmation of such findings by the results of the 3D model, this document and the Record of Decision will be signed.

3. Evaluation of Dredged or Fill Material (Subpart G).³

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material.

(1) Physical characteristics	x
(2) Hydrography in relation to known or anticipated sources of contaminants	x
(3) Results from previous testing of the material or similar material in the vicinity of the project	
(4) Known, significant sources of persistent pesticides from land runoff or percolation	
(5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances	x
(6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources	x
(7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	
(8) Other sources (specify)	x

Remarks: Dredge slurry was collected directly from the discharge lines of dustpan dredges performing maintenance on 11 Deep Draft Crossings during Fiscal Year 2016. The solid and liquid fractions of the slurry were analyzed individually for the presence of EPA priority pollutants including metals, pesticides, PCBs, and semi-volatile organic compounds. Metals were common to both fractions, and were detected at or below background levels in the Mississippi River. Chlordane pesticides and hydrocarbon exhaust products were detected infrequently in the solid samples, but at levels generally at or below 1 part per billion. All contaminant detects in dredge slurry were below regulatory water quality criteria and ecological screening values, and dredging of the crossings is not expected to have a negative impact on human health or the environment. Other sources included conversations and email communications from USACE staff members from 9/29/2016 to 11/11/2016, including Joseph Musso, Jeff Corbino, and Danny Wiegand.

Appropriate references:

1. Environmental Regulatory Code, Part IX. Water Quality Regulation, Louisiana Department of Environmental Quality, 1994, 3rd Edition.
2. State of Louisiana Water Quality Management Plan, Volume 5, Part B – Water Quality Inventory, Louisiana Department of Environmental Quality, Office of Water Resources, 1994.
3. Louisiana DEQ, Chapter 11 Surface Water Quality Standards, May 2007:
<http://www.deq.louisiana.gov/portal/LinkClick.aspx?link=planning%2fregs%2ftitle33%2f33v09.pdf&tabid=1674>
4. Louisiana Department of Environmental Quality. 2015. *2014 Louisiana Water Quality Inventory: Integrated Report*.
<http://www.deq.louisiana.gov/portal/DIVISIONS/WaterPermits/WaterQualityStandardsAssessment/WaterQualityInventorySection305b/2014IntegratedReport.aspx>. Last accessed on August 7, 2015
5. NOAA, Screening Quick Reference Tables, November 2006: <http://response.restoration.noaa.gov/>
6. US Coast Guard, National Response Center: www.nrc.uscg.mil/index.htm
7. US EPA, CERCLIS Database of Hazardous Waste Sites:
www.epa.gov/superfund/sites/cursites/index.htm
8. US EPA, EnviroMapper StoreFront: <http://www.epa.gov/enviro/html/em/index.html>
9. US EPA, National Recommended Water Quality Criteria, 2006:
<http://epa.gov/waterscience/criteria/wqcriteria.html>
10. US EPA, Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material,

3. Evaluation of Dredged or Fill Material (Subpart G).³

July 2004: <http://www.epa.gov/owow/wetlands/pdf/40cfrPart230.pdf>

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or the material meets the testing exclusion criteria.

YES

NO

4. Disposal (Fill) Site Delineation (≥230.11(f)).

a. The following factors, as appropriate, have been considered in evaluating the disposal site.

(1) Depth of water at disposal site	<u>X</u>
(2) Current velocity, direction, and variability at disposal site	<u>X</u>
(3) Degree of turbulence	<u>X</u>
(4) Water column stratification	<u>X</u>
(5) Discharge vessel speed and direction	<u>X</u>
(6) Rate of discharge.....	<u>X</u>
(7) Dredged material characteristics (constituents, amount, and type of material, settling velocities)	<u>X</u>
(8) Number of discharges per unit of time	<u>X</u>
(9) Other factors affecting rates and patterns of mixing (specify)	<u> </u>

Appropriate references:

Same as 3(a)

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable.

YES

NO*

5. Actions to Minimize Adverse Effects (Subpart H).

All appropriate and practicable steps have been taken, through application of the recommendations of §230.70-230.77 to ensure minimal adverse effects of the proposed discharge.

YES

NO*

Actions taken: All material will be placed in a manner conducive to wetlands creation or will be placed in a manner so as not to cause unnecessary suspension of sediments (gapping of spoil banks and disposal of gap material would occur by bucketed equipment). Available data shows material not to be a carrier of contaminants.

6. Factual Determination (§230.11).

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term (adverse) environmental effects of the proposed discharge as related to:

- | | | |
|---|------------------------------|-----|
| a. Physical substrate at the disposal site (review sections 2a, 3, 4, and 5 above). | <input type="checkbox"/> YES | NO* |
| b. Water circulation, fluctuation and salinity (review sections 2a, 3, 4, and 5). | <input type="checkbox"/> YES | NO* |
| c. Suspended particulates/turbidity (review sections 2a, 3, 4, and 5). | <input type="checkbox"/> YES | NO* |
| d. Contaminant availability (review sections 2a, 3, and 4). | <input type="checkbox"/> YES | NO* |
| e. Aquatic ecosystem structure and function (review sections 2b and c, 3, and 5). | <input type="checkbox"/> YES | NO* |
| f. Disposal site (review sections 2, 4, and 5). | <input type="checkbox"/> YES | NO* |
| g. Cumulative impact on the aquatic ecosystem. | <input type="checkbox"/> YES | NO* |
| h. Secondary impacts on the aquatic ecosystem. | <input type="checkbox"/> YES | NO* |

*A negative, significant, or unknown response indicates that the proposed project may not be in compliance with the Section 404(b)(1) Guidelines.

¹Negative responses to three or more of the compliance criteria at this stage indicates that the proposed project may not be evaluated using this "short form procedure". Care should be used in assessing pertinent portions of the technical information of items 2a-d, before completing the final review of compliance.

²Negative responses to one of the compliance criteria at this stage indicates that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form" evaluation process is inappropriate.

³If the dredged or fill material cannot be excluded from individual testing, the "short form" evaluation process is inappropriate.

7. Evaluation Responsibility.

Evaluation prepared by: Steve Roberts, Environmental Manager

Position: Senior Biologist

Date: 11/21/2016

8. Findings.

- a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines X
- b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions
- c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reason(s):
- (1) There is a less damaging practicable alternative
- (2) The proposed discharge will result in significant degradation of the aquatic ecosystem
- (3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem

Date

Sandra Stiles
Acting Chief, Environmental Planning Branch

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

(33 CFR 325)

OMB APPROVAL NO. 0710-003
Expires October 1996

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10; 1413, Section 404. Principal Purpose: These laws require permits authorizing activities in, or affecting, navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application or a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
--------------------	----------------------	------------------	-------------------------------

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME US Army Corps of Engineers, New Orleans District	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) Same as Applicant
6. APPLICANT'S ADDRESS Regional Planning and Environment Division South; Env Compliance Branch CEMVN-PDC-CEC P.O. Box 60267 New Orleans, LA 70160-0267 ATTN:	9. AGENT'S ADDRESS Same as Applicant
7. APPLICANT'S PHONE NOS. W/AREA CODE	10. AGENT'S PHONE NOS. W/AREA CODE
a. Residence b. Business (504) 862-2517	a. Residence b. Business Same as Applicant

11. STATEMENT OF AUTHORIZATION

<hr/>	
APPLICANT'S SIGNATURE	DATE
NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY	

12. PROJECT NAME OR TITLE (see instructions)

Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Phase III. This is a request to amend WQC 840504-09.

13. **NAME OF WATERBODY, IF KNOWN** (if applicable)
Mississippi River, from Baton Rouge to the Gulf of Mexico via Southwest Pass14. **PROJECT STREET ADDRESS** (if applicable)
N/A15. **LOCATION OF PROJECT**COUNTY STATE
St. James,, St. Charles, and Plaquemines Parishes16. **OTHER LOCATION DESCRIPTIONS, IF KNOWN**, (see instructions)

17. DIRECTIONS TO THE SITE

Mississippi River from River Mile 160, Above Head of Passes (AHP), to RM 22, Below Head of Passes (BHP), via the Southwest Pass and Bar Channel

18. NATURE OF ACTIVITY (Description of project, include all features.)

This plan would deepen portions of the Mississippi River (RM 22 BHP to RM 60 AHP) in St. James,, St. Charles, and Plaquemines Parishes. This would include deepening and maintaining 3 river crossings (Rich Bend (Mile 160-155), Belmont (Mile 156-151), Fairview (Mile 117-111)) from 45 feet to 50 feet . This would also include deepening and maintain the lower river (RM 13.4 AHP to RM 22 BHP) to the Gulf of Mexico (via Southwest Pass).

19. PROJECT PURPOSE (Describe the reason or purpose of the project, (see instruction.)

The purpose of the proposed action is to improve the navigational capacity of the Mississippi River and reduce transportation costs within the ship channel.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. REASON(S) FOR DISCHARGE

Improvements to navigational capacity of the Mississippi River.

21. TYPE(S) OF MATERIAL BEING DISCHARGED AND THE AMOUNT OF EACH TYPE IN CUBIC YARDS.

Material dredged during construction (sand/silt/clay loam) at the 3 crossings would occur via dustpan, cutterhead, and hopper dredges, would total approximately 616,600 cubic yards, and would be placed in areas adjacent and downstream, as is current maintenance practice. The material dredged during construction of the lower river would be via cutterhead dredge, would total 19,900,000 cubic yards, and would be placed in open water habitat to create approximately 1462.5 acres of coastal marsh habitat.

Material dredged by hopper, dustpan, and cutterhead (sand/silt/clay loam) during O&M of the 3 crossings would total approximately 5,087,000 cubic yards and would be placed in areas adjacent and downstream, as is current practice. In emergency situations cutterhead dredges may also be utilized for crossings. Maintenance of the lower river/Southwest Pass could occur with dustpan, cutterhead and hopper dredges and is not anticipated to increase from current practice. Approximately 38 percent of the suitable/available material dredged in the lower river/Southwest Pass under the O&M program (approximately 22,250,000 annually) will be used beneficially, equating to approximately 528 acres of intermediate marsh annually. The remainder of the material will be disposed of in the Hopper Dredge Disposal Area at the Head of Pass or in the Ocean Dredge Material Disposal Site west of the Bar Channel (RM 19-22 BHP).

22. SURFACE AREA IN ACRES OF WETLANDS OR OTHER WATERS FILLED (see instructions)

Material dredged from the crossings will be released downstream in open water. Approximately 1462.5 acres of water bottoms would be utilized to create coastal marsh habitat during construction. Approximately 528 acres of water bottoms would be utilized to create coastal marsh habitat during annual O&M, as is current practice, with 38 percent of the material dredged in the lower river. The remaining 62 percent of material will be placed in designated open water disposal areas.

23. IS ANY PORTION OF THE WORK ALREADY COMPLETE? Yes ____ No X ____ IF YES, DESCRIBE THE COMPLETED WORK

24. ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ADJOINS THE WATERBODY (If more than can be entered here, please attach a supplemental list.)

Crossings occur within the open water of the Mississippi River and within the flood protection levees. See attached for landowners in the vicinity of the beneficial use plan.

25. LIST OF OTHER CERTIFICATIONS OR APPROVALS/DENIALS RECEIVED FROM OTHER FEDERAL, STATE OR LOCAL AGENCIES FOR WORK DESCRIBED IN THIS APPLICATION.

AGENCY	TYPE APPROVAL	IDENTIFICATION NO.	DATE APPLIED	DATE APPROVED	DATE DENIED
USFWS	ESA Sec 7	N/A	pending		
LDNR	CZ Consistency Determination	N/A	pending		
SHPO	106/NHPA	N/A	pending		

To the best of my knowledge the proposed activity described in my permit application complies with and will be conducted in a manner that is consistent with the LA Coastal management Program.

*Would include but is not restricted to zoning, building and flood plain permits.

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT

DATE

SIGNATURE OF AGENT

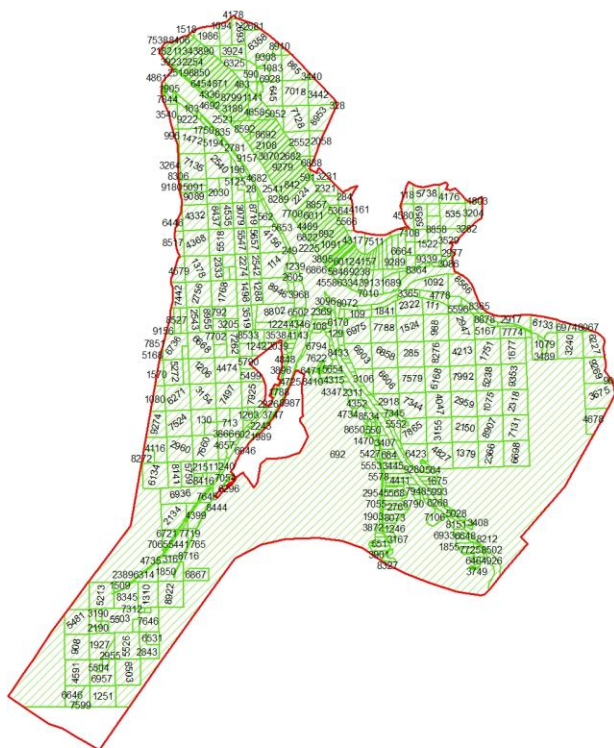
DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency The United States knowingly and willfully falsifies, conceals, or covers up

by any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

*U.S. :1994-520-478/82018



GRANTEE_NA

TRACT_ID

Eugene De Armas et al	8406
Grand Prairie Levee District	1134
Grand Prairie Levee District	3923
Grand Prairie Levee District	2519
U.S.A.	8910
Grand Prairie Levee District	3924
Grand Prairie Levee District	2254
Eugene De Armas et al	1053
Grand Prairie Levee District	2846
Grand Prairie Levee District	2693
Eugene De Armas et al	1094
Eugene De Armas et al	1986
Eugene DeArmas et al	1518
Eugene DeArmas et al	5256
Eugene De Armas et al	8850
Grand Prairie Levee District	3890
Grand Prairie Levee District	2681
Grand Prairie Levee District	5322
Grand Prairie Levee District	7538
Eugene De Armas et al	2182
Grand Prairie Levee District	7537

Grand Prairie Levee District	3431
Eugene De Armas et al	1202
Grand Prairie Levee District	4692
Louisiana Fruit Co.	7844
Grand Prairie Levee District	2280
Mark Delesdernier	9157
Steve DAsaro	8582
Mark Delesdernier et al	2109
Mark Delesdernier et al	2847
Mark Delesdernier et al	2782
Emma Bego	3244
U.S.A.	4290
Buras Levee Dist.	2540
Louisiana Fruit Co.	7135
Cattle Farms Inc.	3264
U.S.A.	9279
Buras Levee Dist.	196
U.S.A.	2682
U.S.A.	3231
U.S.A.	6888
U.S.A.	4091
U.S.A.	2541
U.S.A.	8289
Mark Delesdernier et al	1926
U.S.A.	842
U.S.A.	591
Buras Levee Dist.	28
Buras Levee Dist.	4682
Kate W. Duff et al	5125
Kate W. Duff et al	2030
K.W. Duff et al Int. Wm. A. Wenck Int.	1882
Barbara Leavy undiv.	8306
Kate W. Duff et al	9180
Paul Delesderneir etal	1739
U.S.A.	2224
U.S.A.	284
U.S.A.	2321
Jas. G. Timolat	9355
U.S.A.	1803
U.S.A.	5738
U.S.A.	4176
Cattle Farms Inc.	9089
Buras Levee Dist.	8532
U.S.A.	8516
U.S.A.	7700
U.S.A.	4767
U.S.A.	8857

Mark Deledernier	562
Buras Levee Dist.	8719
J.F. Keeland	3079
Hilda O. Erwin et al	4535
Cattle Farms Inc. J.S. Abercrombie et al	8437
Cattle Farms Inc.	4332
Cattle Farms Inc.	6446
Ira L. Delesdernier et al	6011
Ira L. Delesdernier et al	7899
U.S.A.	8782
U.S.A.	115
Herbert Behrend et al John Behrend	5959
J.G. Timolat	2747
U.S.A.	3204
U.S.A.	535
U.S.A.	4489
U.S.A.	5364
Mark Delesdernier et al	5653
Jas. G. Timolat Est.	5566
U.S.A.	6822
U.S.A.	8972
U.S.A.	892
Delesdernier Est. Inc.	2225
Geo. Delesdernier et al	4156
Buras Levee Dist.	5657
J.F. Keeland	5547
Buras Levee Dist.	4368
Cattle Farms Inc.	8517
Delesdernier Est. Inc.	1091
U.S.A.	6132
Delesdernier Est. Inc.	3895
U.S.A.	4317
J.G. Timolat Est.	7511
Mark Delesdernier et al	249
John Behrend	7108
U.S.A.	1522
U.S.A.	3529
U.S.A.	3282
U.S.A.	8789
U.S.A.	6664
U.S.A.	9289
U.S.A.	7278
Anna Buckingham	5297
Delesdernier Est. Inc.	8877
Delesdernier Est. Inc.	9359
Delesdernier Est. Inc.	6866
Delesdernier Est. Inc.	3755

J.G. Timolat et al	3773
Cemetery	8553
C.W. Wright	4122
U.S.A.	2299
U.S.A.	5831
Paul Delesdernier et al	1260
Delta Development Co Inc	2977
U.S.A.	5517
Geo. Kain et al Patenter	4581
Delesdernier Est. Inc.	6012
Buras Levee Dist.	114
Buras Levee Dist.	2542
Delesdernier Est. Inc.	6334
J.F. Keeland	2274
K.W. Duff et al	8307
J.E. Duff et al	2333
Cattle Farms Inc.	1378
Cattle Farms Inc.	4579
Delesdernier Est. Inc.	4558
U.S.A.	9238
Delesdernier Est. Inc.	4157
J.G. Timolat et al	8364
U.S.A.	9339
School Land	3086
U.S.A.	3230
Thaddeus Wentworth Wright et al	1239
J.F. Keeland	238
Barbara Leavy Int.	1125
Steve DAsaro	113
Steve DAsaro	5502
U.S.A.	7010
Steve DAsaro	3913
Mark Delesdernier et al	8526
Emerson P. Loga et al	2605
Steve DAsaro	5073
Steve DAsaro	1689
Geo. Delesdernier et al	8946
Buras Levee Dist.	1288
J.F. Keelan	1498
Cattle Farms Inc.	1768
Cattle Farms Inc.	2756
Kate W. Duff et al	5518
Mark Delesdernier	8566
U.S.A.	1092
Lloyd N. Whyte	3968
Eunice L. Le Blanc	8275
Unknown	3096

U.S.A.	3365
U.S.A.	6720
U.S.A.	4778
U.S.A.	9310
U.S.A.	2322
U.S.A.	111
U.S.A.	8365
Geo. Delesdernier et al	8802
J. Isabelle Mc Caughan	8469
Buras Levee Dist.	2572
Cattle Farms Inc.	3260
Buras Levee Dist.	792
Buras Levee Dist.	8955
Robt. White Hrs.	2543
Mark Deledernier etal	1841
Buras Levee Dist.	8527
Mark Deledernier etal	8072
Cattle Farms Inc.	9156
Dr. M.F. Bonzano Hrs.	1696
U.S.A.	3827
J. Isabelle Mc Coughan	6502
State	5596
U.S.A.	5074
U.S.A.	1123
U.S.A.	109
U.S.A.	8067
U.S.A.	6974
State	2369
U.S.A.	2917
Buras Levee Dist.	3205
Cattle Farms Inc.	4015
Jas. Eads Hrs	2978
U.S.A. Geo. Delesdernier et al	1110
J.S. Abercrombie et al	5396
State	988
State	2947
State	1524
U.S.A.	8878
State	7788
State	6975
U.S.A.	6170
U.S.A.	1988
State	5167
Jas. Eads Hrs	9352
U.S.A.	4346
Geo. T. Armstrong & H. Howcott et al	1224
U.S.A.	108

Chas. F. Lafeaux	2219
Geo. T. Armstrong H. Howcott et al	3538
Buras Levee Dist.	3434
Buras Levee Dist.	1242
J.G. Timolet et al	8533
Cattle Farms Inc.	7262
Kate W. Duff et al Int.	7702
U.S.A.	129
Cattle Farms Inc.	6736
Also Claimed by Ed Duff USA	4143
Kate W. Duff et al	7851
U.S.A.	6151
Lenmark Lands Inc.	2744
State	7774
U.S.A.	4467
U.S.A.	6794
U.S.A.	8995
U.S.A.	6000
U.S.A.	563
U.S.A.	7428
U.S.A.	5212
U.S.A.	9127
U.S.A.	6227
U.S.A.	3240
U.S.A.	3489
Geo. T. Armstrong Gladys Monroe et al	2039
Cattle Farms Inc.	3033
Buras Levee Dist.	2077
Buras Levee Dist.	1370
Cattle Farms Inc.	7442
U.S.A.	6133
Buras Levee Dist.	5168
U.S.A.	3661
State	1751
State	1677
State	8276
State	4213
State	285
State	6858
State	6903
Charles F. Lateour	7848
J.G. Timolet Jr. et al	8326
U.S.A.	8433
U.S.A.	610
U.S.A.	6167
U.S.A.	7775
Geo. Delesdernier et al	9194

Geo. T. Armstrong Gladys Monroe et al	5397
Buras Levee Dist.	5790
J.G. Timolat Jr. et al	4474
Buras Levee Dist.	1206
Buras Levee Dist.	4828
Kate W. Duff et al	5272
J.G. Timolat Jr. et al	1570
Mrs. C. Rutledge	1866
Geo. T. Armstrong	4848
U.S.A.	5355
U.S.A.	7622
A. Dunbar	3715
U.S.A.	8135
Geo. T. Armstrong	3896
Geo. Delesdernier et al	7388
Balsin Materne et al	7592
U.S.A.	6153
Balsin Materne et al Patentee	1262
U.S.A.	900
U.S.A.	9269
Cattle Farms Inc.	5499
U.S.A.	8410
U.S.A.	6471
State	9353
State	7992
State	5238
State	7579
State	6168
State	6606
U.S.A.	9148
State	3106
Dr. H. L. Ballowe	4725
U.S.A.	5838
U.S.A.	5654
Wallace T. Armstrong	1788
U.S.A.	4315
Cattle Farms Inc. J.S. Abercrombie et al	6329
Buras Levee Dist.	7925
J.G. Timolat Jr. et al	7497
U.S.A.	1079
Buras Levee Dist.	3154
Buras Levee Dist.	6271
Buras Levee Dist.	1080
U.S.A.	4347
U.S.A.	5655
School Land	8649
Unknown	127

U.S.A.	2311
U.S.A.	3675
Howard Collette Est.	7343
Unknown	4830
State	4047
State	2959
State	2918
State	7344
State	1075
State	3107
U.S.A.	7571
Steve D. Asaro	8987
U.S.A.	4352
Cattle Farms Inc.	713
H.J. Harvey Cattle Farms Inc	1263
Kate W. Duff et al Int.	5191
Buras Levee Dist.	2226
Buras Levee Dist.	1459
J.G. Timolat Jr. et al	130
J.G. Timolat Jr. et al	7524
Geo T. Armstrong etal	2243
U.S.A.	4726
Josiah Marshall N. Paten	6633
U.S.A.	4734
U.S.A.	8534
Unknown	3747
U.S.A.	7345
Lorotta OBrien	8773
State	5552
U.S.A.	128
U.S.A.	4678
Cattle Farms Inc.	3866
Buras Levee Dist.	3131
U.S.A.	5342
Lorotta OBrien	1989
State	7865
State	3155
State	2150
State	7131
State	8907
U.S.A.	550
H. Howland E.A. & A.P. Cheron Int.	4523
U.S.A.	8650
U.S.A.	1990
U.S.A.	8923
Buras Levee Dist.	602
H.J. Harvey Cattle Farms Inc	4657

H.J. Harvey Cattle Farms Inc	7660
Cattle Farms Inc.	2960
Buras Levee Dist.	4116
Loretta OBrien	5163
U.S.A.	1470
Arthur H. Simonin	3407
Emile Collette	6046
U.S.A.	743
U.S.A.	6896
Kate W. Duff etal	8272
State	4827
State	1379
U.S.A.	8519
State	6423
State	2366
U.S.A.	5427
U.S.A.	8359
U.S.A.	7850
U.S.A.	684
Buras Levee Dist.	1942
Calif Harvey	1240
Kate W. Duff et al Int. W.A. Wenck	2151
U.S.A.	5923
H.J. Harvey Cattle Farms Inc	5759
Buras Levee Dist.	6134
U.S.A.	5553
U.S.A.	1298
U.S.A.	3614
U.S.A.	1977
U.S.A.	6855
U.S.A.	830
U.S.A.	2040
Henry Lawrence	3642
U.S.A.	603
Buras Levee Dist.	7054
H.J. Harvey Cattle Farms Inc	8416
U.S.A.	564
U.S.A.	5578
Unknown	5428
Unknown	7721
U.S.A.	1675
U.S.A.	9280
U.S.A.	5527
U.S.A.	4411
U.S.A.	2718
Unknown	6296
Wm. Alsey High Patentee	8205

Plaquemines Oil & Dev Co	6936
Hazel Jones et al	7645
U.S.A.	7816
U.S.A.	2462
U.S.A.	5079
Plaquemines Oil & Dev Co	774
U.S.A.	7948
U.S.A.	7825
U.S.A.	1471
U.S.A.	5993
U.S.A.	9073
U.S.A.	1309
U.S.A.	8206
A. Galbrance et al	5162
U.S.A.	6228
U.S.A.	5701
U.S.A.	2954
U.S.A.	4663
U.S.A.	5568
U.S.A.	1992
U.S.A.	6268
U.S.A.	5080
U.S.A.	7055
U.S.A.	4399
Plaquemines Oil & Dev Co	3677
Plaquemines Oil & Dev Co	2862
Plaquemines Oil & Dev Co	2134
U.S.A.	6122
U.S.A.	8790
U.S.A.	2019
U.S.A.	4963
U.S.A.	1054
U.S.A.	276
Jeremiah Weatherly et al Patentee	6135
U.S.A.	5028
Plaquemines Oil & Dev Co	2619
U.S.A.	8073
Joseph P. Sendkar et al	7507
U.S.A.	7106
U.S.A.	5557
U.S.A.	3236
U.S.A.	1903
U.S.A.	7444
U.S.A.	8082
U.S.A.	8151
U.S.A.	4243
U.S.A.	3872

U.S.A.	7719
U.S.A.	5441
Plaquemines Oil & Dev Co	7065
Plaquemines Oil & Dev Co	6721
U.S.A.	3408
U.S.A.	1246
U.S.A.	691
Caroline Brenan Patentee	619
U.S.A.	4496
U.S.A.	2616
U.S.A.	7132
U.S.A.	7323
U.S.A.	2020
U.S.A.	6933
U.S.A.	3167
U.S.A.	522
Mary Louise Brenan Patentee	765
U.S.A.	6648
U.S.A.	8635
U.S.A.	7933
U.S.A.	7146
Jos. P. Sendker et al	7231
U.S.A.	4400
U.S.A.	551
U.S.A.	687
U.S.A.	1254
Gladys Swietzer et al	8716
U.S.A.	935
U.S.A.	1855
U.S.A.	8212
U.S.A.	3094
U.S.A.	3901
U.S.A.	4926
W.B. Sboyd et al	9345
U.S.A.	8327
Steve D Asaro	4735
U.S.A.	7725
U.S.A.	9149
U.S.A.	6314
U.S.A.	4981
U.S.A.	1850
Gladys Swietzer et al	3080
Steve D Asaro	1740
U.S.A.	5618
U.S.A.	5751
Chas. Krenlon et al	4964
Steve D Asaro	7311

U.S.A.	6867
U.S.A.	5525
U.S.A.	3749
Jos. P. Sendker Jos. Lombard Pat.	3303
U.S.A.	4849
Unknown	2389
Delta Development Co	5213
Delta Development Co	1509
Delta Development Co	8345
U.S.A.	1310
Unknown	274
Unknown	8310
Unknown	8463
Delta Development Co	5481
Delta Development Co	3190
Delta Development Co	2899
Delta Development Co	5503
Delta Development Co	7312
Delta Development Co	7411
U.S.A.	7646
Delta Development Co	1523
Delta Development Co	2190
Delta Development Co	3222
Delta Development Co	908
Delta Development Co	1927
U.S.A.	5526
U.S.A.	2843
Delta Development Co	6531
U.S.A.	2955
Delta Development Co	4591
U.S.A.	6957
Delta Development Co	3698
U.S.A.	8503
Delta Development Co	5504
Delta Development Co	6646
U.S.A.	7599
U.S.A.	1251
Government Entity	692
Grand Prairie Levee District	9308
U.S.A.	1083
U.S.A.	865
U.S.A.	3440
Eugene De Armas et al	1331
Alma Hingle et al	4859
Grand Prairie Levee District	5083
U.S.A.	590
Grand Prairie Levee District	6454

U.S.A.	4861
Eugene De Armas et al	4336
Alma Hingle et al	6111
A.S. Abercrombie	3510
George W. Delesdernier et al	1905
James G. Timolet	2295
James G. Timolet	645
U.S.A.	7018
U.S.A.	3442
Mark Deleedenrner	8777
James G. Timolet	1294
James G. Timolet	1619
U.S.A.	5299
La. Fruit Co.	3684
Eugene De Armas et al	8799
Grand Prairie Levee District	2995
Jas. Timolat Jr. et al	4114
Eugene De Armas et al	3188
Eugene DeArmas et al	4766
Mark Delesdernier et al	5607
James G. Timolet	8800
Willis C. Mc Donald et al	6621
Grand Prairie Levee District	1302
Eugene DeArmas et al	7424
Grand Prairie Levee District	1720
Grand Prairie Levee District	2284
J. Geiser et al	4793
Grand Prairie Levee District	7926
New Orleans Female Dominican Academy	6312
Dan Moriarty Est.	5572
Grand Prairie Levee District	7637
U.S.A.	4826
Steve DAsara	1119
Grand Prairie Levee District	6387
Eugene De Armas et al	2521
School	711
Grand Prairie Levee District	5580
Mark Delesdernier	2740
Louisiana Fruit Co.	9222
Louisiana Fruit Co.	3540
Alma A. Hingle et al	4658
Mark Delesdernier et al	6131
James G. Timolat	5052
U.S.A.	7128
U.S.A.	6445
Grand Prairie Levee District	328
U.S.A.	8953

Frank Wagner	163
Ruth Dauterive	8731
Grand Prairie Levee District	5991
Alma A. Hingle et al	806
James G. Timolet	6928
Grand Prairie Levee District	8046
Grand Prairie Levee District	871
U.S.A.	463
Graham C. Pembroke et al	6929
Steve DAsaro	2363
New Orleans Female Dominican Academy	2781
Graham C. Pembroke et al	5244
Narcisse Guedry Pat.	5545
Graham C. Pembroke et al	1750
Grand Prairie Levee District	1894
Mark Delesdernier et al	3512
Grand Prairie Levee District	8592
Mark Delesdernier et al	8692
State	3161
Mark Delesdernier et al	2108
Mathias Strickert	835
Buras Levee Dist.	5194
Louisiana Fruit Co.	1472
Louisiana Fruit Co.	996
Eugene De Armar	3070
Abnigo Adams et al Patentee	5581
U.S.A.	2552
Grand Prairie Levee District	4178
Grand Prairie Levee District	6325
Grand Prairie Levee District	6785
Grand Prairie Levee District	6358
La Plag Rlty Co.	5091
U.S.A.	118
U.S.A.	4161
J.G. Timolat Est.	4580
Rhoda M. Meier Miner John Behrend	8858
U.S.A.	5848
U.S.A.	6321
J.F. keeland	3519
K.W. Duff et al	4345
Lenmark Lands Inc.	6927
U.S.A.	8343
J.G. Timolet Jr. et al	6668
U.S.A.	7824
Cattle Farms Inc.	3241
State	2318
Nelson W. Hill Pat.	2624

Buras Levee Dist.	9274
U.S.A.	2958
State	6698
Geo. Armstrong	3748
Buras Levee Dist.	8141
U.S.A.	3445
Edith Kranebell	1939
U.S.A.	8444
U.S.A.	5902
U.S.A.	4495
U.S.A.	6572
U.S.A.	5452
U.S.A.	316
U.S.A.	8502
U.S.A.	646
U.S.A.	7346
U.S.A.	8922
U.S.A.	168
Grand Prairie Levee District	1141
Grand Prairie Levee District	9223
Jean B. Planche Jr. Patentee	7438
U.S.A.	2058



Figure 1.



Figure 2.

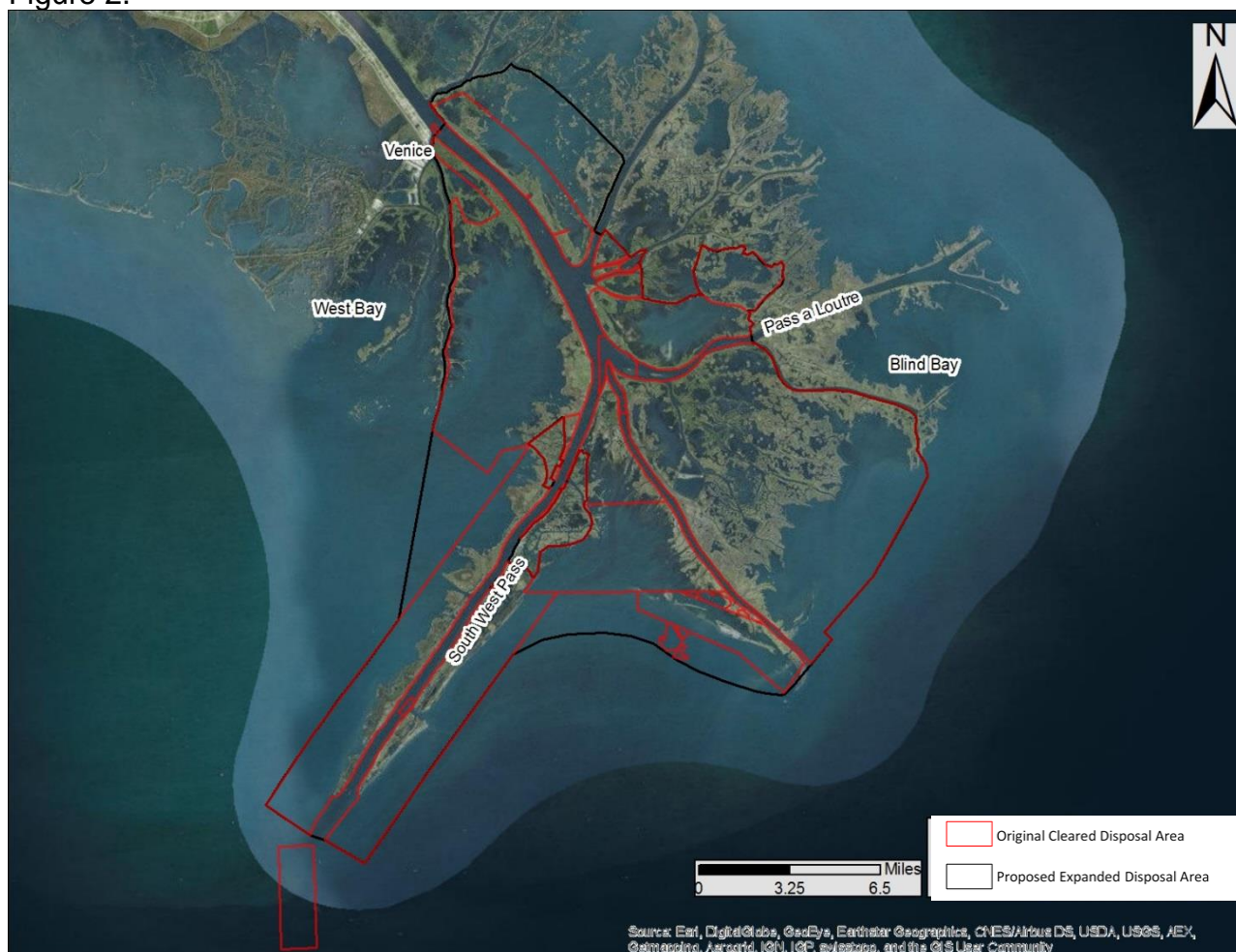


Figure 3. Disposal area long term plan

Appendix A-12. Best Management Practices

Best Management Practices and Avoidance Procedures

**MIGRATORY BIRD TREATY ACT and
BALD AND GOLDEN EAGLE PROTECTION ACT
BEST MANAGEMENT PRACTICES**

Colonial nesting wading birds (including but not limited to, herons, egrets, and Ibis), seabirds/water-birds (including, but not limited to terns, gulls, Black Skimmers, and Brown Pelicans) and bald eagles are known to roost, forage, and nest in the project area. The birds and their nests are protected by the Migratory Bird Treaty Act (MBTA) and must not be disturbed or destroyed. As such, in areas near known rookeries, nesting prevention measures may be necessary in order to insure the success of the nesting season. These measures would be developed by the U.S. Army Corps of Engineers New Orleans District (CEMVN) in coordination with the U.S. Fish and Wildlife Service (USFWS) and Louisiana Department of Wildlife and Fisheries (LDWF) and would be implemented by a trained biologist. The nesting activity period extends from 15 February through 1 September for colonial nesting wading and seabirds/water birds, and September to May for bald eagles. Therefore, the nesting prevention measures should begin well before February.

CEMVN and USFWS biologists will conduct surveys prior to construction to determine the presence and/or location of any eagle's nests, colonial nesting wading/water birds and/or rookeries and if nesting prevention measures would be necessary. Nest prevention measures shall be intended to deter birds from nesting within applicable the designated buffer zone of construction areas without physically harming birds or disturbing any existing nests. Nest prevention measures may be used in combination and/or adjusted to be most effective. At minimum, nest prevention measures shall include, but not be limited to the following:

- Flagging/Streamers
- Vehicular/Pedestrian Traffic
- Clapping and Yelling
- Horn Blowing

Once work has commenced, the presence of nesting eagles, wading birds and/or seabirds/water-birds within the minimum distances from the work area, as specified in paragraph entitled "No Work Distances", shall be immediately reported to the Environmental Technical Manager, Ms. Tammy Gilmore, of the U.S. Army Corps of Engineers at (504) 862-1002 email address tammy.h.gilmore@usace.army.mil

No Work Distances

No-work distance restrictions are as follows:

- o Terns, Gulls, and Black Skimmers -1,300 feet;
- o Colonial nesting wading birds -1,000 feet;
- o Brown Pelicans -2,000 feet; and,
- o Bald Eagles -660 feet.

Coordination by CEMVN personnel with the USFWS may result in a reduction or relaxing of these no-work distances depending on the species of birds found nesting at the work site and specific site conditions.

MANATEE PROTECTION MEASURES COORDINATED WITH USFWS:

All contract personnel associated with the project would be informed of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel would be responsible for observing water-related activities for the presence of manatees. Temporary signs would be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., the work area), and at least one sign would be placed where it is visible to the vessel operator. Siltation barriers, if used, would be made of material in which manatees could not become entangled and would be properly secured and monitored. If a manatee

is sighted within 100 yards of the active work zone, special operating conditions would be implemented, including: moving equipment would not operate within 50 ft of a manatee; all vessels would operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, would be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area of its own accord, special operating conditions would no longer be necessary, but careful observations would be resumed. Any manatee sighting would be immediately reported to the USFWS (337/291-3100) and the LDWF, Natural Heritage Program (225/765-2821).

SEA TURTLE PROTECTION MEASURES

1. Hopper dredging is being conducted under the “Gulf of Mexico Regional Biological Opinion” (RBO) which can be viewed at the following link: <http://el.erdc.usace.army.mil/seaturtles/refs-bo.cfm>.

It should be noted that incidental takes of sea turtle and gulf sturgeon are authorized on a Fiscal Year (FY) (October 1 – September 30) basis to be metered out by the Division Commander, South Atlantic Division, U.S. Army Corps of Engineers for the southeastern United States for Federal, military, and permitted projects. If care is not taken, the take limits could be reached by any of these parties and hopper dredging would cease for the remainder of that FY. The Permittee understands and agrees that, even where it is in full compliance with the terms and conditions of the RBO, incidental take by the Permittee may require suspension of the permit by the Corps of Engineers. The amount of incidental take that will trigger suspension, and the need for any such suspensions, shall be determined at the time in the sole discretion of the Corps of Engineers. The Permittee understands and agrees on behalf of itself, its agents, contractors, and other representatives, that no claim, legal action in equity or for damages, adjustment, or other entitlement against the Corps of Engineers shall arise as a result of such suspension or related action.

2. Prior to the commencement of hopper dredging, and throughout the dredging operations, a Corps of Engineers-approved Inspector shall inspect specific sea turtle protection requirements. The list of inspections the Inspector will perform is identified on a sea turtle inspection checklist entitled “USACE Sea Turtle Inspection Checklist for Hopper Dredges” that can be found at the following link: <http://el.erdc.usace.army.mil/seaturtles/index.cfm>. All identified deficiencies shall be corrected prior to the commencement of hopper dredging activities. An inspection shall also be performed following each sea turtle incidental take. Results of inspections shall be provided to Mr. Edward Creef (Edward.D.Creef@usace.army.mil) as soon as they are completed.

3. No dredging shall be performed by a hopper dredge without the inclusion of a rigid sea turtle deflector device. The Permittee shall electronically submit drawings showing the proposed device and its attachment to Mr. Edward Creef at Edward.D.Creef@usace.army.mil. Mr. Creef can be contacted by phone at (504) 862-2521. These drawings shall include the approach angle for any and all depths to be dredged during the dredging. A copy of the approved drawings and calculations shall be available on the vessel during the dredging. No dredging work shall be allowed to commence until approval of the turtle deflector device has been granted by the New Orleans District U.S. Army Corps of Engineers. Sample turtle deflector design details may be viewed at the web site indicated in condition number 1.

The leading v-shaped portion of the deflector shall have an included angle of less than 90 degrees. Internal reinforcement shall be installed in the deflector to prevent structural failure of the device. The leading edge of the deflector shall be designed to have a plowing effect of at least 6” depth when the draghead is being operated. Appropriate instrumentation or indicator shall be used and kept in proper calibration to ensure the critical “approach angle” (Information only note: The design “approach angle” or the angle of lower draghead pipe relative to the average sediment plane is very important to the proper operation of the deflector. If the lower draghead pipe angle in actual dredging conditions varies tremendously from the design angle of approach used in the development of the deflector, the 6” plowing effect does not occur. Therefore, every effort should be made to insure this design “approach angle” is maintained with the lower drag pipe.).

If adjustable depth deflectors are installed, they shall be rigidly attached to the draghead using either a hinged aft attachment point or an aft trunnion attachment point in association with an adjustable pin front attachment point or cable front attachment point with a stop set to obtain the 6" plowing effect. This arrangement allows fine-tuning the 6" plowing effect for varying depths. After the deflector is properly adjusted there shall be NO openings between the deflector and draghead that are more than 4" X 4".

4. The Permittee shall install baskets or screening over the hopper inflow(s) with no greater than 4" X 4" openings. The method selected shall depend on the construction of the dredge used and shall be approved by the Corps of Engineers-approved Inspector prior to commencement of dredging. The screening shall provide 100% screening of the hopper inflow(s). The screens and/or baskets shall remain in place throughout the performance of the work. The turtle deflector device and inflow screens shall be maintained in operational condition for the entire dredging operation.

5. When initiating dredging, suction through the dragheads shall be allowed just long enough to prime the pumps, and then the dragheads must be placed firmly on the bottom. When lifting the dragheads from the bottom, suction through the dragheads shall be allowed just long enough to clear the lines, and then must cease. Pumping water through the dragheads shall cease while maneuvering or during travel to / from the disposal area (Information Only Note: optimal suction pipe densities and velocities occur when the deflector is operated properly. If the required dredging section includes compacted fine sands or stiff clays, a properly configured arrangement of teeth may enhance dredge efficiency, which reduces total dredging hours, and potential for "turtle takes". The operation of a draghead with teeth must be monitored for each dredged section to insure that excessive material is not forced into the suction line. When excess high-density material enters the suction line, suction velocities drop to extremely low levels causing conditions for plugging of the suction pipe. Dredge operators should configure and operate their equipment to eliminate all low-level suction velocities. Pipe plugging in the past was easily corrected, when low suction velocities occurred, by raising the draghead off the bottom until the suction velocities increased to an appropriate level. Pipe plugging cannot be corrected by raising the draghead off the bottom. Arrangements of teeth and / or the reconfiguration of teeth should be made during the dredging process to optimize suction velocities.

6. Raising the draghead off the bottom to increase suction velocities is not acceptable. The primary adjustment for providing additional mixing water to the suction line should be through water ports. To insure suction velocities do not drop below appropriate levels, production meters shall be monitored throughout the job and adjustments primarily made to the number and opening sizes of water ports. Water port openings on top of the draghead or on raised standpipes above the draghead shall be screened before they are utilized on the dredging project. If a dredge section includes sandy shoals on one end of a tract line and mud sediments on the other end of the tract line, the equipment shall be adjusted to eliminate draghead pick-ups to clear the suction line.

7. During turning operations, the pumps must either be shut off or reduced in speed to the point where no suction velocity or vacuum exists. These operational procedures are intended to stress the importance of balancing the suction pipe densities and velocities in order to keep from taking sea turtles.

8. All hopper dredges shall be equipped with the National Dredging Quality Management Program (DQM) system, formerly known as Silent Inspector, for hopper dredge monitoring. The DQM system must have been certified by the Engineer Research and Development Center (ERDC) within the last year. Questions regarding certification should be addressed to the DQM support team at 877-840-8024. The DQM is an automated dredge monitoring system comprised of both hardware and software developed by the U.S. Army Corps of Engineers (Corps). The Corps developed the DQM as a low cost, repeatable, impartial system for automated dredge monitoring. The DQM consists of three major components: The Dredge Specific System (DSS), the Ship Server, and the Shore Server. The DSS collects and displays various dredge sensor data for the dredge crew to monitor dredge progress and quality control. The other major task of the DSS is to send data to the Ship Server. Most dredging contractors already have a computer system and sensors onboard for control or positioning that can be used as the DSS. The dredging contractor supplies and owns the DSS and all associated

sensors. The Ship Server acts as the dredged-based data archive and report creation center by storing the data from the DSS and performing automated review of the data. The Ship Server can produce many different reports including dredge location history, volume history, and an operational status. Additional information about DQM can be found at: <http://dqm.usace.army.mil/>. The data collected by the DQM system shall, upon request, be made available to the Operations Division Technical Support Branch of the New Orleans District U.S. Army Corps of Engineers.

All hopper dredge(s) shall be equipped with recording devices for each draghead that capture real time draghead elevation, slurry density, and at least two of the following: Pump(s) slurry velocity measured at the output side, pump(s) vacuum, and / or pump(s) RPM. The Permittee shall record continuous real time positioning of the dredge, by plot or electronic means, during the entire dredging cycle including dredging area and disposal area. Dredge location accuracy shall meet the requirements of the latest version of EM 1110-1-1003. A copy of the EM can be downloaded from the following website: <http://www.hnd.usace.army.mil/techinfo/engpubs.htm>. The recording system shall be capable of capturing data at variable intervals but with a frequency of not less than every 60 seconds. All data shall be time correlated to a 24-hour clock and the recording system shall include a method of daily evaluation of the data collected. This data shall be made available at the request of the New Orleans District U.S. Army Corps of Engineers.

The practice of dropping an empty dredge bucket can be taken as a precaution during construction to avoid impacts to sea turtles. A bucket (or similar equipment) will be dropped into the water and retrieved empty one time. After the bucket has been dropped and retrieved, a one-minute no work period must be observed. During this no work period, personnel would carefully observe the work area in an effort to visually detect listed species. If listed species are sighted, no bucket dredging would be initiated until the listed species have left the work area. If the water turbidity makes such visual sighting impossible, work would proceed after the one-minute no work period has elapsed. If more than fifteen minutes elapses with no work, then the empty bucket drop/retrieval process would be performed again prior to work commencing.

9. Dredging operations shall cease immediately upon the first incidental take, and thereafter as directed by the Corps, until the District Engineer, or his designee, notifies the Permittee to resume dredging. The Permittee shall immediately notify Mr. Edward Creef by phone (504-862-2521) and e-mail (Edward.D.Creef@usace.army.mil) that an incidental take has occurred. The Sea Turtle Mortality Report, available on the web site indicated in condition number 1, will be filled out by the National Marine Fisheries (NMFS)-Approved Protected Species Observer immediately (within 6 hours) and sent to Edward Creef electronically at the e-mail address listed above.

10. During dredging operations, NMFS-Approved Protected Species Observers shall be aboard to monitor for the presence of sea turtles, sturgeon, and whales. Observer coverage shall be 100% (24 hr/day) and shall be conducted year round. During transit to and from the disposal area, the Observer shall monitor from the bridge during daylight hours for the presence of endangered species. During dredging operations, while dragheads are submerged, the Observer shall continuously monitor the inflow and / or outflow screening for turtles and / or turtle parts. Upon completion of each load cycle, dragheads should be monitored as the draghead is lifted from the sea surface and is placed on the saddle in order to assure that sea turtles that may be impinged within the draghead are not lost and unaccounted for. Observers shall physically inspect dragheads and inflow and overflow screening / boxes for threatened and endangered species takes.

11. **Monitoring Reports:** The results of the monitoring shall be recorded on the appropriate observation sheets. There is a sheet for each load, a daily summary sheet, and a weekly summary sheet. In addition, there will be a post dredging summary sheet. Observation sheets will be completed regardless of whether any takes of sturgeon, whales, or sea turtles occur. In the event of any sea turtle or sturgeon takes by the dredge, appropriate incident reporting forms shall be completed. Additionally, all specimens shall be photographed with a digital camera. These photographs shall be attached to the respective reports for documentation. Dredging of subsequent loads shall not commence until all appropriate reports are completed from the previous dredging load to ensure completeness and thoroughness of documentation associated with the incidental take. Reports

shall be submitted to the Corps within 24-hours of the take. Copies of the form shall be legible. Observer forms may be accessed on the web site indicated in condition number 1.

a. NMFS-Approved Protected Species Observers: A list of protected species observer-biologists that have been NMFS-approved to monitor threatened / endangered species takes by hopper dredges can be obtained by contacting NOAA Fisheries Northeast Region, Protected Resources Division. The main contact is Ms, Julie Crocker; she can be reached at Julie.Crocker@noaa.gov or 978-281-9300 ext. 6530. A current list of NMFS-Approved Protected Species Observer companies is provided at the end of this document.

b. The Contractor shall provide a digital camera, with an image resolution capability of at least 300 dpi, in order to photographically report incidental takes, without regard to species, during dredging operations. Immediately following the incidental take of any threatened or endangered species, images shall be provided via e-mail, CD, or DVD to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil in a .JPG or .TIF format and shall accompany incidental take forms. The nature of findings shall be fully described in the incidental take forms including references to photographs.

12. Manatee, Sea Turtle, and Whale Sighting Reports.

Any take concerning a manatee, sea turtle, sturgeon, or whale; or sightings of any injured or incapacitated manatees, sea turtles, or whales shall be reported immediately to the Corps Regulatory Section Chief, Martin Mayer electronically at martin.s.mayer@usace.army.mil, and to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil.

13. Disposition of Sea Turtles or Turtle Parts

a. Turtle taken by hopper dredge

- (1) Dead turtles – upon removal of sea turtle and / or parts from the draghead or screening, Observers shall take photographs as to sufficiently document major characteristics of the turtle or turtle parts including but not limited to dorsal, ventral, anterior, and posterior views. For all photographs taken, a backdrop shall be prepared to document the dredge name, observer company name, contract title, time, date, species, load number, location of dredging, and specific location taken (draghead, screening, etc.). Carcass / turtle parts shall also be scanned for flipper and Passive Integrated Transponder (PIT) tags. Any identified tags shall be recorded on the “Sea Turtle Incidental Take Form” that is included in the “Endangered Species Observer Program Forms” located on the web site indicated in condition number 1. Turtle parts which cannot be positively identified to species on board the dredge or barge(s) shall be preserved by the observer(s) for later identification. A tissue sample shall be collected from any lethally taken sea turtle and submitted under the process stated in the “Protocol for Collecting Tissue Samples from Turtles for Genetic Analysis” on the web site indicated in condition number 1. After all data collection is complete, the sea turtle / parts should be marked (spray paint works well), weighted down and disposed of in direction of the contracting officer.
- (2) Live Turtles - Observer(s) shall measure, weigh, scan for PIT tags, tag (Inconel flipper and PIT tags - if PIT tag is not located during scan and only if observer is qualified to tag using PIT tags), and photograph any live turtle(s) incidentally taken by the dredge. Observer(s), or their authorized representative, shall coordinate with the contracting officer’s representative and environmental branch staff to transport as soon as possible the live turtle(s) taken by the dredge to an approved rehabilitation facility such as the Aquarium of the Americas in New Orleans, Louisiana.

14. Relocation Trawling of Sea Turtles

Sea turtle relocation trawling efforts to aid in the prevention of sea turtle takes during dredging operations would be performed by the Permittee as deemed necessary. An initial sea turtle relocation trawling effort would be performed 2 to 3 days prior to the start of hopper dredging activities to determine if sea turtles are present at the dredging site. Based on the results of this trawling effort, the Permittee may be required to implement sea turtle relocation trawling either at the start of hopper dredging activities, or following the first sea turtle take by the hopper dredge. Captured sea turtles either would be relocated approximately 5 miles away from the dredging site, or, if injured, transported to the Aquarium of the Americas located in New Orleans, Louisiana. A NMFS-Approved Protected Species Observer shall supervise the relocation trawling efforts. If relocation trawling in Louisiana territorial waters occurs outside of the shrimping season, the approved sea turtle relocation trawling supervisor must possess a Scientific Collecting Permit from the Louisiana Department of Wildlife and Fisheries (point of contact is Ms. Karen Foote at 225-765-2384).

Trawling operations shall be performed in front of the working hopper dredge, with trawlers operating a safe distance from the hopper dredge. Trawling efforts shall be performed with and against the tidal flow at a speed not to exceed 3.5 knots using repetitive trawls in the dredging area with each trawling effort not to exceed 42 minutes duration.

Methods and equipment shall be standardized including data sheets, nets, trawling direction to tide, length of station, length of tow, and number of tows per station. Data on each tow shall be recorded using the Sea Turtle Trawling Report found at the website (<http://el.erdc.usace.army.mil/seaturtles/docs/trawlingforms.pdf>). The trawler shall be equipped with 60-foot nets constructed from 8-inch mesh (stretch) fitted with mud rollers and flats as specified in the Turtle Trawl Nets Specifications appended to the end of this Section. Paired net tows shall be made for 24 hours per day. The tows shall be performed in shifts, and the trawler shall be available for operation 24 hours a day. Positions at the beginning and end of each tow shall be determined from GPS Positioning equipment.

At least one crewmember who is a NMFS-Approved Protected Species Observer shall be on board the trawler during the trawl. The Observer shall be responsible for handling of captured sea turtles. Each captured turtle shall be identified, scanned for PIT tags, measured, tagged, tissue sampled and released, and data recorded on the Sea Turtle Tagging and Relocation Report, which can be found at the following website: (<http://el.erdc.usace.army.mil/seaturtles/docs/taggingforms.pdf>). Presence of PIT tags shall be scanned for by using a multi-frequency scanner capable of reading multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and reading tags deeply embedded in muscle tissue. Turtle measurements shall be recorded and shall include, at a minimum, weight, straight-line length, straight-line width, and tail length. Turtles shall be tagged with NMFS #681 Inconel tags in each of the front flippers according to NMFS protocol. Aseptic conditions shall be maintained for tags and tag attachment. The Contractor shall be responsible for obtaining any and all permits related to trawling from the appropriate state and Federal agencies. All aspects of the trawling shall be coordinated with Mr. Edward Creef (504-862-2521).

Anyone handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle with mild bleach solution between the processing of each turtle, or 2) maintain a separate set of sampling equipment for handling turtles displaying fibropapilloma tumors or lesions.

Water temperature measurements shall be taken at the water surface each day using a laboratory thermometer. Weather conditions shall be recorded from visual observations and instruments on the trawler. Weather conditions, air temperature, wind velocity and direction, sea state-wave height, and precipitation shall be recorded on the Sea Turtle Trawling Report. High and low tides shall be recorded.

a. Repair and Replacement of Damaged Trawl Nets

The Contractor, at the time of mobilization, shall provide trawl nets that meet the requirements specified in the Turtle Trawl Net Specifications at the end of this section. Tools, supplies and materials for repairing nets shall be kept aboard the trawler. In the event of damage to trawl nets, one hour will be allowed to either repair or replace them. The Contractor shall have at least one set of

replacement nets immediately available at all times, to insure that the dredging work is not adversely delayed due to trawler down-time for replacing damaged nets. It is recommended that a second set of replacement nets be available aboard the trawler.

b. Suspension of Dredging and Relocation Trawling

Should there be a tearing of nets, or breakdown of other equipment that would cause the trawler to leave the area where dredging is underway during any period of time where relocation trawling is required, the dredge may continue to operate for up to 48 hours, as long as no turtles are taken. Should there be dangerously high seas that would cause the trawler to leave the dredging area when relocation trawling is required the dredge may continue to operate, as long as no turtles are taken.

c. Turtle Excluder Devices

Approval for trawling for sea turtles without Turtle Excluder Devices (TEDs) must be obtained from NMFS (contact Eric Hawk at 727-551-5773). Any necessary State or Federal clearances for the capture and relocation of sea turtles must also be obtained. Approvals must be submitted to Mr. Edward Creef electronically at Edward.D.Creef@usace.army.mil prior to trawling.

d. Reporting

Immediately after completing each day of relocation trawling, if possible, the Contractor shall notify Mr. Edward Creef by telephone (504-862-2521) or email (Edward.D.Creef@usace.army.mil) conveying the results of the trawl. The results of each trawl shall be recorded on the Sea Turtle Trawling Report. The Sea Turtle Trawling Report also shall be furnished by the Contractor to Mr. Edward Creef within 24 hours after completing the relocation trawl. Following completion of the project, a copy of the Contractor's log regarding sea turtles shall be forwarded to Mr. Edward Creef within 10 working days.

15. Report Submission.

The Contractor shall maintain a log detailing all incidents, including sightings, collisions with, injuries, or killing of manatees, sea turtles, sturgeon, or whales occurring during the contract period. The data shall be recorded on forms provided at the web site indicated in condition number 1. All data in the original form shall be forwarded directly within 10 days of collection to Mr. Edward Creef at the address provided below. Following project completion, a report summarizing the above incidents and sightings shall be submitted to:

USACE - New Orleans District
Operations Division - Technical Support Branch
Attn Edward Creef
P.O. Box 60267
New Orleans, Louisiana, 70160-0267

Partial List of NMFS-Approved Protected Species Observer Companies

Dr. L. M. Ehrhart Dept. of Biological Science University of Central Florida P.O. Box 25000 Orlando, FL 32816 407-823-2970 Fax: 407-283-5769 lehrhart@pegasus.cc.ucf.edu	A.I.S. Inc. (P.O.C. Arv Poshkus) 19 Camden Street P.O. Box 421 Stoughton, MA 02072-0421 800-230-8032 Fax: 781-297-7669 ARVIDAS1@juno.com	Mary Jo Barkaszi ECOES, Inc. 7341 Glenwood Road Cocoa, FL 32927 321-635-8477 Fax: 321-635-8449 maryjo@eco.es.com www.ecoes.com
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<p>Jane Provancha Dynamac Corporation DYN-2 Kennedy Space Ctr., FL 32899 321-759-0935 Fax: 321-730-3455 jprovancha@dynamac.com</p>	<p>R. Eric Martin Ecological Associates, Inc. P.O. Box 405 Jensen Beach, FL 34958 772-334-3729 Fax: 772-334-4925 erikmartin@bellsouth.net</p>	<p>Roxanne Carter REMSA, Inc. * 124 W Queens Way Hampton, VA 23669 757-722-0113 ext. 25 Fax: 757-722-0638 roxy@remsameso.com</p>
<p>Christopher Slay, President * Coastwise Consulting (Environmental Consultants - Land, Sea, Air) 173 Virginia Avenue Athens, GA 30601 706-543-6859 904-261-8518 Fax/Tel cslay@att.net</p>	<p>Richard Alboth Tiny's Marine Environmental Services 7 Rogers Street Randolph, MA 02368 781-963-6308 Cellular: 321-863-6561 tinysvc@aol.com</p>	<p>Andrea Balla-Holden, Marine & Marine Life Consulting 5988 SE Kelsey Court Port Orchard, WA 98367 360-769-5934: Office 360-769-4195: Fax MarineMarineLife@aol.com</p>
<p>Trish Bargo, * East Coast Observers, Inc. P.O. Box 6192 Norfolk, VA 23508 757-227-5779 757-965-6766 Fax 757-880-7636 Cell tbargo@eastcoastobservers.com</p>		<p>Robert K. Metzger * Relocation Trawling Biologist 1327 N. Wheaton Dr. St. Charles, MO 63301-0881 636-946-6464 Tel/Fax 314-265-4806: Cell metzgerr@swbell.net</p>

* Contractors that also provide sea turtle trawling and relocation services.

Turtle Trawl Net Specifications

DESIGN:	4 Seam, 4 Legged, 2 Bridal Trawl Net
WEBBING:	4 inch bar, 8 inch stretch Top – 36 Gauge Twisted Nylon Dipped Side – 36 Gauge Twisted Nylon Dipped Bottom – 84 Gauge Braided Nylon Dipped
NET LENGTH:	60 ft from cork line to cod end
BODY TAPER:	2 to 1
WING END HEIGHT:	6 feet
CENTER HEIGHT:	Dependent on depth of trawl – 14 to 18 ft
COD END:	Length 50 meshes x 4 in equals 16.7 ft Webbing 2 in bar, 4 in stretch, 84 gauge braid nylon Dipped, 80 meshes around, 40 rigged meshes with 1/4 x 2 in choker rings, 1 each 1/2 x 4 in at end Cod End Cover – none Chaffing Gear – none
HEAD ROPE:	60 ft 1/2 in combination rope (braid nylon with stainless cable center)
FOOT ROPE:	65 ft 1/2 in combination rope
LEG LINE:	Top – 6 ft, Bottom – 6 ft
FLOATS:	Size – Tuna Floats (football style), Diameter – 7in; Length – 9 in; number 12 each; Spacing – center of top net 2 in apart
MUD ROLLERS:	Size – 5 in Diameter, 5.5 in length Number – 22 each; spacing – 3 ft attached with 3/8 in Polypropylene rope (replaced with snap on roller when broken)
TICKLER CHAINS:	NONE (Discontinued – but previously used 1/4 in x 74 ft galvanized chain)
WEIGHT:	20 ft of 1/4 in galvanized chain on each wing, 40 ft per net looped and tied
DOOR SIZE:	7 ft x 40 in (or 8 ft x 40 in); Shoe – 1 in X 6 in: bridles – 3/8 in high test chain
CABLE LENGTH:	(Bridle Length, Total): 7/16 in x 240-300 ft varies with bottom conditions
FLOAT BALL:	NONE
LAZY LINES:	1 in nylon
PICKUP LINES:	3/8 in polypropylene
WHIP LINES:	1 in nylon

SEA TURTLE/GULF STURGEON OBSERVER SPECIFICATIONS

As a result of consultation under Section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers has agreed to report any sea turtle/gulf sturgeon activity to the National Marine Fisheries Service (NMFS). The points of contact (listed below) should be notified of any sightings, collisions with, injuries or killing of sea turtles/gulf sturgeons by telephone within 12 hours of the action. The notification should include the number and species of turtles (if known) impacted and the time the activity occurred.

New Orleans District, Operations Division,
Marine Management Section, Dredge Wheeler
Ms. Bethany Walker
(504) 862-2699 and fax (504) 862-1912
After hours number: 504-905-4573 (cell)

New Orleans District, Operations Division,
Operations Technical Support Branch,
Mr. Ed Creef
(504) 862-2521 and fax (504) 862-2317
After hours number: 504-818-0034 (home)

Observers will continuously monitor all of the hopper inflow and/or over-flow screens 24 hours per day during dredging mode, to detect turtles/sturgeons or turtle/sturgeon parts. Screen monitoring shall be conducted as required to effectively watch these screens, based on the design, configuration, and position thereof. The observers will be provided access and use of a facsimile and telephone 24 hours per day to insure, in the event of a take, the observers will be able to fulfill the requirements of the paragraph entitled "Sea Turtle/Gulf Sturgeon Reporting".

In addition to monitoring 24 hours per day during dredging mode, the observers will be responsible for assuring that:

- 1) temperatures in the waterway are taken, in degrees Fahrenheit, at the surface and at the mid-depth from the surface to the water bottom. The readings shall be made each eight hours for the duration of each dredging assignment. The waterway mileage and latitude/longitude shall be recorded corresponding to each temperature reading.
- 2) during transit of the dredge to/from the disposal site(s), after dredging has ceased, the screen observer shall assure that the hopper screens are cleaned of debris and correctly re-installed on the dredge for return to dredging mode. The observer shall report damage of the screens to the Dredge Wheeler representative immediately upon detection of such damage, and the screens shall be repaired or replaced before dredging is resumed.
- 3) complete turtle/sturgeon data reporting is made, as required in paragraph entitled "Sea Turtle/Gulf Sturgeon Reporting".
- 4) positively identified turtle/sturgeon parts are disposed of at the dredge material disposal site(s). Turtle/sturgeon parts which cannot be positively identified on board the dredge shall be color photographed by the observer(s) using instant developing film or a digital camera. The photos shall be attached to respective reports for documentation and later identification. Observer(s) shall measure, weigh, tag, and release any uninjured turtles incidentally taken by the dredge. Turtle/sturgeon handling and tagging methods shall be performed in accordance with NMFS-approved procedures. Injured turtles shall be transported to a rehabilitation facility, the Aquarium of the Americas at New Orleans, Louisiana. Observer(s) or their authorized representative shall provide NMFS-approved containers for turtle/sturgeon transport.
- 5) Sea Turtle/Gulf Sturgeon Reporting

The observers shall maintain a log detailing all incidents, including sightings, collisions with, injuries, or killing of sea turtles/sturgeons occurring during the contract period. The results of the monitoring shall be recorded on copies of the observation sheets attached, entitled "Endangered Species Observer Program" or similar forms. For each load, screen watch data shall be consolidated on a single sheet prior to beginning a new sheet for the next load. An observation sheet shall be completed for each load whether or not turtles are sighted in the waterway or turtle/sturgeon parts are detected on the screens. Dredging shall not commence until the consolidated report is completed from the previous dredging load. The observer(s) should notify the District points of contact (listed above) of any sightings, collisions with, injuries or killing of sea turtles by telephone and facsimile within 12 hours of the action. The notification should include the number and species of turtles impacted and the time the activity occurred. Upon completion of the dredging project, all consolidated and completed data reports shall be forwarded to the District points of contact (listed above).

The various endangered species observer program data forms are provided below.

ENDANGERED SPECIES OBSERVER PROGRAM
LOAD DATA FORM

USACE DISTRICT: _____
CONTRACT #: _____ Maintenance _____ /New Work _____ PROJECT start date _____
PROJECT NAME: _____ DREDGE NAME: _____
DREDGE FIRM: _____
LOAD #: _____ LOAD start date: _____ Times (24hrs): Start _____ End _____
Condition of screening : Port _____ Starboard _____ Overflow _____
Number of dragheads in use: _____ Type of dragheads used: _____ Size of dragheads: _____
Draghead deflector? YES _____ NO _____ Condition of deflector: _____
Type of material dredged: _____
Weather conditions: _____

Tidal stage (CIRCLE ONE): Slack Rising High Falling Low Unknown

Beaufort Sea States (Winds/Wave Height) (CIRCLE ONE)

0 = <1 knot/ 0 ft	3 = 7-10 knot/ 2 ft	6 = 22-27 knot/10 ft	9 = 41-47 knot/23 ft	12 = >63 knot/45
1 = 1- 3 knot/ 0.25 ft	4 = 11-16 knot/ 4 ft	7 = 28-33 knot/14 ft	10 = 48-55 knot/29 ft	
2 = 4- 6 knot/ 0.5 ft	5 = 17-21 knot/ 6 ft	8 = 34-40 knot/18 ft	11 = 56-63 knot/37 ft	

Waves: _____ ft Wind (speed & direction): _____

AIR TEMP: _____ °C / °F (°F = 9/5 (°C) + 32; °C = 5/9 (°F - 32))
WATER TEMP: Surface _____ °C / °F Column (mid-depth) _____ °C / °F Bottom _____ °C / °F

SCREEN TYPE	Inflow screening:	None	25%	50%	75%	100%
	Overflow screening:	None	25%	50%	75%	100%
	Other screening:	None	25%	50%	75%	100%

PORT SCREEN CONTENTS: _____

STARBOARD SCREEN CONTENTS: _____

Estimate number entrained on this load for the following:

Sturgeon (any species) _____
Shark (any species) _____
Horseshoe crab _____
Blue crab _____

TURTLE OR TURTLE PARTS PRESENT THIS LOAD: YES _____ NO _____

SPECIES OF TURTLE TAKE: Unknown Loggerhead Green Kemp's ridley Hawksbill Leatherback

Comments: _____

Number observers used/24hrs: _____ % Monitoring/24 hrs: None 25% 50% 75% 100%

Observer's name: _____ Observer firm _____
Observer signature _____

USACE DISTRICT: _____
PROJECT NAME: _____ **DREDGE NAME:** _____

Beaufort Sea State: 0 1 2 3 4 5 6 7 8 9 10 11 12

Condition of deflector: _____ **Condition of screening:** _____

Which species? (complete incident form(s)) _____

Comments (type of material, biological specimens, unusual circumstances, etc): _____

[illegible][illegible]

Observer name _____

USACE Sea Turtle/Dredging Database – Post Hopper Dredging Project Checklist follows.

**USACE Sea Turtle/Dredging Database
Post-Hopper Dredging Project Checklist**

(1) _____ PROJECT SUMMARY

District name _____ District POC _____
Contract # _____ Maintenance _____ New Work _____ Federal _____ Regulatory _____

Project name _____ Dates of project _____

Dredge name _____	Dredge firm _____	Dates worked _____
Dredge name _____	Dredge firm _____	Dates worked _____
Dredge name _____	Dredge firm _____	Dates worked _____
Dredge name _____	Dredge firm _____	Dates worked _____

For total project:
days dredged: _____ # hours dredged: _____ # loads dredged: _____ Total CY dredged _____

For dredge vessel _____
days dredged: _____ # hours dredged: _____ # loads dredged: _____ Total CY dredged _____

For dredge vessel _____
days dredged: _____ # hours dredged: _____ # loads dredged: _____ Total CY dredged _____

For dredge vessel _____
days dredged: _____ # hours dredged: _____ # loads dredged: _____ Total CY dredged _____

For dredge vessel _____
days dredged: _____ # hours dredged: _____ # loads dredged: _____ Total CY dredged _____

General project description/Disposal method(s): _____

Type of material dredged: (circle) silt clay sand mud shell rock other
Type of draghead(s): _____ Silent inspector: YES _____ NO _____

Mitigation measures:
Dredging within designated environmental window YES _____ NO _____ N/A _____
Draghead deflectors installed YES _____ NO _____ N/A _____
Relocation trawling conducted YES _____ NO _____ N/A _____
Pre-dredge assessment trawling conducted YES _____ NO _____ N/A _____

Monitoring measures:
Screening type(s) : _____ % material screened: None 25% 50% 75% 100%
observers/24hrs: _____ % monitoring/24 hrs: None 25% 50% 75% 100%

For total project:
Incidental sea turtle takes Loggerhead _____ Green _____ Kemp's ridley _____ Other _____ Unknown _____
Incidental sturgeon takes Shortnose _____ Gulf _____ Other _____ Unknown _____
Description of other endangered/sensitive species incidents: _____

(2) _____ Dredge summary logs associated with dates of incidental takes

(3) _____ Endangered Species Observer Final Report(s)
(Each incidental take reported should include: Incidental Take Form, Load Data Form, Dredge Load Log, Copies of photos)

(4) _____ Relocation and/or assessment trawling Final Report(s)
(Report should include: total #/species of turtles relocated during project; total #/species of turtles relocated on date of dredging incidental take, total #/species of sturgeon collected.)

(5) _____ Reports/descriptions of other related research/studies being done during/related to project.

ENDANGERED SPECIES OBSERVER PROGRAM
STURGEON INCIDENTAL TAKE DATA FORM

USACE DISTRICT: _____
PROJECT NAME: _____ DREDGE NAME: _____

DATE: _____ Time sturgeon take recovered (24hr): _____ Sturgeon # for project: _____

LOAD #: _____ Times (24hrs): Start _____ End _____ Load start date _____

SPECIES OF STURGEON TAKE: Shortnose _____ Gulf _____ Other _____ Unknown _____

Channel location of take: Latitude _____ Longitude _____
Other location / Channel description (e.g. buoy markers, landmarks): _____

Location take recovered on dredge: _____

Number of dragheads in use at time of incident: _____ Draghead deflector? YES _____ NO _____
Condition of deflector: _____ Condition of screening: _____

Beaufort Sea State: 0 1 2 3 4 5 6 7 8 9 10 11 12

AIR TEMP: _____ °C / °F (°F = 9/5 (°C) + 32; °C = 5/9 (°F - 32))
WATER TEMP: Surface _____ °C / °F Column (mid-depth) _____ °C / °F Bottom _____ °C / °F

Condition of specimen: _____

0 = Alive; 1 = Fresh dead; 2 = Moderately decomposed; 3 = Severely decomposed; 4 = skeleton/old bone; 5 = undetermined

Measurements/description of specimen: _____

Genetic samples taken: YES _____ NO _____ Photos taken: YES _____ NO _____

Sample frozen/preserved: YES _____ NO _____

Final disposition of specimen: _____

Comments: _____

Load data form attached: YES _____ NO _____ Dredge load log attached: YES _____ NO _____

Observer's name _____

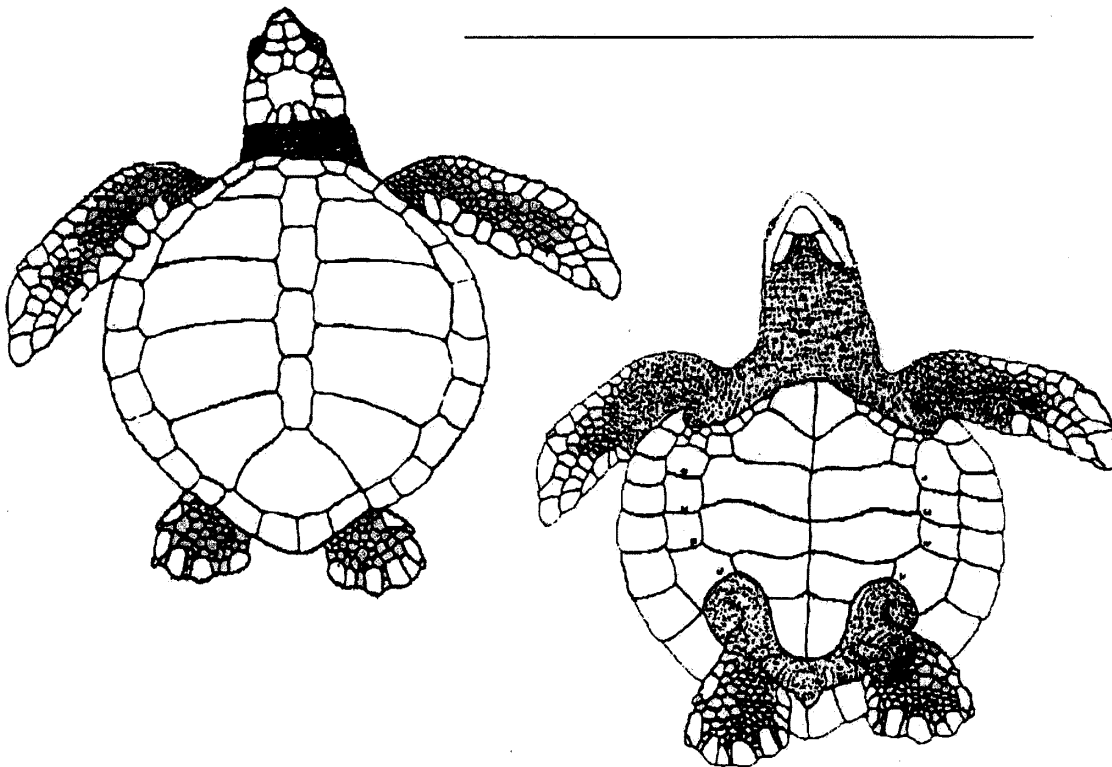
Use diagram below to illustrate specimen/part recovered:



Kemp's Ridley (*Lepidochelys kempii*)

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments:

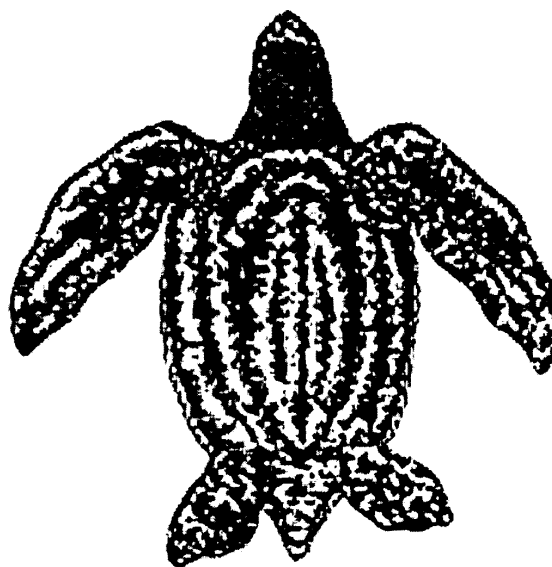
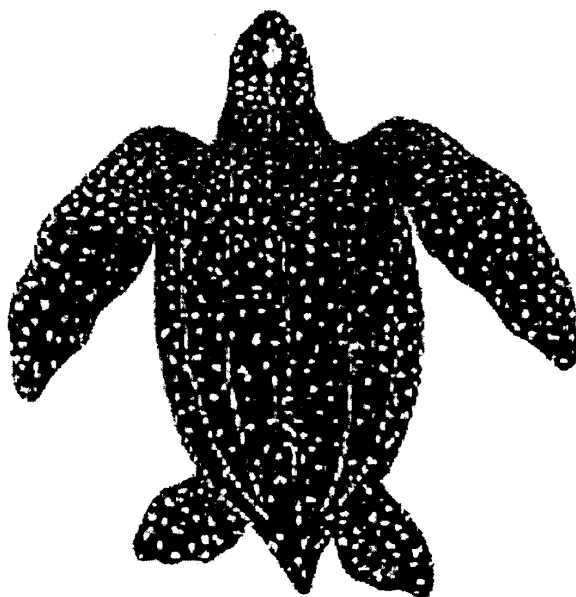


Diagrams by Tom McFarland

Leatherback (*Dermochelys coriacea*)

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____

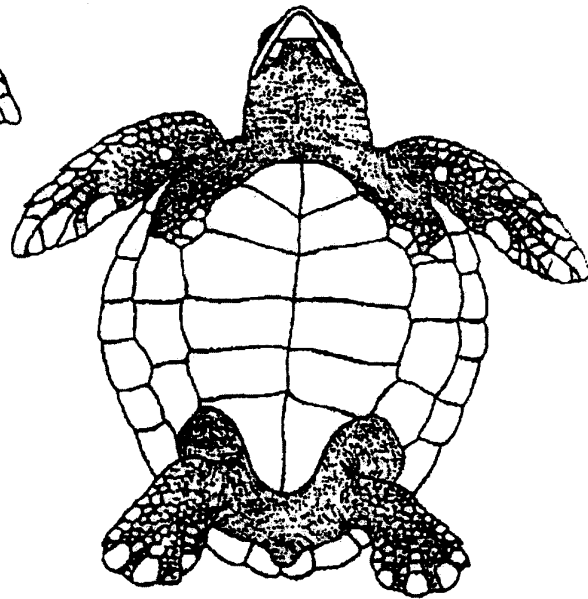
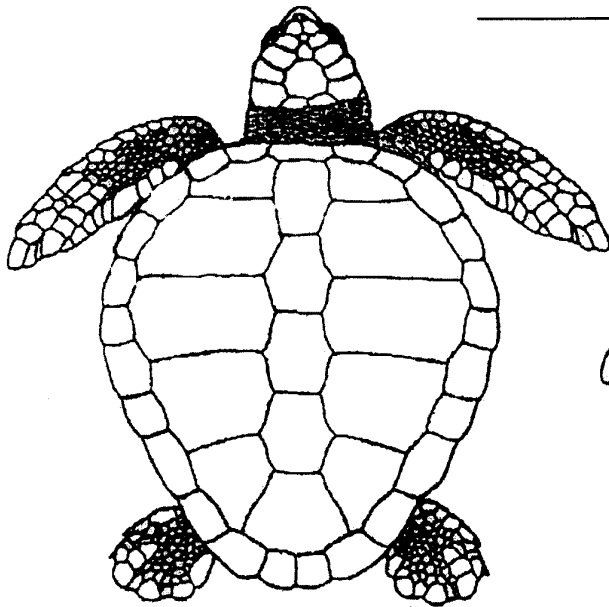


Diagrams by Tom McFarland

Loggerhead (*Caretta caretta*)

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments: _____

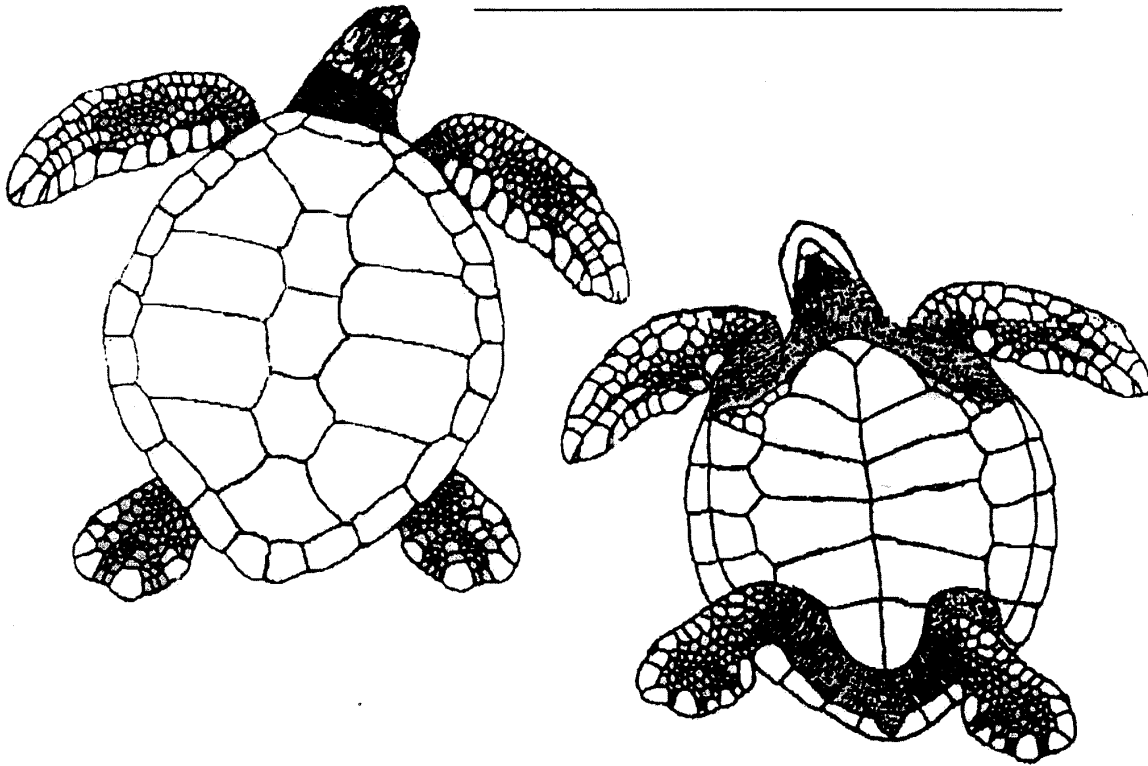


Diagrams by Tom McFarland

Green turtle (*Chelonia mydas*)

Shade areas of turtle that are missing; sketch cracks and lacerations

Comments:



Diagrams by Tom McFarland

Endangered Species Protection for Sea Turtles & Gulf Sturgeon

I. Sea Turtle Trawling and Relocation

Sea Turtle Trawling and Relocation, as specified herein, will be at the option and in the discretion of the Government to aid in preventing the taking of sea turtles during dredging operations with the approved turtle deflector in place. Within 72 hours after receiving written directions from the Contracting Officer, the Contractor shall begin trawling for turtles to relocate them from the dredging project area. Relocation trawling shall be performed so as to not interfere with dredging operations in progress.

e. Approved Sea Turtle Trawling and Relocation Supervisor

A NMFS-Approved Protected Species Observer (supervisor) shall conduct sea turtle trawling. A letter of approval from NMFS shall be provided to the Contracting Officer or his/her authorized representative prior to commencement of trawling. If trawling in Louisiana territorial waters outside of the shrimping season, the approved sea turtle trawling and relocation supervisor must also possess a Scientific Collecting Permit from the Louisiana Department of Wildlife and Fisheries (point of contact is Ms. Karen Foote at 225-765-2384).

f. Sea Turtle Trawling Procedures

Any captured sea turtles either shall be transported to the Institute for Marine Mammal Studies located in Gulfport, Mississippi, or released into waters minimally impacted by presence of oil/dispersants (to be determined by the relocation trawling supervisor in coordination with Edward Creef and Dena Dickerson (601-831-0687)). Any captured gulf sturgeons shall be released immediately after capture and handling for measurements away from the dredging site in waters minimally impacted by presence of oil/dispersants (to be determined at the time of capture by the trawling supervisor in coordination with Edward Creef and Dena Dickerson). Methods and equipment shall be standardized including data sheets, nets, trawling direction to tide, length of station, length of tow, and number of tows per station. Data on each tow shall be recorded using the Sea Turtle Trawling Report found at the website (<http://el.erdc.usace.army.mil/seaturtles/docs/trawlingforms.pdf>). The trawler shall be equipped with 60-foot nets constructed from 8-inch mesh (stretch) fitted with mud rollers and flats as specified in the Turtle Trawl Nets Specifications appended to the end of this Section. Paired net tows shall be made for 24 hours per day, as directed by the Contracting Officer or his/her authorized representative. The tows shall be performed in shifts, to be determined by the Contracting Officer or his/her authorized representative, and the trawler shall be available for operation 24 hours a day. Positions at the beginning and end of each tow shall be determined from GPS Positioning equipment. Refer to EM 1110-1-1003 "Navstar global positioning system surveying", paragraph 5.3 and Table 5-1, for acceptable GPS criteria.

g. Trawling Requirements

Trawling operations shall be conducted in the vicinity of dredge operations, but shall maintain a safe distance from that dredge. **NOTE: ALL TRAWLING ACTIVITIES, VESSELS AND EQUIPMENT SHALL COMPLY WITH THE CONTRACTOR'S ACCIDENT PREVENTION PLAN AND THE REQUIREMENTS OF EM 385-1-1, U.S. ARMY CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS MANUAL.** Trawling shall be conducted with and against the tidal flow at a speed not to exceed 3.5 knots using repetitive trawls in the channel or other work area not to exceed 42-minutes (total time). Trawls shall be made in the center, green, and red sides of the channel such that the total width of the channel bottom is trawled.

h. Sea Turtle/Gulf Sturgeon Handling and Measurements

At least one crewmember who is a NMFS-Approved Protected Species Observer shall be on board the trawler during the trawl. The observer shall be responsible for handling of captured sea turtles and Gulf sturgeons.

Each captured turtle or gulf sturgeon shall be identified, scanned for PIT tags, measured, tagged, tissue sampled and released, and data recorded on the Sea Turtle Tagging and Relocation Report, which can be found at the following website: (<http://el.erd.c.usace.army.mil/seaturtles/docs/taggingforms.pdf>). Presence of PIT tags shall be scanned for by using a multi-frequency scanner capable of reading multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and reading tags deeply embedded in muscle tissue. Any captured sea turtles shall be transported to the Institute for Marine Mammal Studies located in Gulfport, Mississippi. Turtle measurements shall be recorded and shall include, at a minimum, weight, straight-line length, straight-line width, and tail length. Gulf sturgeon measurements shall be recorded and shall include, at a minimum, weight, total length, and fork length. Turtles shall be tagged with NMFS #681 Inconel tags in each of the front flippers according to NMFS protocol. Aseptic conditions shall be maintained for tags and tag attachment. The Contractor shall be responsible for obtaining any and all permits related to trawling from the appropriate state and Federal agencies. All aspects of the trawling shall be coordinated with Edward Creef (504-862-2521) and Dena Dickerson (601-831-0687).

i. Handling Fibropapillomatose Turtles

Anyone handling sea turtles infected with fibropapilloma tumors shall either: 1) clean all equipment that comes in contact with the turtle with mild bleach solution between the processing of each turtle, or 2) maintain a separate set of sampling equipment for handling turtles displaying fibropapilloma tumors or lesions.

j. Water Quality and Physical Measurements

Water temperature measurements shall be taken at the water surface each day using a laboratory thermometer. Weather conditions shall be recorded from visual observations and instruments on the trawler. Weather conditions, air temperature, wind velocity and direction, sea state-wave height, and precipitation shall be recorded on the Sea Turtle Trawling Report. High and low tides shall be recorded.

k. Repair and Replacement of Damaged Trawl Nets

The Contractor, at the time of mobilization, shall provide trawl nets that meet the requirements specified in the Turtle Trawl Net Specifications at the end of this section. Tools, supplies and materials for repairing nets shall be kept aboard the trawler. In the event of damage to trawl nets, one hour will be allowed to either repair or replace them. The Contractor shall have at least one set of replacement nets immediately available at all times, to insure that the dredging work is not adversely delayed due to trawler down-time for replacing damaged nets. It is recommended that a second set of replacement nets be available aboard the trawler.

l. Suspension of Dredging and Relocation Trawling

Should there be a tearing of nets, or breakdown of other equipment that would cause the trawler to leave the area where dredging is underway during any period of time where relocation trawling is required, the dredge may continue to operate for up to 48 hours, as long as no turtles are taken, and subject to the discretion of the Contracting Officer. Should there be dangerously high seas that would cause the trawler to leave the dredging area when relocation trawling is required, the dredge may continue to operate, as long as no turtles are taken and subject to the discretion of the Contracting Officer.

m. Turtle Excluder Devices

Approval for trawling for sea turtles without Turtle Excluder Devices (TEDs) must be obtained from NMFS (contact Eric Hawk at 727-551-5773). Any necessary State or Federal clearances for the capture and relocation of sea turtles must also be obtained. Approvals must be submitted to the Contracting Officer or his/her authorized representative prior to trawling.

n. Reporting

Immediately after completing each day of relocation trawling, if possible, the Contractor shall notify Dena Dickerson by telephone conveying the results of the trawl. The results of each trawl shall be recorded on the Sea Turtle Trawling Report. The Sea Turtle Trawling Report also shall be furnished by the Contractor to Mr. Edward Creef, U.S. Army Corps of Engineers, New Orleans District, within 24 hours after completing the relocation trawl (fax number 504-862-2317; email: edward.d.creef@usace.army.mil). Following completion of the project, a copy of the Contractor's log regarding sea turtles shall be forwarded to Mr. Edward Creef within 10 working days.

Turtle Trawl Net Specifications

DESIGN:	4 Seam, 4 Legged, 2 Bridal Trawl Net
WEBBING:	4 in bar, 8 in stretch Top – 36 Gauge Twisted Nylon Dipped Side – 36 Gauge Twisted Nylon Dipped Bottom – 84 Gauge Braided Nylon Dipped
NET LENGTH:	60 ft from cork line to cod end
BODY TAPER:	2 to 1
WING END HEIGHT:	6 ft
CENTER HEIGHT:	Dependent on depth of trawl – 14 to 18 ft
COD END:	Length 50 meshes x 4 in equals 16.7 ft Webbing 2 in bar, 4 in stretch, 84 gauge braid nylon Dipped, 80 meshes around, 40 rigged meshes with ¼ x 2 in choker rings, 1 each ½ x 4 in at end Cod End Cover – none Chaffing Gear – none
HEAD ROPE:	60 ft ½ in combination rope (braid nylon with stainless cable center)
FOOT ROPE:	65 ft ½ in combination rope
LEG LINE:	Top – 6 ft, Bottom – 6 ft
FLOATS:	Size – Tuna Floats (football style), Diameter – 7 In; Length – 9 in; number 12 each; Spacing – center of top net 2 in apart
MUD ROLLERS:	Size – 5 in Diameter, 5.5 in length Number – 22 each; spacing – 3 ft attached with 3/8 in Polypropylene rope (replaced with snap on roller when broken)
TICKLER CHAINS:	NONE (Discontinued – but previously used ¼ in x 74 ft galvanized chain)
WEIGHT:	20 ft of ¼ in galvanized chain on each wing, 40 ft per net looped and tied
DOOR SIZE:	7 ft x 40 in (or 8 ft x 40 in); Shoe – 1 in X 6 in: bridles – 3/8 in high test chain
CABLE LENGTH:	(Bridle Length, Total): 7/16 in x 240-300 ft varies with bottom conditions
FLOAT BALL:	NONE
LAZY LINES:	1 in nylon
PICKUP LINES:	3/8 in polypropylene
WHIP LINES:	1 in nylon



APPENDIX B

Real Estate



APPENDIX B – REAL ESTATE PLAN

B-1.0 PROJECT DESCRIPTION, LOCATION AND DESCRIPTION OF THE LANDS, EASEMENTS, RIGHTS-OF-WAY, RELOCATIONS, AND DISPOSAL AREAS (LERRD’S) REQUIRED

The project area is the southeastern portion of Louisiana (see map in Section 8 below) consisting of:

Dredging within the banks of the Mississippi River. The Tentatively Selected Plan (TSP) for the next phase of construction is to deepen the MRSC to a depth of 50 ft LWRP for the 3 crossings located within the footprint of the Port of South Louisiana (Richbend, Fairview, and Belmont) and a depth of 50 ft MLLW in the Lower Mississippi River from RM 13.4 AHP to RM 22 BHP. The 9 crossings located within the Port of Greater Baton Rouge will remain at their present constructed and maintained depth.

Disposal of materials dredged from the 3 crossings within the Port of South Louisiana will be deposited back into the river below the dredged location. All actual dredging activities for the three crossings will be conducted below the ordinary high water mark of the River; therefore, the actual dredging work will can be accomplished by invoking the Federal navigational servitude. Similarly, dredging of the reach of the Lower Mississippi River below approximate RM 18 BHP, will be placed with the OMDDS, such that all dredged work and disposal for this reach will be accomplished by invoking the Federal navigational servitude.

Disposal of materials dredged within the Lower Mississippi River between RM 13.4 BHP and approximately RM 18 BHP will be placed within existing disposal areas adjacent to the Mississippi River in the southern portion of Plaquemines Parish between Venice, Louisiana and the Gulf of Mexico. USACE has previously obtained environmental clearance over 143,264 acres, most of which are located in the USFWS Delta National Wildlife Refuge and in the LaDWF Passe a Loutre Wildlife Management Area.

The current evaluation has determined that construction of the alternatives beyond 48 ft in the Lower Mississippi River reach of the project (RM 13.4 AHP to RM 22 BHP) will potentially require the acquisition of additional dredged material placement and access areas. The majority of the additional dredged material placement and access areas that have been potentially identified for future use appear to lie in coastal marshes that are subject to inundation by the mean high waters of the Gulf of Mexico. As such, the marshes could be considered “navigable in law” (33 CFR 329.12(2)(b)), and disposal could be accomplished by invoking the Federal navigational servitude. The limits of the navigation servitude will be determined during PED in order to be available prior to the scheduled need for authorization for entry for construction.



If additional dredged material placement areas and/or access areas are determined to be necessary for construction and/or OMRR&R of the Recommended Plan, the Government intends to maximize use of the Federal navigation servitude, to the extent practicable and in keeping with project needs, for the additional dredged material placement and access requirements for the project. For purposes of selecting the TSP, we have selected several broad areas, as shown in Figure B-2, that would be examined during the feasibility design phase to identify discrete areas that would be suitable for consideration as dredged material placement areas and/or as access to those areas if such additional areas are needed for project construction and/or OMRR&R.

It is possible that some portion of the lands identified as being potentially needed as additional dredged material placement or access sites could lie outside of the limits of the navigation servitude. If additional dredged material placement or access areas are needed that include those privately owned lands that lie outside of the Federal navigation servitude, the Government may require the non-Federal sponsor to acquire an interest in real property for that purpose over those lands. Similarly, the Government may determine that additional State-owned lands, that lie outside of the area available under the navigation servitude, may be needed for the Recommended Plan. For those lands, the non-Federal sponsor would also be required to provide authorization for entry for the construction and OMRR&R of the project. The determination of whether such additional lands are required for project construction of the TSP will not be made until the final feasibility design phase.

Final determination of the State-owned and privately owned lands that lie outside of the Federal navigation servitude and that will be acquired for construction and/or OMRR&R of the project will not take place until final project design is complete. However, for purposes of this report, the Government has estimated \$2.5M for the land and administration costs associated with acquisition of a temporary work area easement over privately owned lands in order to ensure an appropriate estimate of the cost of construction for the TSP, to inform the public of the potential for the acquisition of additional interests in real property, and to estimate the maximum environmental impact. In the subsequent phase of feasibility design, further refinement of construction and OMRR&R requirements, including dredged material placement and access requirements, will be determined, and more precise dredged material placement and access needs will be available.

For any areas for which the Federal navigation servitude will not be exercised, the non-Federal Sponsor will be required to acquire the necessary interest in real property from the owners of interest in privately owned lands and to timely provide an authorization for entry to the interest acquired in the privately-owned lands and to any State owned land. Additionally, the non-Federal sponsor will be required to obtain authorization for entry over any lands under the



jurisdiction of another Federal agency, such as USFWS and its lands in the Delta National Wildlife Refuge.

Because a definitive identification cannot be made at this time regarding those lands that lie within the Federal navigational servitude, an assumption was made that some acreage would need to be acquired by the Non-Federal Sponsor from private individuals. See Map of Disposal Site in Section 8 below.

B-2.0 NON-FEDERAL SPONSOR-OWNED LERRD

The Non-Federal Sponsor (NFS) on the project is Louisiana Department of Transportation and Development (LaDOTD). It is assumed that LaDOTD does not have jurisdiction over any LERRDs within the Mississippi River or in the existing or proposed areas for dredged material placement or access in southern Plaquemines Parish. The NFS will provide an authorization for entry over any LERRD's needed for this project which cannot be utilized by invoking the Federal navigational servitude.

LaDOTD has been an active participant in the development of the scope of the GRR and the Project Management Plan and executed a Feasibility Cost Sharing Agreement in April 2015. LaDOTD has expressed strong support and willingness to continue as the NFS through construction an OMRR&R, if building a channel up to a maximum of 50 feet is feasible.

STANDARD ESTATE

At this time, the need for additional LERRDs is unknown; however it is possible that some LERRDs may be required to support construction and OMRR&R of the Recommended Plan for purposes of dredged material placement and access. It is anticipated that, if additional LERRDs are found to be necessary, most of those lands and waterbottoms will lie within the area available under the Federal navigation servitude. However, if some of the required areas lie outside of the Federal navigation servitude, USACE will determine the requisite estates and easements necessary to meet the required purpose. If the additional need for dredged material disposal and access is limited to the construction of the Recommended Plan, the Non-Federal Sponsor will be required to acquire 5 year temporary work area easements for those purposes. If the additional need extends to OMRR&R requirements for dredged material placement and access, USACE will determine the requisite estate during final feasibility design.

EXISTING FEDERAL PROJECT(S) WITHIN THE PROJECT AREA

The Gulf Intracoastal Waterway (GIWW) links deep-water ports, tributaries, rivers and bayous and stretching for more than 1,300 miles from Mexican border at Brownsville, Texas to Apalachicola, Florida. Within this Mississippi River Ship Channel project, there are four locks



within the GIWW – Port Allen Lock near Baton Rouge and Algiers, Harvey and Inner Harbor Navigation Canal Locks in the New Orleans area.

Mississippi River and Tributaries Project (MR&T) the largest flood control project in the world, provides protection to the 36,000 square-mile lower Mississippi Valley. The four major elements are levees, floodways, channel improvement and stabilization and tributary basin improvements. MR&T has levees and a floodway within the Mississippi River Ship Channel project area.

The USFWS has jurisdictional responsibility for the Delta National Wildlife Refuge in lower Plaquemines Parish. The non-Federal sponsor is responsible for providing authorization for entry to any lands necessary for construction and OMRR&R of the Recommended Plan that are situated on the refuge, includes any newly designated areas for dredged material placement or access that area determined to be necessary during the feasibility design phase of the study.

B-3.0 FEDERALLY-OWNED LANDS WITHIN THE LERRD'S FOR THE PROJECT

Mississippi River South and Southwest Passes Project encompass 14,706.34 acres of waterways and wildlife refuge areas in Plaquemines Parish, of which 35.25 acres are encumbered with easements, 8,367.17 acres are owned by the United States in fee, and 6,303.92 acres are public domain lands. Much of the disposal sites are within this project boundary.

B-4.0 NAVIGATIONAL SERVITUDE

The navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (Art. I, §8, cl.3) to use, control and regulate the navigable waters of the United States and the submerged lands hereunder for various commerce-related purposes including navigation and flood control.

Dredging will take place below the Ordinary High Water Mark within the banks of the Mississippi River; therefore, the Government will invoke the navigational servitude for dredging within the banks of the waterways, as it was done for Phases I and II.

In tidal areas, the servitude extends to all lands below the mean high water mark of a navigable watercourse. For the disposal areas, if the state lands fall within the navigational servitude limits, we will exercise the servitude and will not seek permission of a state agency since our rights under the servitude prime the State's rights acquired through statehood or later acquisition. If some portion of the State owned lands lie outside of the Federal navigation servitude, it is the responsibility of the non-Federal sponsor, LaDOTD to acquire ROE on behalf of the project to those non-servitude lands. Additionally, LaDOTD will be required to acquire any interests in real property over privately-owned lands that lie outside of the area available under the Federal



navigation servitude that is determined in the feasibility design phase to be necessary for the construction and/or the OMRR&R of the Recommended Plan.

A formal determination of which project areas fall within the navigational servitude will be made no later than the PED phase.

B-5.0 PROJECT MAPS

Figure B-1 below - Shows the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana project area. Upper Mississippi River (Baton Rouge to New Orleans Harbor) includes 12 Crossings. Lower Mississippi River (New Orleans Harbor to Gulf of Mexico) includes Southwest Pass and Bar Channel.



Figure B-1: Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana project area

Figure B-2 below – Shows the proposed disposal areas in the southern portion of Plaquemines Parish.



Figure B-2: Proposed disposal areas in the southern portion of Plaquemines Parish

B-6.0 INDUCED FLOODING

Construction of this project will not induce flooding.

B-7.0 BASELINE COST ESTIMATES/CHART OF ACCOUNTS (COA'S)

If all lands needed for the project can be utilized by invoking the navigational servitude, there will be no real estate costs associated with this project. However, in order to account for the possibility that some lands might not be subject to the navigational servitude and that acquisition could be necessary, a real estate cost estimate was prepared. The total estimated real estate costs were estimated to be \$2,500,000. Real Estate costs include the LER and administrative costs of negotiations, appraisal, mapping, title search, and processing the Non-Federal Sponsor's credit package. The real estate cost estimate includes a contingency of 25%. These costs have been included only as a precaution to avoid understating the costs.



B-8.0 RELOCATION ASSISTANCE BENEFITS

This Project does not displace residential, commercial, industrial or habitable structures within the Project boundaries; therefore, the provisions under Title II of Public Law 91-646, as amended, are not applicable.

B-9.0 TIMBER/MINERAL/ROW CROP ACTIVITY

All work is anticipated to occur by invoking the navigational servitude. Mineral rights will not be impacted. There is no timber or row crop activity in the area of the disposal site or within the banks of the Mississippi River where dredging will take place.

B-10.0 OYSTER LEASES

No oyster leases in the immediate area of the disposal sites are evident through a SONRIS search of the State of Louisiana online website. Several locations north and two small locations east show leases, but these are well outside of the disposal site boundary.

B-11.0 PROJECT SPONSOR/NFS CAPABILITY ASSESSMENT

The Non-Federal Sponsor (NFS) is responsible for providing an authorization for entry for all areas not subject to the navigational servitude. In the event that the NFS has to perform any acquisitions of private LERRD's, the sponsor will be advised of the Uniform Relocations Act requirements and Federal requirements for documenting expenses for credit. Prior to the final REP and final Feasibility Report, the NFS's capability assessment will be completed and added to this report as an Exhibit.

B-12.0 ZONING IN LIEU OF ACQUISITION

Zoning ordinances will not be enacted to facilitate the acquisition of real estate interests in connection with the Project.

B-13.0 ACQUISITION SCHEDULE

This schedule assumes dredging and disposal can be accomplished by invoking the navigational servitude. If it becomes necessary for the NFS to acquire real estate interests from private landowners, the NFS will need approximately two years to complete acquisition.

Obtain mapping	1 month
Issuance of Authorization for Entry by NFS	1 month



B-14.0 FACILITY/UTILITY RELOCATIONS

Preliminary in-house database research suggests approximately 50 - 70 pipelines may be located within the dredging areas along the Mississippi River (River Mile 233.40 to 110.6). At this time, it is unknown how many of these pipelines would need to be relocated due to the project.

Since 1995, utilities are required to go 25 feet below the deepest depth of 45 foot channel. New permits will require placement 25 feet below 55 foot depth. Due to O & M dredging cycles, some pipelines were removed on previous phases. Crossings in the Upper Mississippi River will be further investigated for pipeline locations during feasibility. Project costs include an estimated cost of relocations of \$40,000,000.

B-15.0 ENVIRONMENTAL CONSIDERATIONS

There is a low risk of saltwater intrusion due to small potential changes in depths and limited impacts to saltwater sill activation. Also, there is a low risk of relative sea level rise impacts. Probability of encountering Hazardous, Toxic and Radioactive Waste (HTRW) is low.

B-16.0 LANDOWNER CONCERNS

All work is anticipated to be performed in areas subject to the navigational servitude. Therefore, there are no landowner concerns. We anticipate broad public interest in the study from a range of stakeholders including maritime businesses, local communities and environmental groups.

B-17.0 NON-FEDERAL SPONSOR NOTIFICATION OF RISKS

It is anticipated that the Non-Federal Sponsor may not have to acquire any LERRDs; therefore, a notification of risks is not necessary.

B-18.0 OTHER RELEVANT REAL ESTATE ISSUES

The Project Checklist is attached to the REP as Exhibit A.

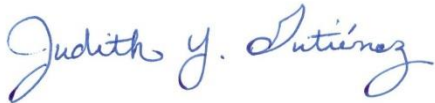


PREPARED BY:



Pamela M. Fischer
Realty Specialist

REVIEWED AND RECOMMENDED BY:



Judith Y. Gutierrez
Deputy Chief, Real Estate Division New Orleans

November 18, 2016



EXHIBIT A

Quality Control Plan Checklist

Real Estate Plans

And other similar Feasibility-Level Real Estate Planning Documents

ER 405-1-12, Section 12-16, Real Estate Handbook, 1 May 1998

A Real Estate Plan (REP) is prepared in support of a decision document for full-Federal or cost shared specifically authorized or continuing authority projects. It identifies and describes lands, easements and rights-of-way (LER) required for the construction, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of a proposed project including requirements for mitigation, relocations, borrow material, and dredged or excavated material disposal. It also identifies and describes facility/utility relocations, LER value, and the acquisition process. The REP does not just cover LER to be acquired by the non-Federal sponsor (NFS) or Government. The report covers all LER needed for the project, including LER already owned by the NFS, Federal Government, other public entities, or subject to the navigation servitude.

The REP must contain a detailed discussion of the following 20 topics, as set out in Section 12-16 of the ER, including sufficient description of the rationale supporting each conclusion presented. If a topic is not applicable to the project, this should be stated in the REP. The pages of a REP should be numbered.

MISSISSIPPI RIVER SHIP CHANNEL, Gulf to Baton Rouge, LA
PROJECT _____

General Reevaluation Report
REPORT TITLE _____

November 2016

November 18, 2016

Date of Report _____ **Date of REP** _____

1. **Purpose of the REP.** ✓

- a. Describe the purpose of the REP in relation to the project document that it supports.
- b. Describe the project for the Real Estate reviewer.
- c. Describe any previous REPs for the project.



2. **Describe LER.** √

- a. Account for all lands, easements, and rights-of-way underlying and required for the construction, OMRR&R of the project, including mitigation, relocations, borrow material and dredged or excavated material disposal, whether or not it will need to be acquired or will be credited to the NFS.
- b. Provide description of total LER required for each project purpose and feature.
- c. Include LER already owned by the Government, the NFS and within the navigation servitude.
- d. Show acreage, estates, number of tracts and ownerships, and estimated value.
- e. Break down total acreage into fee and the various types and durations of easements.
- f. Break down acreage by Government, NFS, other public entity, and private ownership, and lands within the navigation servitude.

3. **NFS-Owned LER.** √

- a. Describe NFS-owned acreage and interest and whether or not it is sufficient and available for project requirements.
- b. Discuss any crediting issues and describe NFS views on such issues.

4. **Include any proposed Non-Standard Estates.** √

- a. Use Standard Estates where possible.
- b. Non-standard estates must be approved by HQ to assure they meet DOJ standards for use in condemnations.
- c. Provide justification for use of the proposed non-standard estates.
- d. Request approval of the non-standard estates as part of document approval.
- e. If the document is to be approved at MSC level, the District must seek approval of the non-standard estate by separate request to HQ. This should be stated in the REP.
- f. Exception to HQ approval is District Chiefs of RE approval of non-standard estate if it serves intended project purposed, substantially conforms with and does not materially deviate from the standard estates found in the RE Handbook, and does not increase cost or potential liability



to the Government. A copy of this approval should be included in the REP. (See Section 12-10c. of RE 405-1-12)

g. Although estates are discussed generally in topic 2, it is a good idea to also state in this section which standard estates are to be acquired and attach a copy as an appendix. The duration of any temporary estates should be stated.

5. Existing Federal Projects. √

a. Discuss whether there is any existing Federal project that lies fully or partially within LER required for the project.

b. Describe the existing project, all previously-provided interests that are to be included in the current project, and identify the sponsor.

c. Interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit.

d. Additional interest in the same land is eligible for credit.

6. Federally-Owned Lands √

a. Discuss whether there is any Federally-owned land included within the LER required for the project.

b. Describe the acreage and interest owned by the Government.

c. Provide description of the views of the local agency representatives toward use of the land for the project and issues raised by the requirement for this land.

7. Navigation Servitude. √

a. Identify LER required for the project that lies below the Ordinary High Water Mark, or Mean High Water Mark, as the case may be, of a navigable watercourse.

b. Discuss whether navigation servitude is available

c. Will it be exercised for project purposes? Discuss why or why not.

d. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or other project to which a navigation nexus can be shown.



e. See paragraph 12-7 of ER 405-1-12.

8. **Map** √

a. An aid to understanding

b. Clearly depicting project area and tracts required, including existing LER, LER to be acquired, and lands within the navigation servitude.

c. Depicts significant utilities and facilities to be relocated, any known or potential HTRW lands.

9. **Induced Flooding** can create a requirement for real estate acquisition. √

a. Discuss whether there will be flooding induced by the construction and OMRR&R of the project.

b. If reasonably anticipated, describe nature, extent and whether additional acquisition of LER must or should occur.

c. Physical Takings Analysis (separate from the REP) must be done if significant induced flooding anticipated considering depth, frequency, duration, and extent of induced flooding.

d. Summarize findings of Takings Analysis in REP. Does it rise to the level of a taking for which just compensation is owed?

10. **Baseline Cost Estimate** as described in paragraph 12-18. √

a. Provides information for the project cost estimates.

b. Gross Appraisal includes the fair market value of all lands required for project construction and OMRR&R.

c. PL 91-646 costs

d. Incidental acquisition costs

e. Incremental real estate costs discussed/supported.

f. Is Gross Appraisal current? Does Gross Appraisal need to be updated due to changes in project LER requirements or time since report was prepared?



11. **Relocation Assistance Benefits** Anticipated. √

- a. Number of persons, farms, and businesses to be displaced and estimated cost of moving and reestablishment.
- b. Availability of replacement housing for owners/tenants
- c. Need for Last Resort Housing benefits
- d. Real Estate closing costs
- e. See current 49 CFR Part 24

12. **Mineral Activity.** √

- a. Description of present or anticipated mineral activity in vicinity that may affect construction, OMRR&R of project.
- b. Recommendation, including rationale, regarding acquisition of mineral rights or interest, including oil or gas.
- c. Discuss other surface or subsurface interests/timber harvesting activity
- d. Discuss effect of outstanding 3rd party mineral interests.
- e. Does estate properly address mineral rights in relation to the project?

13. **Oyster Leases**

14. **NFS Assessment** This section will be completed and added for the final REP

- a. Assessment of legal and professional capability and experience to acquire and provide LER for construction, OMRR&R of the Project.
- b. Condemnation authority
- c. Quick-take capability
- d. NFS advised of URA requirements
- e. NFS advised of requirements for documenting expenses for credit.



f. If proposed that Government will acquire project LER on behalf of NFS, fully explain the reasons for the Government performing work.

g. A copy of the signed and dated Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability (Appendix 12-E) is attached to the REP.

15. **Zoning** in Lieu of Acquisition √

a. Discuss type and intended purpose

b. Determine whether the proposed zoning proposal would amount to a taking for which compensation will be due.

16. **Schedule** √

a. Reasonable and detailed Schedule of land acquisition milestones, including LER certification.

b. Dates mutually agreed upon by Real Estate, PM, and NFS. _____

17. **Facility or Utility Relocations** √

a. Describe the relocations, identity of owners, purpose of facilities/utilities, whether owners have compensable real property interest.

b. A synopsis of the findings of the Preliminary Attorney's Investigation and Report of Compensable Interest is included in the REP as well as statements required by Sections 12-17c.(5) and (6).

c. Erroneous determinations can affect the accuracy of the project cost estimate and can confuse Congressional authorization.

d. Eligibility for substitute facility

1. Project impact

2. Compensable interest

3. Public utility or facility

4. Duty to replace



5. Fair market value too difficult to determine or its application would result in an injustice to the landowner or the public.

e. See Sections 12-8, 12-17, and 12-22 of ER 405-1-12.

18. **HTRW** and Other Environmental Considerations √

a. Discussion the impacts on the Real Estate acquisition process and LER value estimate due to known or suspected presence of contaminants.

b. Status of District's investigation of contaminants.

c. Are contaminants regulated under CERCLA, other statutes, or State law?

d. Is clean-up or other response required of non-CERCLA regulated material?

e. If cost share, who is responsible for performing and paying cost of work?

f. Status of NEPA and NHPA compliances

g. See ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects.

19. **Landowner Attitude.** √

a. Is there support, apathy, or opposition toward the project?

b. Discuss any landowner concerns on issues such as condemnation, willing seller provisions, estates, acreages, etc.?

20. A statement that the **NFS has been notified in writing about the risks of acquiring LER before the execution of the PPA.** If not applicable, so state. √

21. **Other Relevant Real Estate Issues.** Anything material to the understanding of the RE aspects of the project. √

A copy of the completed Checklist is attached to the REP. √

(Draft REPs must contain a draft checklist and draft Technical Review Guide)



I have prepared and thoroughly reviewed the REP and all information, as required by Section 12-16 of ER 405-1-12, is contained in the Plan.

Parvula Frail

November 18, 2016

Preparer

Date

A copy of the Real Estate Internal Technical Review Guide for Civil Works Decision Documents is attached and signed by me as the Reviewer

Judith y. Gutierrez

November 18, 2016

RE Internal Technical Reviewer

Date

The REP has been signed and dated by the Preparer and the District Chief of Real Estate.

√



APPENDIX C

Engineering



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C-1.0 GENERAL

This Draft Engineering Appendix presents and documents the feasibility level engineering and design completed to identify the Tentatively Selected Plan. Development of the Engineering Appendix was in accordance with Engineering Regulation (ER) 1110-2-1150, "Engineering and Design for Civil Works Projects", dated 31 August 1999. The comparative studies of alternatives, field investigations, designs, and costs estimates presented herein are in sufficient detail to substantiate the recommended plan and baseline estimate.

C-2.0 HYDRAULICS AND HYDROLOGY

C-2.1.1 Model Studies

C-2.1.2 One Dimensional Model

C-2.1.2.1 Purpose

This Coastal & Hydraulics Laboratory Engineering Appendix describes the one-dimensional (1D) sedimentation analysis of proposed options for deepening the Mississippi River Ship Channel.

C-2.1.2.2 Introduction

The 255 mile long Mississippi River Ship Channel extends from Baton Rouge, Louisiana to the Gulf of Mexico and provides deep-draft access to the largest port complex in the United States of America. Annually, the port complex serves an average of 11,000 deep-draft vessels and handles 450 million tons of cargo. The authorized navigation depth of the Ship Channel is 55 feet (ft). The navigation depth is currently maintained to 45ft. The US Army Engineer New Orleans District is evaluating the feasibility of increasing the maintained depth to 48 or 50ft.

Since typical channel depths in most of this reach of the Mississippi River exceed the maintained channel depth, maintenance dredging is required only in relatively short and distinct locations. The reach of the navigation channel that is referred to as the Southwest Pass (SWP) dredging reach, is comprised of the Mississippi River, extending downstream from Venice, LA, to the Head of Passes (HOP) (River Mile 0.0), and the reach below Mile 0.0 which extends downstream through Southwest Pass and the Southwest Pass Bar Channel. The bar channel terminates at approximate river Mile 22.0 below Head of Passes (BHP). (See Figure C-1.) The Mississippi River - Southwest Pass is the longest single dredging reach and has been maintained to a depth of 45ft relative to Mean Low Gulf Southwest Pass (MLG^{SWP}), equivalent to a depth of 48.5ft below Mean Lower Low Water (MLLW), since 1987. The majority of the sediment entering this reach is diverted by distributaries with less than half of the remainder being deposited and subsequently removed by dredging as presented in Figure C-2. Annual dredging quantities in this reach from 1970 to 2008



averaged 19.4 million cubic yards (yd³). An explanation of the difference between MLG^{SWP} and MLLW is provided in Chapter 3 of the main report.

The remainder of the locations requiring periodic maintenance dredging are river crossings in the upper 120 miles of the Ship Channel (See Figure C-3). These crossings have been maintained to a depth of 45ft relative to the Low Water Reference Plane (LWRP), since 1995. Total annual dredging quantities for the crossings averaged 16 million yd³ from 1999 to 2015.

Annual dredging requirements can vary greatly. In Southwest Pass, dredging requirements are strongly influenced by sediment supply. Thus, dredging requirements tend to be higher in years with significant floods or prolonged periods of higher than normal flow. Conversely, dredging requirements tend to be lower during years dominated by low to moderate flows. While sediment supply is a significant factor in dredging requirements at crossings, other factors such as hydrograph shape also influence requirements. For example, dredging of a crossing is more likely to be required after a rapid fall in stage than after a slow fall of similar magnitude.

C-2.1.2.3 Model Description

The 1D sedimentation model adopted for this study was developed for the Mississippi River Hydrodynamic and Delta Management Study (Thomas – in preparation) using the HEC-6T computer program (Thomas, 2014). That model was adapted from earlier models including the Mississippi Valley Division (MVD) Regional Model (Copeland and Lombard, 2009) and the Myrtle Grove Diversion Model (Thomas, 2012). The current model extends from Tarbert Landing at Mississippi River Mile (RM) 306 downstream through Southwest Pass to the Jetties at RM 18 Below Head of Passes (BHP). All of the models in this series are based on cross-section data extracted from the 1991-92 Mississippi River Comprehensive Hydrographic Survey and have been extensively validated as described in the above references.

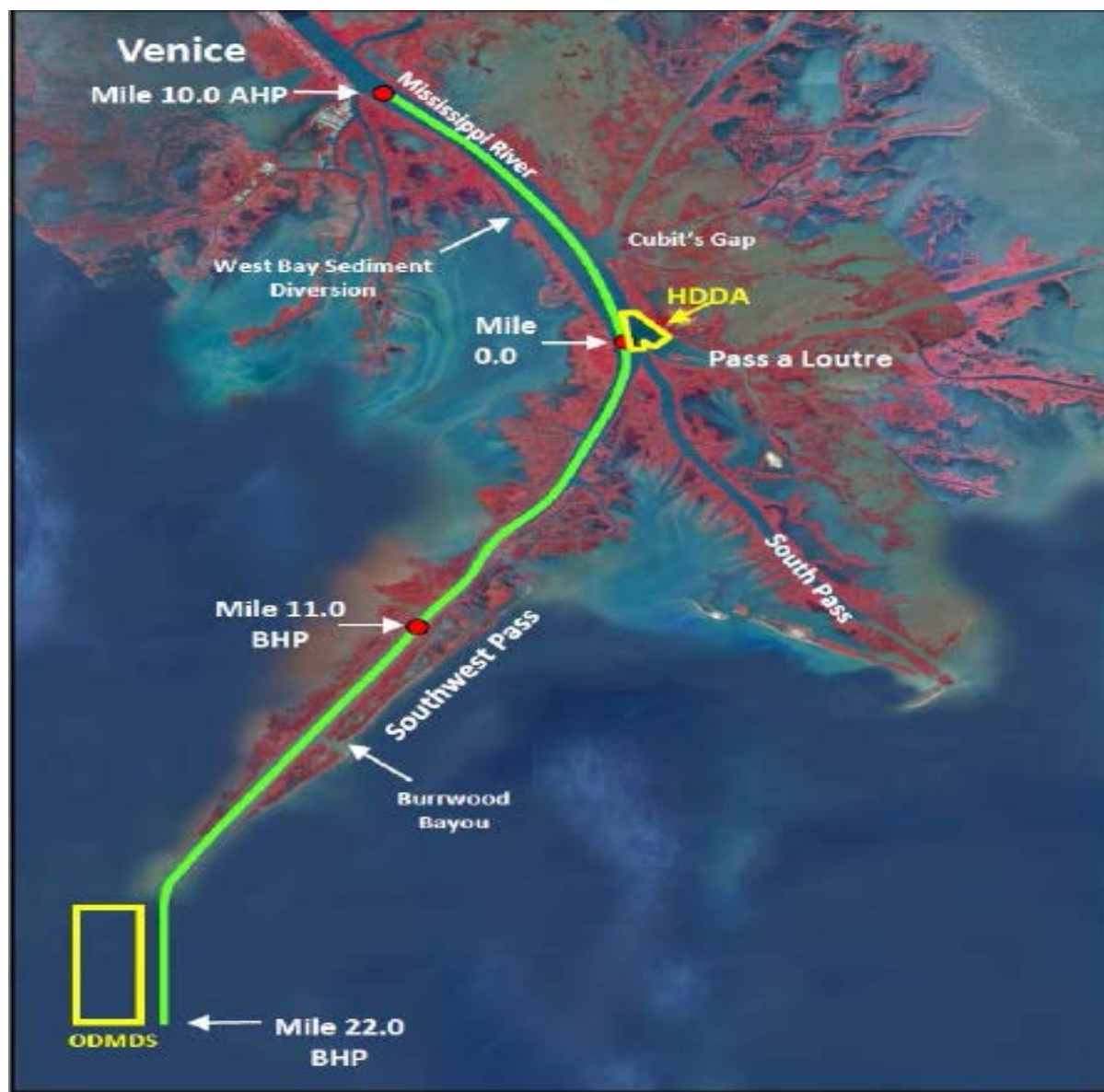


Figure C-1 – Southwest Pass Dredging Reach

The reach of dredging referred to as the "Southwest Pass" dredging reach (Figure C-1), is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 Above Head of Passes (AHP), and the HOP. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA), as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging.



Of particular importance to this study, fine sediment erosion and deposition parameters in the MVD Regional Model were adjusted to reproduce cumulative dredging trends in the Southwest Pass reach from 1991 to 2002. The Myrtle Grove Diversion Model added dredging of the deep draft crossings. The model developed for Mississippi River Hydrodynamic and Delta Management Study incorporated changes in the HEC-6T program that permitted evaluation of the effects of subsidence and eustatic sea level rise. Additionally, all elevation data was adjusted to the North American Datum of 1988 (NAVD88 – 2004.65). Note: All datums henceforth refer to epoch 2004.65.

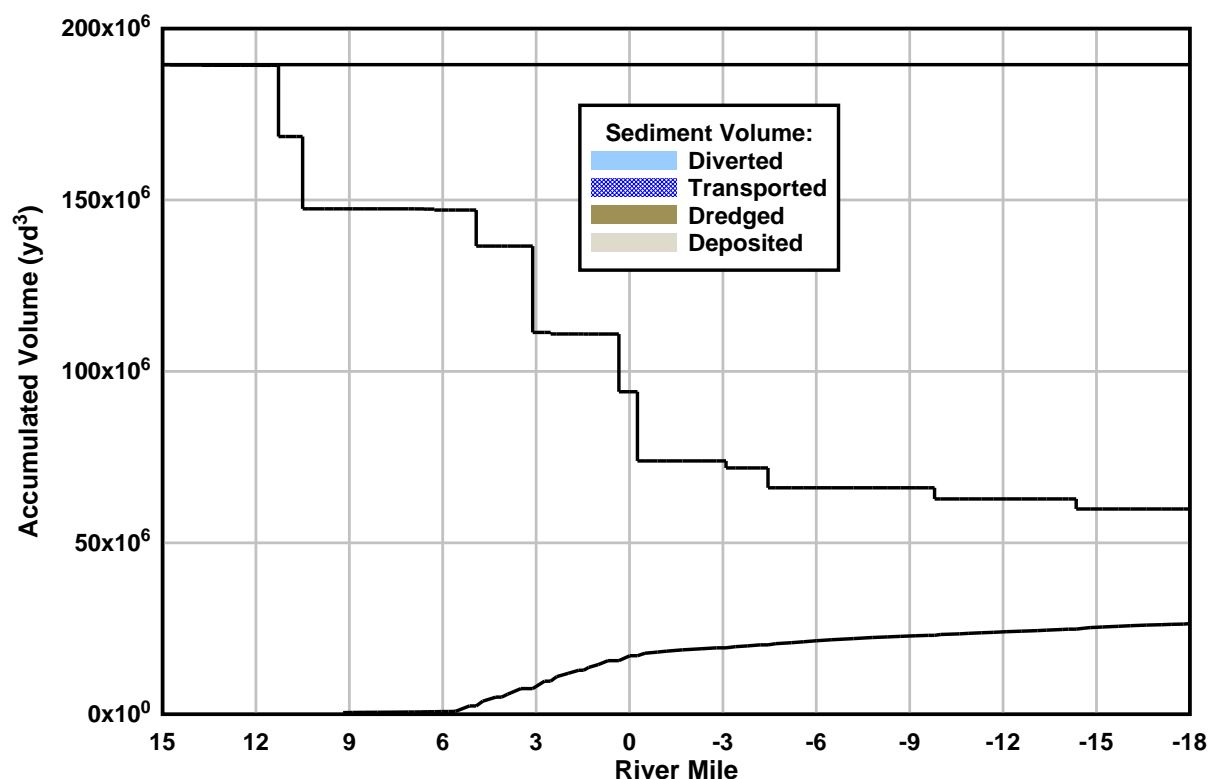


Figure C-2 - Average annual transport and fate of sediment passing the Venice Discharge Range (RM 12.5) and entering the Southwest Pass dredging reach estimated from multi-decade 1D sedimentation model simulations. Annual variations in the estimated values are significant because the annual sediment inflow can vary by a factor of five.

C-2.1.2.4 Methodology/Alternatives

Long-term sedimentation processes were simulated for the 45, 48, and 50ft draft channels and compared to estimate the relative change in required maintenance dredging at each dredging site over the project life. The comparisons were based on the final 50 years of each model simulation. Daily water and sediment inflows at the upstream boundary of the model were derived from the historical record from 1954 through 2003 adjusted for current operations at the Old River Control Complex. Gulf water levels at the downstream boundary of the model were adjusted monthly to account for seasonal changes in the level of the Gulf of Mexico. Simulations for each channel



depth were conducted for no eustatic sea level rise and for the rates proposed by the NRC 1 and NRC 3 curves, 0.5 and 1.5 meter rises at year 2100 respectively.

For this study, all of the historical dredging templates used in the model were adjusted as needed to incorporate design channel widths and side slopes. At the time of model construction, template invert elevations in the Venice to the Gulf of Mexico reach were referenced to MLG-SWP. Subsequent model studies, including the multi-dimensional model studies described in sections C2.1.3 and C2.1.4, will use templates referenced to MLLW. Template invert elevations in the crossing reaches were referenced to the LWRP. In the 1D model, all template invert elevations were converted to NAVD88 as described in Tables C-1 and C-2. Dredging template elevations were not adjusted for eustatic sea level rise during the model simulations. Thus, computed dredging quantities near the end of the 50-year simulation are probably over-estimated for the NRC 3 scenario and to a much lesser extent for the NRC 1 scenario.

The volume of computed dredging in the Venice to the Gulf reach was relatively insensitive to channel deepening. Under existing conditions, the channel traps nearly all of the available sand and most of the silt transported into the reach. Thus, the primary effect of channel deepening in this reach is to shift deposition slightly upstream. Computed dredging volumes are probably more sensitive to estimates of water and sediment diversion from this reach than to the channel depth (See Figure C-2).

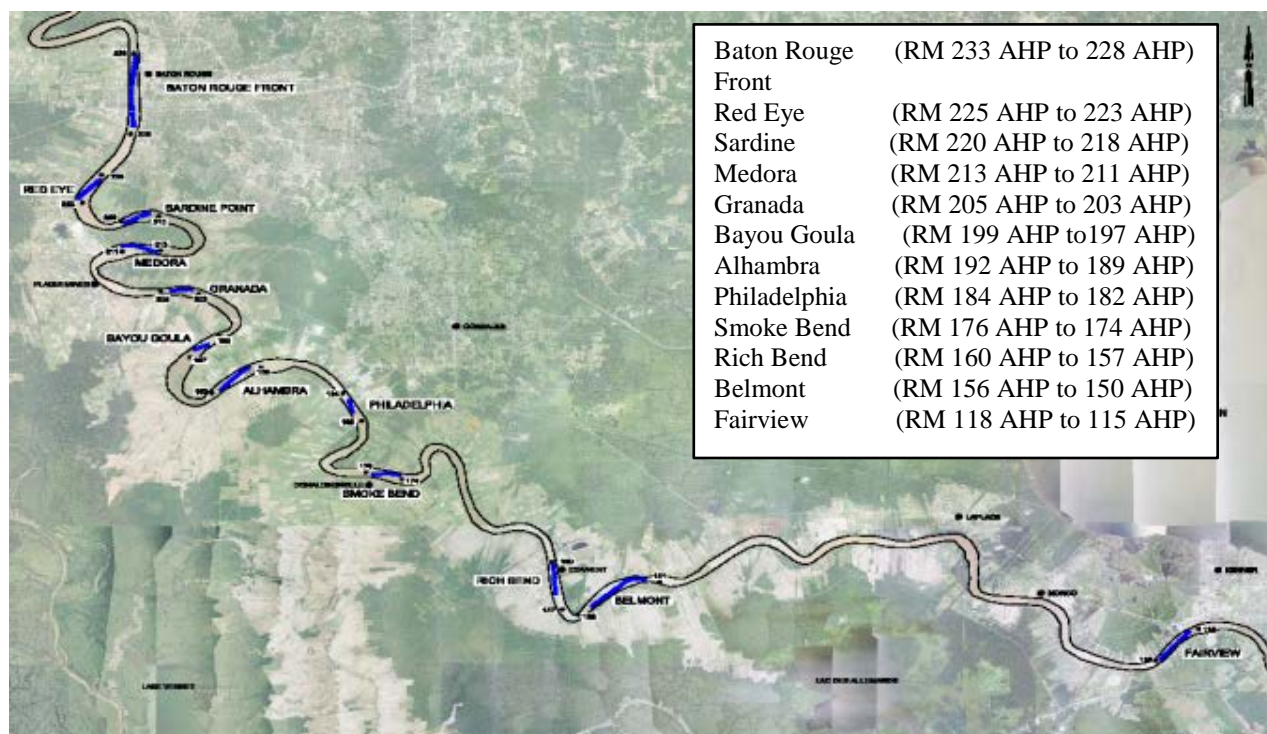


Figure C-3 Ship channel crossings requiring periodic maintenance dredging

Dredging operations are conducted in the model when deposition in the navigation channel exceeds a specified trigger elevation. Traditionally, the trigger elevation has been based on the amount of over-dredging allowed in the dredging template, thus simulated dredging operations are initiated whenever sediment deposition exceeds the depth of over-dredging. This approach, referred to as the “more aggressive dredging schedule” yields a conservative estimate of potential deposition in the navigation channel but may force dredging in some locations where shoaling does not impede navigation. Additionally, by maintaining greater channel depths, this option may induce some deposition that would not occur in the prototype. A “less aggressive dredging schedule,” where the trigger elevation was set 1ft below the authorized depth, also was evaluated in this study. For both schedules, dredging operations in the crossings were only conducted when the Mississippi River discharge was less than 600,000 cubic feet per second (cfs), and sediment dredged from each crossing was reintroduced into the river immediately downstream of the crossing. Sediment dredged from the Southwest Pass reach was removed from the model.

C-2.1.2.5 Results

Computed average annual dredging quantities over the 50-year project life are presented in Annex 1. The “Dredging Index” is the ratio of the computed dredging quantities for a specific set of locations and test scenario to the corresponding quantities for a base condition identified in the table header. It describes the relative impacts of channel deepening on historical and projected



future dredging and should be considered more reliable than absolute quantities computed by the model.

Table C-1 - Dredging Template Summary for Southwest Pass

Dredging Reach	Southwest Pass		
River Mile	11.0	2.0	17.8 BHP
* MLLW (ft) to NAVD88	0.3	0.3	-0.7
	Channel invert (ft) NAVD88		
45ft channel	-48.2	-48.2	-49.2
48ft draft	-51.2	-51.2	-52.2
50ft draft	-53.2	-53.2	-54.2
Advanced Maintenance	6ft		
Over-dredging allowance	2ft		
	Dredge cut invert (ft) NAVD88		
45ft draft	-56.2	-57.2	-57.2
48ft draft	-59.2	-59.2	-60.2
50 ft draft	-61.2	-61.2	-62.2
Bottom width	750ft		
Side slopes	1 on 5		
*MLLW may be estimated by linear interpolation between RM 17.8 BHP and RM 2.			

In the Southwest Pass dredging reach, both dredging schedules produced similar results with the more aggressive dredging schedule producing slightly greater quantities but slightly smaller dredging indices. Along with the increase in dredging quantities, the model indicates an upstream shift in deposition in response to channel deepening. Rising sea levels can also be expected to shift deposition upstream.

It should be noted that the 1D model does not address the extent or frequency of salinity intrusion due to channel deepening or relative sea level rise. The salt water wedge is present throughout the year in Southwest Pass and during low flow conditions may intrude upstream of Head of Passes. Fine sediments tend to flocculate when fresh water encounters saline water enhancing sediment deposition. Increased frequency and extent of salinity intrusion, due to channel deepening or relative sea level rise, could increase the contact area between fresh and saline water. However,



such increases are most likely during low flow periods when fine sediment concentrations are relatively low.

Table C-2 - Dredging Template Summary for Crossings

Dredging Reach	Crossings				
River Mile	231	204	183	153	117
*Low Water Reference Plane (ft) NAVD88	2.5	1.9	1.6	1.2	0.8
	Channel invert (ft) NAVD88				
45ft channel	-42.5	-43.1	-43.4	-43.8	-44.2
48ft draft	-45.5	-46.1	-46.4	-46.8	-47.2
50ft draft	-47.5	-48.1	-48.4	-48.8	-49.2
Advanced Maintenance	3ft				
Over-dredging	2ft				
	Dredge cut invert (ft) NAVD88				
45ft draft	-47.5	-48.1	-48.4	-48.8	-49.2
48ft draft	-50.5	-51.1	-51.4	-51.8	-52.2
50ft draft	-52.5	-53.1	-53.4	-53.8	-54.2
Bottom width	500ft				
Side slopes	1 on 5				
*Consult current definition of the LWRP to determine elevations at a specific crossing.					

Computed dredging quantities in the crossings are much less reliable than computed quantities in the Southwest Pass reach. While the dredging descriptions used in earlier models produced reasonable reproductions of observed dredging in the 1990's, these descriptions do not reproduce subsequent increases in observed dredging. An attempt was made to create more consistent descriptions for this study. With these adjustments, the more aggressive dredging schedule produced combined quantities for all crossings for the 45ft channel that were about 25% less than historical quantities. The less aggressive schedule fared far worse, and neither schedule matched the historical distribution of dredging among individual sites. At individual sites where the model is grossly under-predicting dredging requirements for the 45ft channel, large values of the dredging index should not be considered predictive of expected behavior. For the individual sites where computed quantities for the 45ft channel were within the range of historical observations, the



model indicated significant increases, 50% to 200%, in the dredging index when the channel was deepened to 48 or 50 ft.

Since the model estimates of dredging at individual crossings were not reliable, the best available option to account for the potential increase in the sediment trap efficiency of a deeper channel is to apply the estimated dredging index to recent historical dredging requirements.

Modeling efforts to date indicate that the observed increase in dredging in the crossings over the last decade may not be entirely due to increased river flows. Little and Biedenharn (2014) suggest that this reach of the river switched from a degradational or equilibrium state to an aggradational state in the 1990's. Additional studies are needed to determine what factors are responsible for this shift and if the shift is likely to persist into the future. The two-dimensional sedimentation model currently under development (section C2.1.3) may provide some additional insights into specific processes, e.g., rate of point bar development, affecting dredging requirements.

C-2.1.2.6 Stage Impacts of Channel Deepening

Daily stage profiles in the Lower Mississippi River were computed with HEC-6T, a one-dimensional (1D) sedimentation model over a 50-year period for authorized channel depths of 45, 48, and 50 feet. To estimate the impacts of varying channel depth, computed stage profiles through Southwest Pass and in a 25 mile reach above Head of Passes are presented in Figures C4-C7 for selected river discharges at the beginning and end of the 50-year simulation. The simulation included bed profile adjustments due to sedimentation processes and maintenance dredging required to maintain the navigation channel. The model geometry was developed from the 1992 comprehensive bathymetric survey and was calibrated to observed water surface profiles and channel morphology during the 1992-2004 time period.

Computed stage profiles at the beginning and end of the 50-year simulation for an authorized depth of 45ft are presented in Figure C-4 for three index flows. The model extends over 300 miles upstream to Tarbert Landing, and the flows are described in terms of the river discharge at the upstream boundary of the model. Computed flows throughout the model are adjusted to account for diversions of water and sediment. In descending order, the index flows represent a major flood event, a near bank-full flow, and a typical low flow. The slope of the stage profile increases with increasing river discharge.

The model includes approximately 0.75ft of eustatic sea level rise during the 50-year simulation period. This increase in the mean level of the Gulf of Mexico accounts for almost all of the increase in stage shown in Figure C-4 from the beginning to the end of the simulation. In the prototype, the increase in stage due to sea level rise may be moderated by increased flow diversions at existing distributaries. The existing 1D model does not include estimates of these potential changes in diversion rates.



Computed stage profiles at the beginning and end of the 50-year simulation for an authorized depth of 50ft are presented in Figure C-5 for the same flows. Again, almost all of the increase in stage during the simulation may be attributed to eustatic sea level rise.

The initial (Year 0) stage profiles for the 45 and 50ft channels are compared in Figure C-6. As compared to the 45ft channel, increasing the authorized depth to 50ft results in a small decrease in stage throughout this reach. For low flows, the decrease in stage is insignificant. For flood flows, the decrease is typically less than 0.2ft with the largest decreases occurring between the West Bay Sediment Diversion at River Mile (RM) 4.7 and Venice (RM 10.5). Stage profiles for an authorized channel depth of 48ft would be expected to plot between the 45 and 50ft profiles shown in Figure C6.

The final (Year 50) stage profiles for the 45 and 50ft channels are compared in Figure C-7. The response to increased navigation channel depths is similar but slightly smaller than the response indicated in the initial stage profiles presented in Figure C-6. This difference in response can be attributed largely to eustatic sea level rise which caused a general decrease in water surface slope. Some of the difference may also be attributed to variations in sediment erosion and deposition and the timing of simulated dredging events during these two model simulations. Both the computed decreases in stage and water surface slope imply corresponding decreases in mean channel velocity.

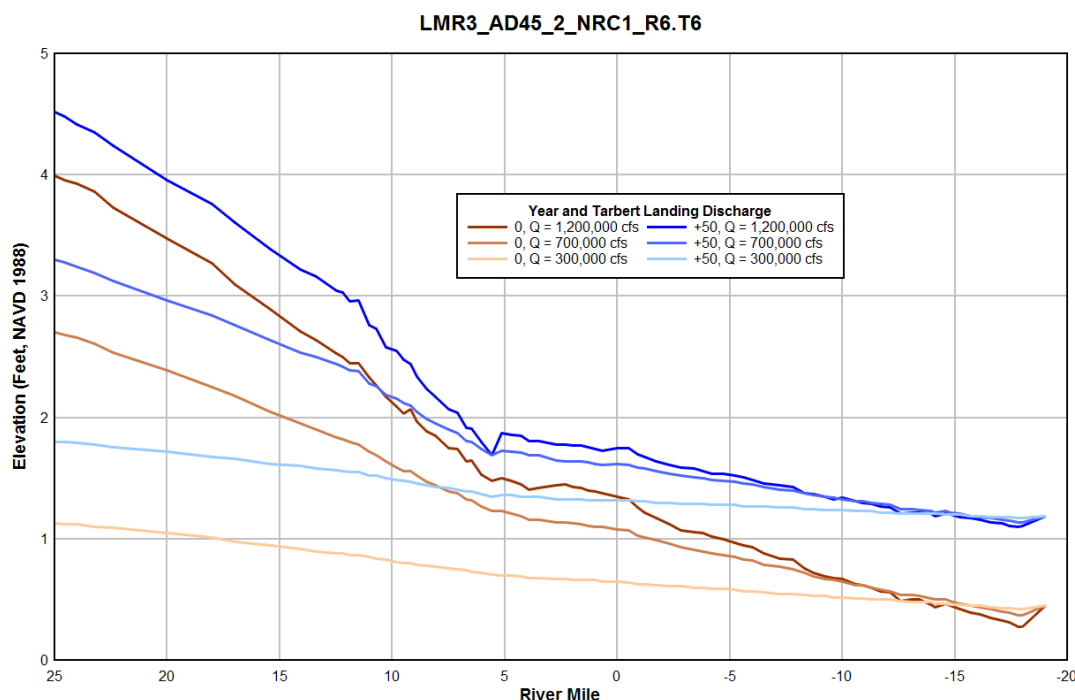


Figure C-4 Computed stage profiles are shown for selected flows at the beginning and end of the project for an authorized depth of 45 feet. The primary driver for stage increases over the life of the project is eustatic sea level rise (NRC 1 curve).

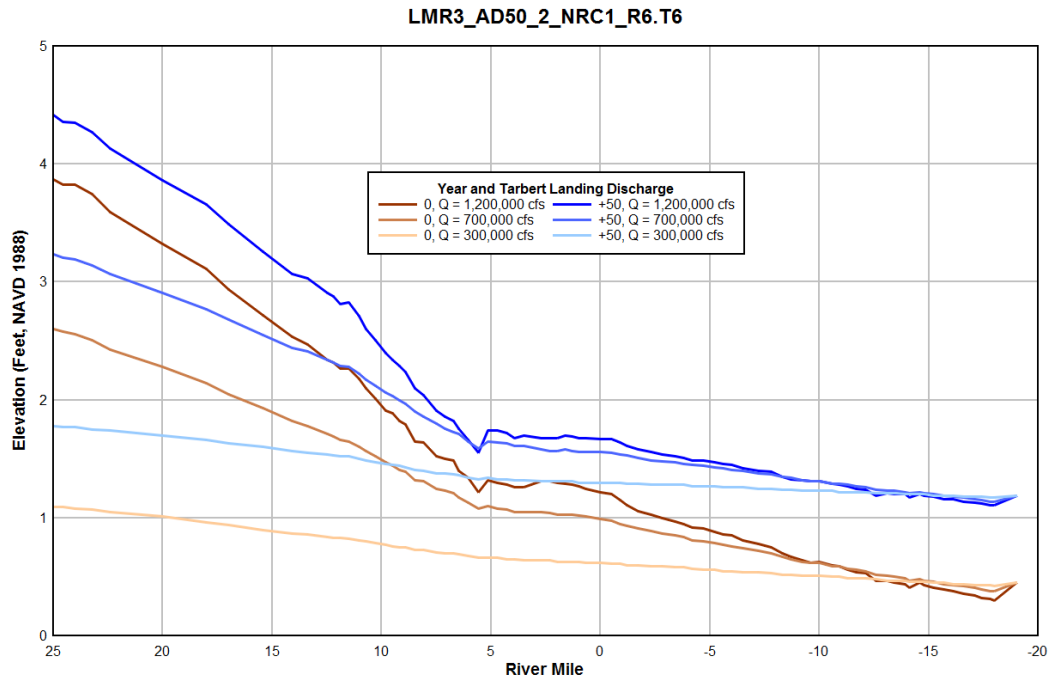


Figure C-5 Computed stage profiles are shown for selected flows at the beginning and end of the project for an authorized depth of 50 feet. The primary driver for stage increases over the life of the project is eustatic sea level rise (NRC 1 curve).

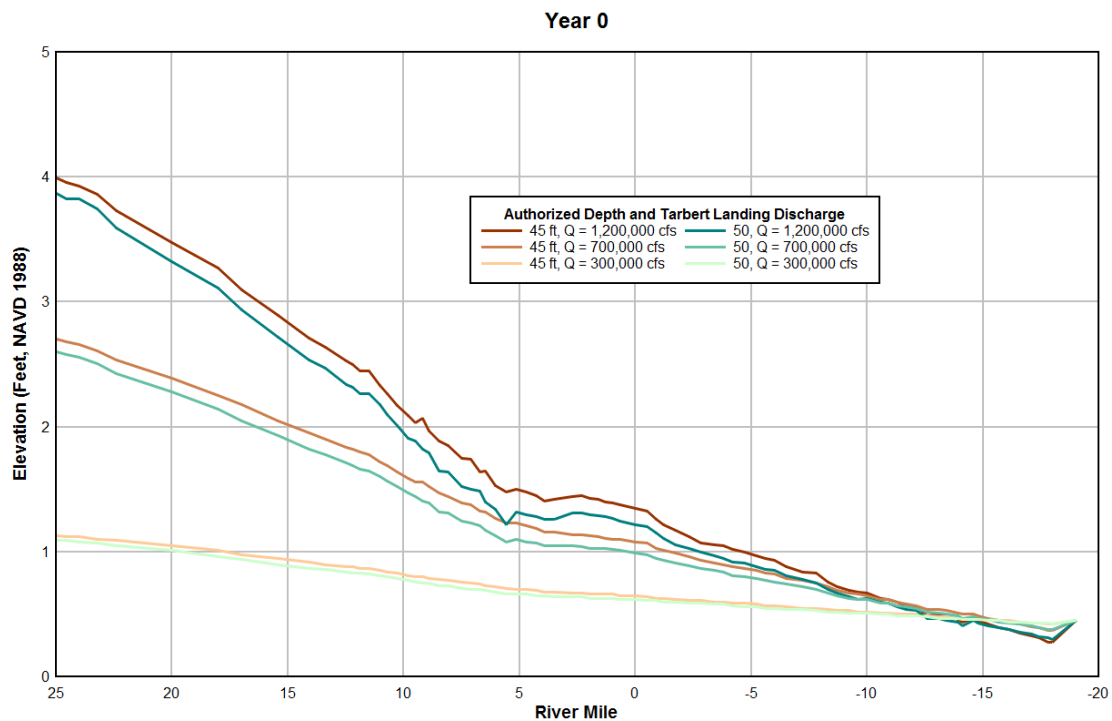


Figure C-6 - Increasing the authorized channel depth from 45 to 50ft slightly lowers the initial computed stage profile. The difference in stage is insignificant at low flows and typically less than 0.2ft for flood flows.

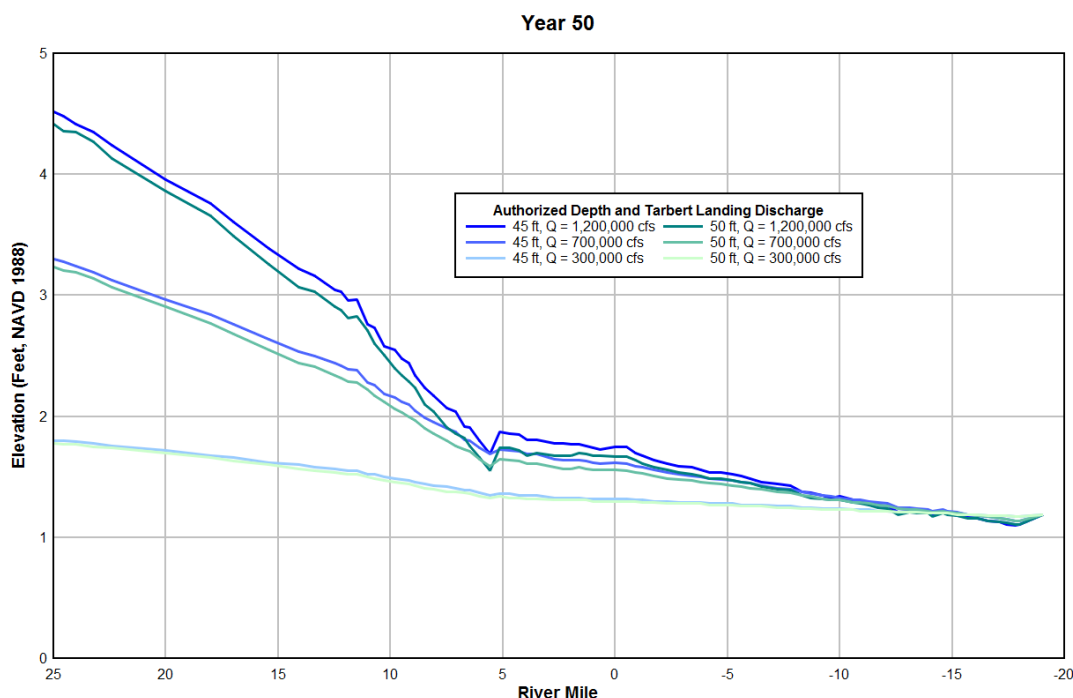


Figure C-7 - The computed reduction in stage due to deepening of the navigation channel persists throughout the 50 year model simulation. The magnitude of the reduction is slightly less at the end of the simulation.

C-2.1.3 Two Dimensional Model

As part of the analysis of proposed channel deepening in the Mississippi River, the AdH model (coupled to SEDLIB) that was developed for the Mississippi Hydrodynamic and Delta Management Study is being applied to address the potential dredging impacts associated with channel deepening in the Mississippi River below Baton Rouge.

The 2D model is being used to address the effects of spatial heterogeneity on dredging requirements in the crossings. For example, if dredging in a particular crossing is a result of the encroachment of a point bar in to the dredge cut, rather than the (more) uniform filling of the cut by pure deposition, this non-uniform filling could alter the effect of deepening on the dredging requirements.

The 2D model has already yielded results, but these results are being subjected to QA/QC requirements and additional sensitivity analyses before being added to the technical database made available to decision makers for this analysis.

C-2.1.4 Three Dimensional Model

The project TSP will be evaluated using a 3D model in order to determine the project impact on salinity intrusion and shoaling. The model to be used was developed under the Mississippi Delta



& Hydrodynamics Study and is documented in “A Report on the Development, Calibration and Initial Application of a Delft3D Z Coordinate Model in the Mississippi Delta”, December 2015. Further evaluation of the model’s capabilities is documented in “1st Addendum to “A Report on the Development, Calibration and Initial Application of a Delft3D Z Coordinate Model in the Mississippi Delta, December 2015, July 2016, DRAFT report. The Z-model grid coverage is shown in Figure C-8.

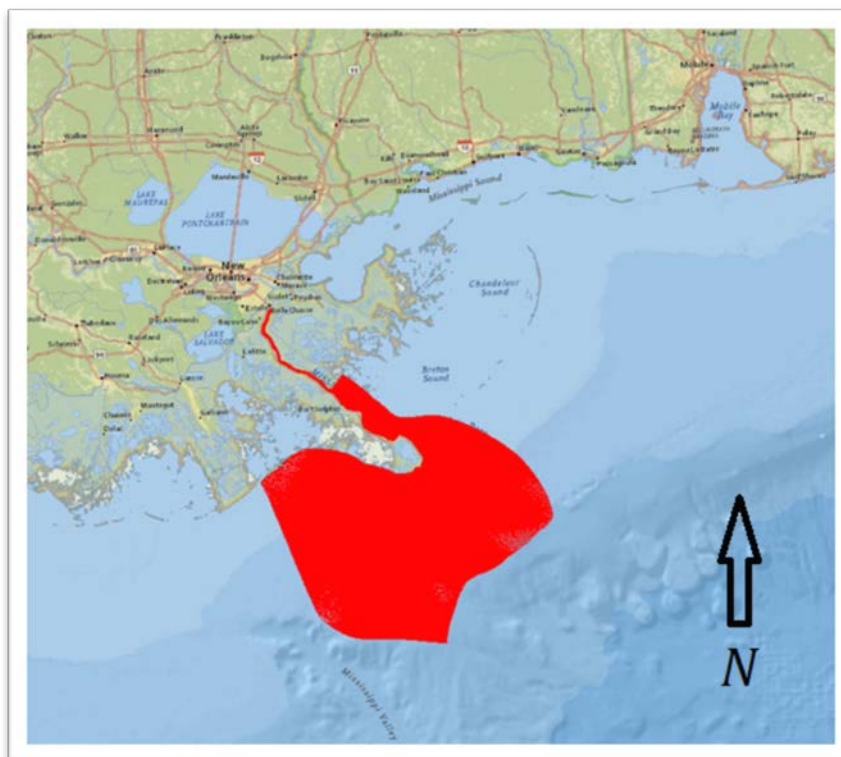


Figure C-8 – Coverage of Delft3D Z-model in the Mississippi Delta.

The intermediate eustatic sea level rise scenario will be applied at the tide boundary for the 2025 and 2075 conditions. Subsidence will be applied to the bathymetry using the future ADH bathymetry as a guideline. The river hydrograph and sediment load will be identical to those reported in the model addendum. The model results with the TSP, future sea level conditions, and bathymetry modified by subsidence will be compared to the 2012/13 existing conditions as reported in the aforementioned addendum.

C-2.2 Water Quality

C-2.2.1 Regulatory Overview

The Clean Water Act (CWA) established a process for states to assess water quality. Section 305(b) requires states to develop a surface water quality monitoring program, and a report



describing the water quality status of state waterbodies with respect to support of designated uses. Section 303(d) requires states to develop and list Total Maximum Daily Loads (TMDLs) for impaired waterbodies (waterbodies with water quality unsupportive of one or more designated uses). A TMDL is the maximum amount of the pollutant(s) contributing to impairment that can enter a waterbody from all sources (including nonpoint sources) and still meet water quality criteria. LDEQ implements a watershed-based approach to reduce pollutant loads in the waterbodies where TMDLs have been established, through the Louisiana Pollutant Discharge Elimination System (LPDES) and Louisiana Nonpoint Source (NPS) programs. For the purpose of state water quality assessment, Louisiana is divided into twelve major basins, which are further divided into waterbodies known as subsegments. The 2014 Louisiana Water Quality Inventory: Integrated Report is the biennial publication prepared by the Louisiana Department of Environmental Quality (LDEQ) on the status of Louisiana waters in accordance with Sections 305(b) and 303(d) (LDEQ 2014).

Designated Uses

Louisiana Surface Water Quality Standards (LAC 33:IX.11) define eight designated uses for surface waters: primary contact recreation; secondary contact recreation; fish and wildlife propagation; drinking water supply; oyster propagation; agriculture; outstanding natural resource; and limited aquatic life and wildlife use. Designated uses for each waterbody and water quality criteria for each designated use are included in the standards. Definitions for the designated uses common to most Louisiana waterbodies are as follows:

- *Primary Contact Recreation:* any recreational or other water contact activity involving prolonged or regular full-body contact with the water and in which the probability of ingesting appreciable amounts of water is considerable. Examples of this type of water use include swimming, skiing, and diving.
- *Secondary Contact Recreation:* any recreational or other water contact activity in which prolonged or regular full-body contact with the water is either incidental or accidental, and the probability of ingesting appreciable amounts of water is minimal. Examples of this type of water use include fishing, wading, and boating.
- *Fish and Wildlife Propagation:* the use of water for aquatic habitat, food, resting, reproduction, cover, and/or travel corridors for any indigenous wildlife and aquatic life species associated with the aquatic environment. This use also includes the maintenance of water quality at a level that prevents damage to indigenous wildlife and aquatic life species associated with the aquatic environment, and contamination of aquatic biota consumed by humans.



- The use subcategory of *limited aquatic life and wildlife* recognizes the natural variability of aquatic habitats, community requirements, and local environmental conditions. *Limited aquatic life and wildlife* use may be designated for waterbodies having habitat that is uniform in structure and morphology, with most of the regionally expected aquatic species absent, low species diversity and richness, and/or a severely imbalanced trophic structure. Aquatic life able to survive and/or propagate in such waterbodies includes species tolerant of severe or variable environmental conditions. Water bodies that might qualify for the *limited aquatic life and wildlife* use subcategory include intermittent streams, and naturally dystrophic and man-made waterbodies with characteristics including, but not limited to, irreversible hydrologic modification, anthropogenically and irreversibly degraded water quality, uniform channel morphology, lack of channel structure, uniform substrate, lack of riparian structure, and similar characteristics making the available habitat for aquatic life and wildlife suboptimal.

If a designated use is not fully supported, the waterbody is considered to be impaired, and suspected causes and sources of impairment are identified. A suspected cause of impairment is a water quality criteria violation associated with impairment (e.g., low dissolved oxygen, non-native aquatic plants), while a suspected source of impairment is an activity, event, or condition associated with a suspected cause of impairment (e.g., agriculture, chemical spills, natural conditions).

Water Quality Criteria

Water quality criteria are elements of state water quality standards expressed as constituent concentrations, levels, or narrative statements representing the quality of surface waters supporting a particular designated use. When criteria are met for a designated use, surface water quality is expected to support the designated use. Louisiana has both general and numeric criteria (LAC 33:IX.1113). General criteria are expressed in a narrative form, and include aesthetics, color, suspended solids, taste and odor, toxic substances (in general), oil and grease, foam, nutrients, turbidity, flow, radioactive materials, and biological and aquatic community integrity. Numeric criteria are generally expressed as concentrations or scientific units, and include pH, chloride, sulfate, total dissolved solids, dissolved oxygen, temperature, bacteria, and specific toxic substances.

The U.S. Environmental Protection Agency (USEPA) has published criteria guidance and recommendations for a number of substances, and states may incorporate these without modifications into their water quality standards. Although states generally use USEPA guidance and recommendations for developing and adopting their own criteria, they are allowed to develop their own methodology. USEPA guidance and recommendations are continuously developed and revised.



National criteria recommendations have been established for the protection of both aquatic life and human health. Aquatic life criteria are designed to protect all aquatic life (plants and animals), and include acute criteria for short-term exposures (e.g., spills) and chronic criteria for long-term exposures. Separate criteria are available for fresh and salt waters. Criteria may be dependent upon other water quality characteristics such as pH, temperature, or hardness. Human health criteria are numerical guidelines for the potential risk of adverse effects to humans due to substances in water. Factors considered include body weight, risk level, fish consumption, drinking water intake, and incidental ingestion while swimming. Criteria are available for public drinking water supply and non-drinking water.

Louisiana Pollutant Discharge Elimination System

The LPDES Program administers permitted wastewater discharges into state surface waters, allowing the state to control the amounts and types of wastewaters discharged into its waters in order to meet water quality standards. The program began in 1996, when LDEQ adopted responsibility for administering the permitting, compliance, and enforcement activities of the National Pollutant Discharge Elimination System (NPDES) from the USEPA.

Louisiana Nonpoint Source Program

The Louisiana NPS Program administers nonpoint source pollution management in accordance with Section 319(h)(11) of the CWA, as another measure for meeting water quality standards. It includes partnering with stakeholders and other statewide nonpoint source pollution management programs for the development and execution of watershed implementation plans for reducing nonpoint source pollution, as well as educational outreach with the same objective (LDEQ 2014).

C-2.2.2 Historic and Existing Conditions

Mississippi River

The Mississippi River basin is the largest watershed in the U.S., draining 41% of the land area of the lower 48 states. The study area portion of the watershed can be seen in Figure C-9. River water quality is influenced by both natural and anthropogenic sources, and is controlled by interacting factors such as water acidity, abundance of major inorganic and organic compounds, and suspended sediment.

Natural erosion and weathering of crustal materials influences river water quality by releasing dissolved solids along with small amounts of metals, nutrients, and organic materials. Mississippi River water is considered to be bicarbonate-type, because bicarbonates associated with highly soluble rock and soil in the basin are the primary dissolved salt in river water (Meade 1995). Bicarbonate-type water is slightly alkaline, which influences the partitioning of constituents; for



example, metals in bicarbonate-type water associate with suspended particulates or bed sediments, rather than being in the dissolved phase.

Man's activities in the basin affect both water quality and quantity, and include industry, development, mining, agriculture, and river engineering (e.g., Turner and Rabalais 2003, Raymond et al. 2008). Current anthropogenic influences on river water quality include agriculture, development, and river engineering. The combination of runoff of fertilizer primarily applied for large-scale farming of corn and soybeans in the basin and changes in watershed land cover through development promote elevated nitrate levels in the river (Broussard 2008). Another byproduct of agricultural chemical application in the basin is the presence of pesticides in river water, with the pesticide of greatest ecological concern being atrazine. Atrazine is a broad-leaf herbicide used for weed control that is highly mobile and slow to degrade in surface waters. It can act as an endocrine disruptor for amphibians at concentrations as low as 1 µg/L, and can inhibit root growth of marsh vegetation (Demcheck and Swarzenski 2003, Swarzenski et al. 2005). It is the second most heavily applied pesticide in the lower 48 states (Thelin and Stone 2013). In addition to chemicals associated with agricultural runoff, the river is known for its diminished but still significant suspended sediment load (Meade and Moody 2010). Factors which are suspected to have led to diminished suspended sediment loads in the river primarily include river engineering works and agricultural soil conservation.

River water quality varies due to factors such as seasonality, changing farming practices, and rainfall patterns. As this relates to agricultural runoff and suspended sediment, fertilizer and pesticide concentrations in the river are dependent on their physiochemical properties, timing of application and subsequent rainfall, crop selection, and Federal farm policy, while suspended sediment concentration, load, and grain size distribution are dependent on factors such as river discharge, time between flood events, and water depth (Meade 1995, Allison et al. 2010, Rosen and Xu 2014).

Anthropogenically-induced changes in Mississippi River water quality are primarily related to population increases within the river's watershed and development practices, including the adoption of agricultural soil conservation practices beginning in the 1930s; the construction of major river engineering works during the 20th century; increasing use of fertilizers and pesticides, particularly for industrial farming; and insufficient regulation of point source pollution prior to effective enforcement of the CWA.



Figure C-9 – Study Area within the Mississippi River Watershed

Table C-3, adapted from Garrison (1998), includes a water quality summary for three long-term (periods of record ranging from 1905-1995) monitoring stations in the Mississippi River.



Table C-3 - Mississippi River Water Quality Summary, from Garrison (1998) (BDL = Below Detection Limit)

Group	Parameter	Units	Mississippi River at New Orleans, Louisiana (8)			Mississippi River at Violet, Louisiana (9)			Mississippi River at Belle Chasse, Louisiana (10)		
			Percentile			Percentile			Percentile		
			25 th	50 th (Median)	75 th	25 th	50 th (Median)	75 th	25 th	50 th (Median)	75 th
Physical properties	Specific Conductance	µmhos/cm	346	406	462	324	358	450	332	402	461
	pH	SU	7.3	7.6	7.9	7.4	7.6	7.8	7.3	7.6	7.8
	Water Temperature	°C	11.5	19	28	10.5	17.5	26.2	11	19.2	26.5
	Dissolved Oxygen	mg/L	6.5	8	9.5	7.1	8.1	9.6	6.8	7.9	10.2
	Dissolved Solids	mg/L	208	245	275	201	220	254	214	249	286
Major cations	Calcium (Dissolved)	mg/L	36	41	45	35	38	44	35	39	43
	Magnesium (Dissolved)		9.7	12	13	9.6	11	13	9.8	12	14
	Sodium (Dissolved)		16	22	28	15	18	26	15	20	28
	Potassium (Dissolved)		2.8	3.3	3.5	2.5	2.9	3.3	2.8	3.3	3.6
Major Anions	Alkalinity (Total, as CaCO ₃)	mg/L	90	106	118	89	98	115	88	105	120
	Sulfate (Dissolved)		44	53	62	40	46	57	38	48	59
	Chloride (Dissolved)		19	25	30	18	22	29	20	26	32
Nutrients	Ammonia + Organic Nitrogen (Total, as N)	mg/L	0.5	0.7	0.9				0.5	0.7	1
	Nitrate + Nitrite (Total, as N)		0.88	1.2	1.6	0.85	1.2	1.4	1.1	1.4	1.7
	Phosphorus (Total, as P)		0.18	0.24	0.31	0.2	0.24	0.3	0.14	0.2	0.27
Biological Constituents	Fecal coliform	Col/100 mL	170	280	460	2,000	3,100	3,600	140	310	800
	Fecal streptococcus		200	440	880				120	280	750
	Phytoplankton	Cells/mL	760	1,400	2,800				880	1,800	4,100
Metals	Iron (Dissolved)	µg/L	BDL	20	40	BDL	BDL	30	BDL	20	29
	Zinc (Dissolved)		BDL	BDL	20	BDL	BDL	BDL	BDL	BDL	BDL
Organic Compounds	2,4-D (Total)	µg/L	BDL	BDL	0.2	BDL	BDL	BDL			
	Phenols (Total)					BDL	1	2			
	Oil and Grease (Total Recoverable)	mg/L				BDL	BDL	1			
	Organic Carbon (Total)		3.6	5.6	7.7	6	6.2	8.5	5.2	6.7	8.9

Factors affecting river water quality historically within the watershed are summarized in Turner and Rabalais (2003), and primarily include increasing watershed population and development, lack of soil management practices, removal or replacement of native vegetation, and farming. These factors are thought to have contributed to increases in river suspended sediment and nitrogen concentrations, which correlate with elevated suspended sediment concentrations near the turn of the 20th century and increases in offshore diatom densities since the 19th century. Fertilizer and pesticide application from industrial farming practices have been correlated with increases in river and tributary nitrate concentrations, and the presence of pesticides in these waterbodies. During the second half of the 20th century, nitrate concentrations in the lower river increased from 0.56 to 1.45 mg/L, correlating strongly with a shift to intensive farming of corn and soybeans in the basin, particularly in the Midwest (NSTC/CENR 2000, Broussard 2008, Broussard and Turner 2009). Elevated nutrient concentrations in river water reaching the Gulf of Mexico have been linked to the formation of the annual Gulf of Mexico hypoxic zone, a nearshore area along the Louisiana and Texas coastline ranging in size from 5,000-20,000 square miles with hypoxic bottom waters, which generally appears during the summer months. Most nearshore aquatic organisms are not adapted for life in hypoxic waters and will die if unable to migrate in a timely manner to areas with higher, habitable dissolved oxygen concentrations (NSTC/CENR 2000). Atrazine, developed in the 1950s and therefore previously nonexistent in river water, is now



present at concentrations ranging from 0.1-1.4 $\mu\text{g/L}$ (Demcheck and Swarzenski 2003). The combination of elevated nitrate and atrazine in the river has been linked to wetland losses in areas of coastal Louisiana receiving chronic river water inflows (Swarzenski et al. 2005, 2008). Additionally, there is evidence that agricultural practices and land use have led to increasing river discharge:precipitation and bicarbonate load:river discharge relationships, suggesting that agricultural activities in the basin may be affecting loadings of major ions and agricultural pollutants besides nitrate and atrazine, and increasing river water alkalinity (Raymond et al. 2008).

Decreasing suspended sediment concentrations in the lower river have been linked to river engineering and agricultural soil conservation practices within the basin. The construction of river engineering works in the 1950s and 1960s (particularly the dams along the Lower Missouri River, the largest tributary source of sediment to the lower river), construction of dikes and revetments along the lower river, and agricultural soil conservation practices implemented within the basin are believed to be the major factors contributing to the 60% reduction in the suspended sediment load of the lower river since 1900 (Meade and Moody 2010). Based on watershed and riverine modeling, a 17% reduction has occurred when comparing present loads with calculated loads for the time period prior to European settlement within the watershed, suggesting that watershed development before the adoption of agricultural soil conservation practices contributed to unnaturally elevated suspended sediment loads in the lower river (Tweel and Turner 2012). Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012).

River water quality has also been impacted by inflows of industrial and municipal effluent, as well as unpermitted point source discharges. Insufficient and ineffective regulation of point source pollution until the late 20th century contributed to water quality problems related to organic enrichment, thermal pollution, and the introduction of synthetic organic compounds and heavy metals. The enactment of the Clean Water Act and improved regulation of point sources of pollution have reduced or eliminated many of the water quality problems in the river. However, nonpoint source pollution within the watershed, especially agricultural runoff, continues to generate water quality problems. A recent increase in corn farming within the basin for the production of biofuels has the potential to increase agricultural nonpoint source pollution of the river (COMRACWA 2008). Additionally, although water quality in the river is good with respect to water quality criteria, some heavy metals as well as organic contaminants introduced to the river have an affinity for binding to suspended and bed sediments. Historical evidence suggests suspended sediment in the river may contain elevated levels of some heavy metals with respect to pollution guidelines (Meade 1995). Recent bed sediment chemistry data for samples collected in the river near diversions proposed under the LCA MRDM study suggests some low-level organic



contamination of bed sediments (Weston Solutions 2008, Providence Engineering and Environmental Group 2007).

Louisiana Water Quality Inventory

The 2014 Louisiana Water Quality Inventory: Integrated Report (IR) reports the most recent assessment of waterbody subsegments as required by Sections 303(d) and 305(b) of the CWA. For the Mississippi River, there are three applicable subsegments for the study area including:

- LA070301 (Mississippi River from Monte Sano Bayou [Baton Rouge] to Head of Passes),
- LA070401 (Mississippi River Passes – Head of Passes to Mouth of Passes [includes all passes in the birdfoot delta]), and
- LA070601 (Mississippi River Basin Coastal Bays and Gulf Waters to the State 3 mile limit)

Table C-4 provides the 2014 IR's summary information for the applicable waterbody subsegments as presented in Appendix A of the IR. The upper reaches of the river within the study limits are fully supporting the assigned designated uses. However, the lower reach (coastal/Gulf waters) are listed as impaired due to the reasons shown below. LDEQ has developed a TMDL for mercury in fish tissue impairment while the dissolved oxygen and fecal coliform impairments are listed on the 303(d) list and require TMDL development.

Table C-4 - Mississippi River Waterbody Subsegments

Subsegment Number	Designated Uses					Impaired Use	Suspected Causes of Impairment	Suspected Sources of Impairment
	PCR ¹	SCR ²	FWP ³	DWS ⁴	OYS ⁵			
LA070301	F ⁶	F	F	F				
LA070401	F	F	F		F			
LA070601	F	F	N ⁷		N	FWP	Mercury in fish tissue	Atmospheric deposition of toxics and unknown source
	F	F	N		N	FWP	Dissolved oxygen	Upstream source
	F	F	N		N	OYS	Fecal coliform	On-site treatment systems, waterfowl, and other wildlife



¹ Primary Contact Recreation (swimming)

² Secondary Contact Recreation (boating)

³ Fish and Wildlife Propagation (fishing)

⁴ Drinking Water Supply

⁵ Oyster Propagation

⁶ Fully supporting

⁷ Not supporting

C-2.2.3 Alternative 1 (No Action Alternative Future without Project Conditions – Year 50)

Direct and Indirect Impacts: There would be no direct or indirect impacts from implementing the No Action Alternative.

Cumulative Impacts: Without the proposed project, study area water quality would likely continue current trends. For example, surface water quality has improved significantly with the implementation of the Clean Water Act and industrial and municipal discharge programs such as NPDES. These programs continue to advance with new or improved technologies to treat wastewater discharges.

The causes of impairment listed in Table C-4 above will continue to degrade water quality until TMDL development and execution, and the suspected sources are addressed. In addition, contaminants of emerging concern such as pharmaceuticals and personal care products, microplastics, etc. continue to present uncertainty for surface water quality and potential concerns for human health and the environment.

C-2.2.4 Alternative 2 (a depth of 48 ft for the Crossings and a depth of 48 ft in Lower Mississippi River)

Direct and Indirect Impacts: See Direct and Indirect Impacts section for Alternative 3 below.

Cumulative Impacts: See Cumulative Impacts section for Alternative 3 below.

C-2.2.5 Alternative 3 (a depth of 50 ft for the Crossings and a depth of 50 ft in Lower Mississippi River)

Direct and Indirect Impacts: The upper reach of the river from Baton Rouge to New Orleans has 12 crossings where channel depths are generally maintained at a depth of 45 feet. At 11 of the crossings, sediment samples were collected along with river water for chemical analyses of the sediment and dredging elutriates where dredging would occur to deepen the river. Section C5 of this report summarizes the findings of those analyses.



This section will be updated with an evaluation of any potential direct or indirect impacts as it relates to drinking water intakes (three identified) in close proximity or just downstream of the crossings locations. Figure C-10 shows the Donaldsonville intake at the Smoke Bend Crossing and Figure C-11 shows two intakes for the St. James Water Districts #1 and #2 in relation to Belmont Crossing. Based on the chemical analyses, if elutriates show concentrations of contaminants above water quality criteria potential impacts to drinking water intakes would be evaluated as necessary.

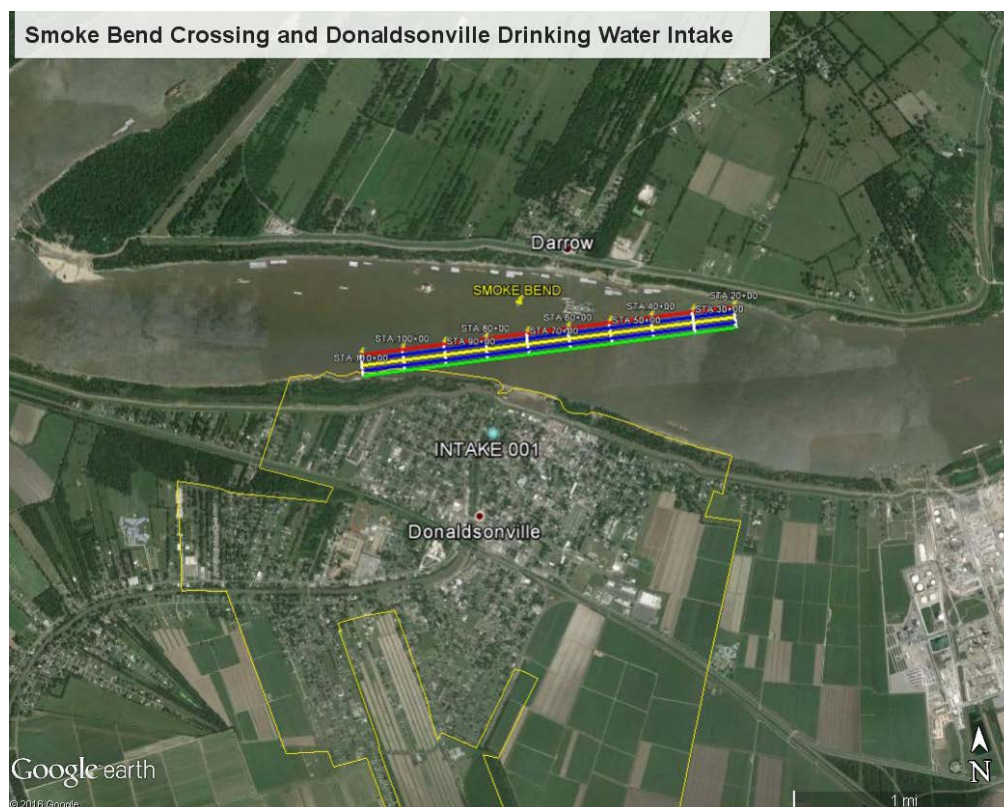


Figure C-10 – Smoke Bend Crossing and Donaldsonville Drinking Water Intake

C-2.2.6 Additional Alternatives Considered

The three alternatives as described above were reviewed and approved by the CEMVN vertical team (i.e., Division and HQ) and local sponsor at the designated Alternatives Milestone meeting on July 6, 2016 at CEMVN. These three alternatives were carried forward for the Engineering analysis concurrent to the evaluation of the draft SEIS, and economic and cost benefit analysis. Through the economic analysis additional alternatives were developed that considered combinations of the No Action and Alternatives 2 and 3 to maximize benefits and reduce costs. This resulted in new alternatives of varying depths throughout the project area. The direct, indirect and cumulative impacts of these additional alternatives will be the same as Alternative 2 and 3 or less.

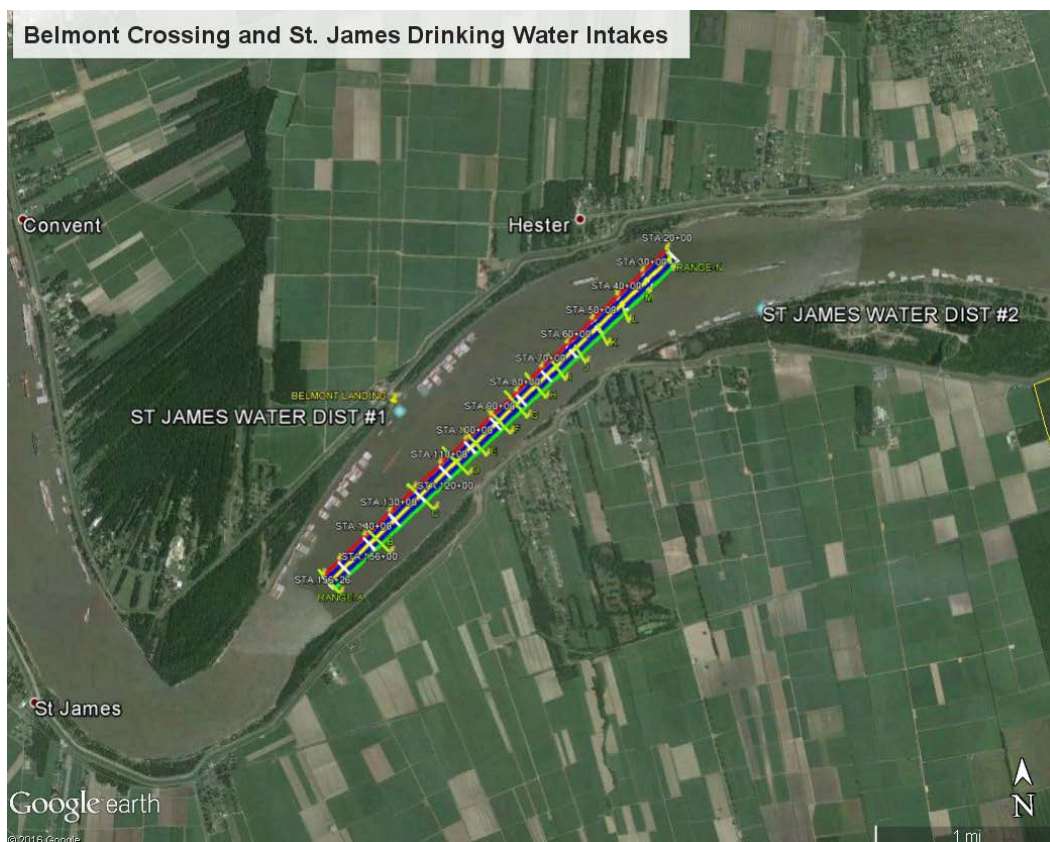


Figure C-11 – Belmont Crossing and St. James Water District #1 and #2 Intakes

In the lower section of the river, there are five water intakes that could potentially be impacted by saltwater intrusion due to deepening of the river. These include:

- Dalcour Water at river mile 81
- Belle Chasse at river mile 76
- East Pointe a La Hache at river mile 50
- Port Sulphur Water District at river mile 49
- Boothville Water at river mile 19

To evaluate this potential concern, a three-dimensional model is being developed. Section C2.1.3 of this report will document the findings of the model. This section (Water Quality) will be updated with any potential impacts to the intakes listed above.

Cumulative Impacts: With the proposed action, long-term, cumulative impacts are not anticipated as it relates to surface water quality. Near-term disturbances due to dredging activities such as



increased turbidity and potential suspension of contaminants that may exist in the bed sediments would likely have a short duration before returning to pre-dredging conditions. The dredging elutriates previously described will be incorporated into this analysis and evaluated for any potential long-term impacts to drinking water supplies once the data are available. Section C5 will discuss any potential impacts to other resources.

As described in the No Action Alternative, other on-going activities and sources of impairment will continue to influence surface water quality, which would be beyond the impacts of the proposed action.

C-3.0 GEOTECHNICAL INVESTIGATIONS AND DESIGN

This section includes the existing soils investigations for the channel deepening within the Mississippi River crossings, Cubits Gap to Head of Passes, Southwest Pass, and the Bar Channel.

C-3.1 Geotechnical Design for Channel Deepening

This portion of the report contains the plan for feasibility level geotechnical design performed for the proposed channel deepening within the river crossings, Cubits Gap to Head of Passes, Southwest Pass, and the Bar Channel. This report covers the soils, geology, foundation investigation and conditions.

C-3.1.1 Data Collection

No new borings were drilled for this project. Existing general type and undisturbed borings, Cone Penetrometer Tests (CPT), and dredged material grab samples are available throughout the entire project area.

C-3.1.2 Project Design Criteria

For this investigation, the channel depth is 50 feet MLLW in the Bar Channel, Southwest Pass, and Cubits Gap to Head of Passes with a channel width of 600 feet in the Bar Channel and 750 feet in Southwest Pass and Cubits Gap to Head of Passes. For the crossings, the channel depth is 50 feet NAVD88 with a channel width of 500 feet. A 1V on 5H slope will be used for the side slopes.

C-3.1.3 Field Investigation

C-3.1.3.1 Undisturbed Soil Borings

Numerous undisturbed soil borings exist throughout the project area. The soil borings were obtained by the USACE, A/E contract, and local sponsors. The boring plots are available through a Freedom of Information Act request.



C-3.1.3.2 General Type Soil Borings

Numerous general type soil borings exist throughout the project area. The soil borings were obtained by the USACE, A/E contract, and local sponsors. The boring plots are available through a Freedom of Information Act request.

C-3.1.3.3 Cone Penetrometer Test Data

Cone Penetrometer Test (CPT) data is available for portions of the project area, and were obtained by the USACE and A/E contract. The CPT plots are available through a Freedom of Information Act request.

C-3.1.3.4 Dredged Material Samples

Dredged material grab samples are available for portions of the project area. Spreadsheets of the data are available through a Freedom of Information Act request.

C-3.1.4 Geology

Geologic profiles have been developed for various projects along the river, and are available upon request.

The study area is located partially within the Central Gulf Coastal Plain physiographic province: the upper portion within the Mississippi River Alluvial Plain (from Baton Rouge to the vicinity of Donaldsonville), and the lower portion within the Mississippi River Deltaic Plain (from the vicinity of Donaldsonville to the gulf). The oldest deposits encountered within the study area are of Pleistocene Age (Ice Age). These deposits outcrop in the vicinity of Baton Rouge and dip beneath the surface in a southwesterly direction. At the end of the Ice Age, sea level had been lowered to a stage 400-450 feet below is present level and the Mississippi River Valley system had become deeply entrenched within the coastal plain sediments. Approximately 3,500 to 5,000 years ago, as sea level approached its present stand, the entrenched valley was gradually filled with Holocene (more recent) alluvial sediments which covered the exposed weathered and eroded surface of the Ice Age deposits. As the succeeding Mississippi River system migrated laterally back and forth across the alluvial plain, delta lobe complexes were formed below the general latitude of Donaldsonville, Louisiana. These triangle-shaped delta lobes, which continually shifted deposition to areas of steeper gradient, displaced the gulf waters and deposited fine-grained materials southeastward, eventually forming the existing deltaic plain. The modern “birds-foot” delta is continuing this process and extending deposition gulf ward toward the continental shelf. (Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981.)

C-3.1.4.1 Foundation Conditions



Between Baton Rouge and College Point, below Donaldsonville, Louisiana, the existing Mississippi River channel is incised in more recent deposits consisting of a top-stratum of relatively fine-grained soils overlying a substratum of sand and gravelly sands. The top-stratum is generally composed of natural levee clays and silts, backswamp clays and channel filling clays on the concave sides of the bends and accretionary clays, silts, and sands and point bar silts, silty sands, and sands on the convex sides of the bends. Below Donaldsonville, Louisiana, the river is incised in more recent and Ice Age deposits. Generally, on the concave sides of the bends, the banks are composed of more recent materials consisting of a top stratum of fine-grained soils overlying, and in some areas contacting laterally, Ice Age deposits. Between Donaldsonville and Kenner, Louisiana, this relatively fine-grained top-stratum consists of natural levee, undifferentiated deltaic plain, swamp, and marsh materials. Between Kenner, Louisiana, and the gulf, the top-stratum on the concave sides of the bends consists of natural levee, swamp, marsh, abandoned distributary, interdistributary, intradelta, prodelta, bay sound, estuarine, and nearshore gulf deposits. On the convex sides of the bends, the top stratum consists of accretionary and point bar deposits. The more recent top-stratum deposits are underlain by Ice Age materials throughout the area. A general physical description of the soils encountered in the various geologic environments is as follows:

- Natural levee – Interfingering layers of fat and lean clays and layers of silt.
- Point bar – Silts, silty sands and sands with thin layers of clay.
- Accretionary – Alternating layers of clay, silt, silty sands, and sands.
- Abandoned distributary – Layers of fat and lean clays, silts, and silty sands.
- Abandoned course – Layers of fat and lean clays and silts in upper portions with sands in lower portions.
- Backswamp – Homogeneous fat clays with wood, organic matter, and a few layers of silt.
- Undifferentiated deltaic plain – Fat and lean clays with lenses and layers of silt.
- Marsh – Organic clays, silts, and oozes with plant roots and particles (grasses and sedges).
- Swamp – Organic clays and silts with decayed wood (trees and shrubs).
- Interdistributary – Fat clays with thin lenses and layers of silt and a few thin layers of fine sand.
- Intradelta – Interfingered layers of silt, silty sand, and sand, with lenses and layers of fat clay (forms the sandy “barfinger” wedges at the mouth of the river).



- Prodelta – Homogeneous fat clays of medium consistency.
- Nearshore gulf – Silty sands and sand with shells.
- Estuarine – Silts, silty sands, and sands (reworked) with shells.
- Substratum – Massive sands grading to gravelly sands and gravel with depth.
- Pleistocene – Stiff to very stiff, oxidized clays with lenses and layers of silt, silty sand, and sand.
- (Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981)

C-3.1.4.2 *Terrain and Land Use*

The study area is characterized by low relief with elevations varying from a maximum of approximately 30 feet National Geodetic Vertical Datum in the vicinity of Baton Rouge, Louisiana, to a minimum near sea level in the marsh areas near the mouth of the Mississippi River. Large areas in and below New Orleans have been leveed and subjected to drainage by pumps. As a result of subsidence and shrinkage of the drainage soil, ground surface elevations as low as -10 feet are found. The most prominent topographic features are the natural levees which flank the present course, abandoned courses, and abandoned distributaries of the Mississippi River system. These natural levees form ridges which stand significantly above the surrounding swamps and marshes and vary in width from over 5 miles in the vicinity of Baton Rouge to less than 1,000 feet near the Gulf of Mexico. Drainage in the area is away from the river and its elevated natural levees into the adjoining swamps and marshes. Surrounding the natural levees in the area south and east of New Orleans, Louisiana, are vast marshes which are broken and fragmented by numerous bayous, lagoons, canals, lakes, ponds, and smaller abandoned distributaries.

The silt-laden overflow which formed the delta of the Mississippi River is now confined by a manmade levee system, the construction of which was initiated in 1712 and which now extends from Baton Rouge to Bohemia, Louisiana, on the east bank, and from above the study area to Venice, Louisiana, on the west bank. There are no natural tributaries nor distributaries through the portion on the levee system within the study area, and periodic overflow is limited to the area downstream of the artificial levees. The marshes throughout the study area are being lost to subsidence and erosion. These marshes no longer receive the sediments necessary for their stabilization or aggradation, and their rate of erosion accelerates as fetch lengths increase and wave action increases. Even though accretion is occurring at the mouths of a few of the passes of the Mississippi River, erosion is occurring in most of the marshes between the passes.



Land adjacent to the Mississippi River between Baton Rouge, Louisiana, and the Gulf of Mexico is extensively developed for agricultural, industrial, urban, and suburban uses. Excluded from this development are natural levees near the mouth of the river that are too low and narrow to justify flood protection. Protected land along the river below New Orleans, Louisiana, is used primarily for agriculture along with some suburban and industrial development. There is extensive urban, suburban, and industrial development in the vicinities of New Orleans and Baton Rouge, Louisiana, while the land between these metropolitan areas is also developed primarily for agriculture along with industrial and suburban development. Continued and increasing restrictions on crops basic to the area, due to this development, and the deep-draft navigational project in the river have accelerated a trend of decreasing agricultural activity and increasing industrialization. This trend is more pronounced in the area between New Orleans and Baton Rouge, Louisiana. Land being converted to industrial sites, for the most part, is located immediately adjacent to the river while recent residential development is mainly located near existing towns. Suburban or semirural development is also spreading along the river and is radiating out from larger population centers such as Baton Rouge and New Orleans, Louisiana. There remains, however, a considerable amount of agricultural land along the entire reach of the Mississippi River within the study area that has not been converted to other uses.

(Cited from Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana, Feasibility Study, 1981.)

C-3.1.5 Laboratory Tests

C-3.1.5.1 Testing for Undisturbed Soil Borings

For the undisturbed soil borings, visual classifications were made on all samples obtained from the soil borings. Water content determinations were made on all cohesive soil samples. Unconfined Compression (UCT) tests and Unconsolidated-Undrained (Q) shear tests were performed on samples from the undisturbed borings. Liquid and plastic limits were determined for all samples on which UCT's and Q tests were performed. The results of these tests are available through a Freedom of Information Act request.

C-3.1.5.2 Testing for General Type Soil Borings

For the general type soil borings, visual classifications were made on all samples obtained from the soil borings. Water content determinations were made on all cohesive soil samples. Unconfined Compression Tests (UCTs) were performed on samples from the general type borings. Liquid and plastic limits were determined for all samples on which UCTs were performed. The results of these tests are available through a Freedom of Information Act request.



C-3.1.5.3 Testing for Cone Penetrometer Tests

The results of the Cone Penetrometer Tests are available through a Freedom of Information Act request.

C-3.1.5.4 Testing for Dredged Material Samples

For the dredged material grab samples, classifications were made on all samples in accordance with USCS and as supplemented by “Guide for Moisture Contents Adapted to CEMVN-ED-F Soils”. Specific gravity, grain size, hydrometer, and sieve tests were performed on all samples and reports were presented containing the grain size curve, D85, D60, D50, D30, D15, D10, Cc and Cu values. Relative maximum and minimum density testing was performed on granular samples (ASTM D-4253 and ASTM D-4254). The results of these tests are available through a Freedom of Information Act request.

C-3.1.6 Foundation Design

C-3.1.6.1 General

The geotechnical design was broken into several areas, namely the crossings (Baton Rouge Front, Red Eye, Sardine, Medora, Grenada, Bayou Goula, Alhambra, Philadelphia, Smoke Bend, Rich Bend, Belmont, and Fairview), Cubits Gap to Head of Passes (RM 7.0 or 6.0 AHP to 0.5 BHP), Southwest Pass (RM 0.5 BHP to 19.5 BHP), and the Bar Channel (RM 19.5 BHP to 22 BHP). For the foundation design, the project was further divided into soils reaches. The soils reaches were based on subsurface stratifications and subsurface soil shear strengths.

C-3.1.6.2 Design Soil Parameters

Design soil parameters (Q-Case) and subsurface stratifications for each soils reach for the foundation design of each area are available through a Freedom of Information Act request.



C-4.0 CIVIL DESIGN

C-4.1 Channel Design

C-4.1.1 General

The currently authorized and maintained Mississippi River – Gulf to Baton Rouge project is located within the Mississippi River between the Gulf of Mexico, approximate Mile 22.1 BHP (Below Head of Passes) and Baton Rouge, Louisiana, approximate Mile 232.4 AHP (Above Head of Passes). The current project was constructed in multiple phases, with Phase I providing a 45ft MLG^{SWP} deep draft channel from the Gulf to Mile 181 AHP which was completed in December 1988, and Phase II providing a 45ft MLG deep draft channel (reduced by the Low Water Reference Plane (LWRP) within this non-tidal segment of the river) from Mile 181 AHP to the upper limit at Mile 232.4 AHP in Baton Rouge, Louisiana.

Note: In practice, MLG at SWP has become a localized reference, or in this case, a series of local staff gages referenced with MLG. The series of gages along Southwest Pass were set and maintained to NGVD29. Over the years the water control gages were surveyed and moved as necessary to allow them to properly reference NGVD29. The MLG gages were not moved as necessary in order to maintain the 0.78ft offsets. As a result, MLG at Southwest Pass, as it is presently used in practice is approximately 3.5ft below MLLW.

For this phase of the study, 2004–2006 Mississippi River hydrographic surveys were utilized in determining the reaches that would be proposed for enlargement, based off of the depths and widths along the river projected in the survey. This reevaluation study evaluates the feasibility of deepening the current project to depths of 48ft Mean Lower Low Water, equal to 45ft MLG^{SWP} and 50ft MLLW (47ft MLG^{SWP}), commencing with the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river).

For this reach, an advance maintenance of 6ft below each alternative depth was applied, along with an allowable overdepth of 2ft. Advanced maintenance is performed to avoid frequent re-dredging and to ensure the least overall cost of maintaining the project, by allowing post-dredging shoaling to occur without impacting project depth. Allowable overdepth will account for inaccuracies in the dredging process as well shoaling during construction and maintenance dredging events, and facilitate obtaining the full advance maintenance prism. For the reach of river extending upstream of Mile 13.4 AHP, the project depths of 48ft and 50ft below the LWRP (Low Water Reference Plane) were evaluated and adjusted using the 2007 LWRP NAVD88 elevations obtained from the curves provided in the following graph. The project reach extends through the Ports of St Bernard, New Orleans, South Louisiana, and Baton Rouge upstream to Mile 232.4 AHP. This



information was used in determining the adjusted dredging elevations of the Mississippi River crossing locations for both the 48ft and 50ft alternatives. See the following tables for the 48ft and 50ft template information utilized for the crossings. As depicted by these tables, an advance maintenance of 3ft below each adjusted crossing project elevation was applied, along with an overdepth of 2ft to account for inaccuracies in the dredging process and to account for shoaling during the dredging process and facilitate obtaining the full advance maintenance.

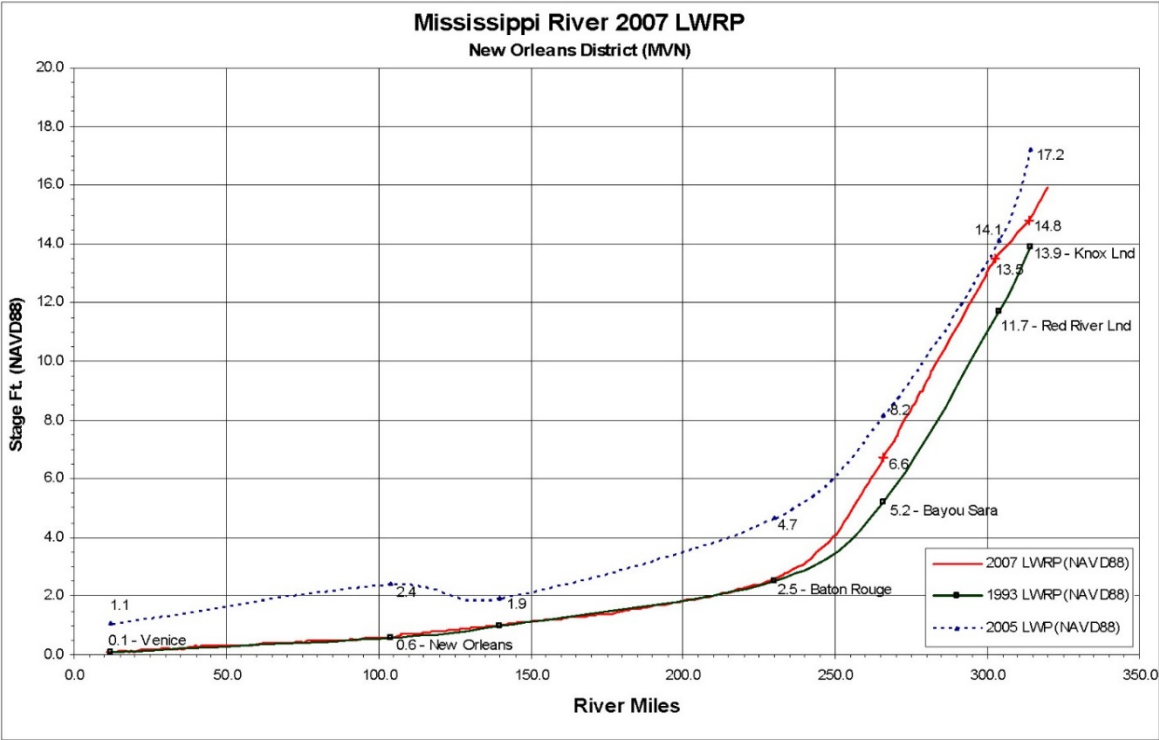


Figure C-12 - 2007 LWRP Elevations – NAVD88



Table C-5 - 48ft Crossing Template Information

Crossing Location	River Mile	2007 LWRP FT. NAVD88	-48' NAVD88	3' Adv Maint	Side Slopes	Bottom Width (250' O/C)	2' Overdepth by 500' Width
Baton Rouge Front	231	2.50	-45.50	-48.50	1 on 5	500	-50.50
Red Eye	224	2.40	-45.60	-48.60	1 on 5	500	-50.60
Sardine Point	219	2.30	-45.70	-48.70	1 on 5	500	-50.70
Manchac Bend	215	2.15	-45.85	-48.85	1 on 5	500	-50.85
Medora	212	2.00	-46.00	-49.00	1 on 5	500	-51.00
Grenada	204	1.90	-46.10	-49.10	1 on 5	500	-51.10
Bayou Goula	198	1.80	-46.20	-49.20	1 on 5	500	-51.20
Alhambra	191	1.70	-46.30	-49.30	1 on 5	500	-51.30
Philadelphia Point	183	1.60	-46.40	-49.40	1 on 5	500	-51.40
81 Mile Point	179	1.55	-46.45	-49.45	1 on 5	500	-51.45
Smoke Bend	175	1.45	-46.55	-49.55	1 on 5	500	-51.55
Rich Bend	159	1.25	-46.75	-49.75	1 on 5	500	-51.75
Belmont	153	1.20	-46.80	-49.80	1 on 5	500	-51.80
Fairview	117	0.80	-47.20	-50.20	1 on 5	500	-52.20

Table C-6 - 50ft Crossing Template Information

Crossing Location	River Mile	2007 LWRP FT. NAVD88	-50' NAVD88	3' Adv Maint	Side Slopes	Bottom Width (250' O/C)	2' Overdepth by 500' Width
Baton Rouge Front	231	2.50	-47.50	-50.50	1 on 5	500	-52.50
Red Eye	224	2.40	-47.60	-50.60	1 on 5	500	-52.60
Sardine Point	219	2.30	-47.70	-50.70	1 on 5	500	-52.70
Manchac Bend	215	2.15	-47.85	-50.85	1 on 5	500	-52.85
Medora	212	2.00	-48.00	-51.00	1 on 5	500	-53.00
Grenada	204	1.90	-48.10	-51.10	1 on 5	500	-53.10
Bayou Goula	198	1.80	-48.20	-51.20	1 on 5	500	-53.20
Alhambra	191	1.70	-48.30	-51.30	1 on 5	500	-53.30
Philadelphia Point	183	1.60	-48.40	-51.40	1 on 5	500	-53.40
81 Mile Point	179	1.55	-48.45	-51.45	1 on 5	500	-53.45
Smoke Bend	175	1.45	-48.55	-51.55	1 on 5	500	-53.55
Rich Bend	159	1.25	-48.75	-51.75	1 on 5	500	-53.75
Belmont	153	1.20	-48.80	-51.80	1 on 5	500	-53.80
Fairview	117	0.80	-49.20	-52.20	1 on 5	500	-54.20



It should be noted that the reevaluation study strictly considered deepening of the current project, with channel widths remaining the same throughout the entire reach. Channel widths and side slopes utilized in the study for generating quantities and costs are as follows:

<u>Channel Reach</u>	<u>Bottom Width</u>	<u>Side Slopes</u>
Jetty and Bar Entrance Channel (Miles 22.1 BHP to 19.5 BHP)	600ft	1V on 3H
SW Pass Reach (Miles 19.5 BHP to 6 AHP)	750ft*	1V on 3H
Miles 6 AHP to 181 AHP	750ft	1V on 3H
Miles 181 AHP to 233.8 AHP	500ft	1V on 5H

*Note that channel transitions from 600ft to 750ft in width between Miles 17.5 BHP and 18.0 BHP

The above limits and dimensions are identical for the current -45ft project with the exception of the side slopes for the crossings between Miles 181 AHP and 232.4 AHP where the side slopes for this reevaluation study have been flattened from the originally authorized 1V on 3H to 1V on 5H to better reflect the actual side slopes that are being obtained during O&M dredging of the crossings due to the sandy material that is encountered while dredging within these reaches of the Mississippi River. The proposed channel alignments within the SW Pass and Mississippi River crossing reaches, which are maintained on an annual basis, will follow the existing alignments that are currently used for navigation and maintenance dredging.

C-4.1.2 48ft Channel Alternative

This alternative will provide a 48ft deep draft project from the Gulf of Mexico to Baton Rouge, Louisiana. The project design elevation for this channel alternative is -48.0ft MLLW, beginning at the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass (SWP) to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river Reach). This -48ft MLLW elevation correlates to the original authorized depth of 45ft MLG, (as used in practice locally at this site), to which the project was deepened in 1987 and to which it is currently maintained. As stated in paragraph C4.1.1, this reach of channel is often referred to as the SW Pass reach, and will be dredged to a depth of 6ft below -48ft MLLW (advanced maintenance), over the bottom widths and side slopes specified at the end of paragraph C4.1.1. An allowable overdepth of 2ft was accounted for in disposal area capacity evaluation and cost estimating. Dredging quantities were based off of hydrographic surveys of the Mississippi River – SW Pass performed in September 2015. It is anticipated that shoaling within this reach of the river will remain consistent with historical patterns, and similar dredging requirements are anticipated between approximate Miles 6 AHP and 22 BHP.



For the upper portion of the study, the Mississippi River crossings listed in the tables in paragraph C4.1.1 were evaluated under this reevaluation study. The crossings which are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88) for each respective crossing location, would be deepened to 48ft below the LWRP under this alternative. The advance maintenance and allowable overdepth, 3ft and 2ft respectively, which are currently applied for maintenance of the crossings under the current 45ft project, would be retained for this deepening alternative. In addition, the current channel bottom width of 500ft was determined to be adequate to accommodate projected future vessels and was therefore used for this alternative, and channel side slopes of 1V on 5H were utilized for this reevaluation study in estimating quantities. For determining construction quantities, it was assumed that construction would immediately follow annual O&M dredging of the crossings and be performed during low water season. For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities.

C-4.1.3 50ft Channel Alternative

This alternative will provide a 50ft deep draft project from the Gulf of Mexico to Baton Rouge, Louisiana. The project design elevation for this channel alternative is -50.0ft MLLW, beginning at the Gulf entrance at approximate Mile 22.1 BHP, and proceeding up through Southwest Pass (SWP) to Mile 13.4 AHP north of Venice (tidally influenced stretch of the river Reach). As stated in paragraph C4.1.1, this reach of channel is often referred to as the SW Pass reach, and will be dredged to a depth of 6ft below -50ft MLLW, over the bottom widths and side slopes specified in paragraph C4.1.1. An allowable overdepth of 2ft was accounted for in disposal area capacity evaluation and cost estimating. Dredging quantities were based off of hydrographic surveys of the Mississippi River – SW Pass performed in September 2015. It is anticipated that shoaling within this reach of the river will remain consistent with historical patterns, and similar dredging requirements are anticipated between approximate Miles 6 AHP and 22 BHP.

The Mississippi River crossings listed in the tables in paragraph C4.1.1 were evaluated under this reevaluation study. The crossings which are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88) for each respective crossing location, would be deepened to 50ft below the LWRP under this alternative. The potential for required dredging of any additional crossings is being evaluated under the ongoing 2D model analysis. The advance maintenance and allowable overdepth, 3ft and 2ft respectively, which are currently applied for maintenance of the crossings under the current 45ft project, would be retained for this deepening alternative. In addition, the current channel bottom width of 500ft was determined to be adequate to accommodate projected future vessels and was therefore used for this alternative, and channel side slopes of 1V on 5H were utilized for this reevaluation study in estimating quantities. For determining construction quantities, it was assumed that construction would



immediately follow annual O&M dredging of the crossings and be performed during low water season. For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities.

C-4.2 Dredging and Disposal for Construction (Both the 48ft and 50ft Alternatives)

C-4.2.1 General

Dredging and disposal alternatives investigated in this study centered on identifying the least-cost, environmentally acceptable plan. Dredging for construction of both the 48ft and 50ft channels would be accomplished via different types of dredging equipment, similar to that utilized for the construction of the current 45ft channel.

C-4.2.2 Mississippi River - SW Pass Channel Reach

For the deepening of the SW Pass reach from the current project depth of 48ft MLLW to 50ft MLLW, it is anticipated that deepening will be required between approximate Mile 6 AHP and approximate Mile 22.1 BHP. Construction of the 50ft MLLW project in SW Pass would be accomplished via 3 separate contracts: two (2) hydraulic cutterhead contracts covering the reach between Miles 6 AHP to 19.5 BHP, and one (1) hopper dredge contract covering the jetty and bar channel reach from Miles 19.5 BHP to 22.1 BHP. For the hydraulic cutterhead dredging work, all dredge material would be utilized in a beneficial manner for either bank stabilization behind existing foreshore dikes along the channel or for marsh creation in the adjacent open waters. Construction of the jetty and bar channel reach from Miles 19.5 BHP to 22.1 BHP would be performed via mobile hopper dredge(s) versus stationary cutterhead dredges as this area of work will be within the Gulf entrance channel and susceptible to high sea conditions, as well as having to contend with deep draft vessels both exiting to and entering from the Gulf of Mexico via the jetties. For the hopper dredging work, all material will be dredged and hauled to the EPA approved ODMDS (Ocean Dredge Material Disposal Sites) adjacent to and west of the gulf entrance channel between Approximate Miles 20.4R BHP and 23.1R BHP.

C-4.2.3 Mississippi River Crossings

While there are a total of 24 crossing locations between New Orleans and Baton Rouge, only 12 of these crossings currently require maintenance dredging. These 12 deep draft crossings were evaluated as part of the deepening study based upon channel conditions that existed in the fall/winter of 2014. The crossings that are being carried over for further evaluation in the next study phase are: Baton Rouge Front, Red Eye, Sardine Point, Medora, Granada, Bayou Goula, Alhambra, Philadelphia Point, Smoke Bend, Rich Bend, Belmont, and Fairview. Other crossing locations that will be reconsidered during the next phase of this reevaluation study as potentially



requiring maintenance dredging, based off of future channel surveys and 2-D model results, will include: Missouri Bend and 81 Mile Point.

As previously stated in paragraph C4.1.3, the crossings are currently maintained to 45ft below the LWRP (reduced by the appropriate LWRP elevations in NAVD88 datum) for each respective crossing location, and would be deepened to either 48ft or 50ft below the LWRP under this study. Construction would be accomplished via contract and/or Government dustpan dredge(s) which is consistent with the method of construction utilized for deepening as well as maintenance of the crossings. Material dredged from the crossings would be placed adjacent to the crossing and put back into the system for the material to be carried downstream and to fallout into deeper holes within the river.

C-4.2.4 Construction Schedule

For initial construction of either alternative, it is anticipated that construction of the project will be accomplished within a four year period, commencing during low water season following routine annual O&M dredging of the channel.

C-4.3 Operations and Maintenance Dredging

Annual maintenance dredging will be required within the reaches of the Mississippi River addressed in this reevaluation report. For this phase of the study, EDRC was tasked with developing a 1D model to determine the annual maintenance dredging quantities that could be anticipated within the crossings, as well as the lower Mississippi River reach between Venice and the Gulf, otherwise referred to as the Mississippi River - SW Pass Channel reach.

C-4.3.1 Mississippi River - SW Pass Channel Reach

The ERDC 1D model results received broke out the anticipated shoaling over the following reaches:

Southwest Pass Reach– Miles 18.0 BHP to 0.5 BHP

Head of Passes Reach – Miles 0.5 BHP to 1.5 AHP

Fairway/ Anchorage at Pilottown Reach – Miles 1.5 AHP to 5.0 AHP

Venice Reach – Miles 5.0 AHP to 11.0 AHP

While the projected annual quantities from the 1D model were, for the most part, in line with those obtained during historical O&M dredging of the channel, there were some issues with the results that were projected for the Head of Passes and Fairway/ Anchorage at Pilottown reaches where the model projections were well above the average annual quantities dredged within these reaches.



The District and ERDC both agreed that shoaling and maintenance dredging needs within the lower portion of the Mississippi River, from Venice, Louisiana (Mile 11 AHP) to the Gulf entrance channel (Mile 22.1 BHP), would remain essentially the same as the current 45ft project. **As a result, the dredging needs for both the 48ft and 50ft channel alternatives in this reach were based off of average annual quantities obtained from historical dredging performed within the above reaches of the Mississippi River - SW Pass channel.** The following annual maintenance plan was developed through coordination with the District's Operations Manager and used in obtaining the average annual O&M dredging costs for both the -48ft MLLW and -50ft MLLW alternatives:

Cubits Gap to Head of Passes reach (Approximate Miles 6 AHP to 0.5 BHP)

The ERDC 1D model indicated annual dredging of approximately 19,000,000 cys/yr for this reach, referred to in the ERDC model as the Head of Passes Reach – Miles 0.5 BHP to 1.5 AHP, combined with the Fairway/ Anchorage at Pilottown Reach – Miles 1.5 AHP to 5.0 AHP. However, based off of annual dredging performed within these reaches combined, and accounting for the possible extension of dredging to Mile 6.0 AHP, cost estimates were based off of an annual quantity of 9,000,000 cys for the reach between Miles 0.5 BHP and 6.0 AHP. **It is estimated that approximately 2,500,000 cys would be removed annually by one (1) cutter head dredge (1 mob and demob), and 6,500,000 cys being removed by hopper dredges (assumes 4 hopper contracts and 4 mobs and demobs).** If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the event Contract hoppers are unable to meet the O&M needs. Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre via the dredge-and-haul method. The HDDA, as shown in Figure C-1, is a designated in channel hopper disposal site. The site is mined on a periodic basis via cutterhead dredge, using project funds, and the material is transported either east or west of the channel and used for wetland creation.

SW Pass reach; Mile 0.5 BHP to 19.5 BHP

The ERDC 1D model indicated annual dredging of approximately 9,000,000 cys/yr for the Mile 0.5 BHP to 18 BHP reach. However, based off of annual dredging performed within these reaches combined, and accounting for the possible extension of dredging below Mile 18.0 BHP to Mile 19.5 BHP, cost estimates were based off of an annual quantity of approximately 9,500,000 cys for the reach, as compared to the 9,000,000 cys/ yr estimated by the ERDC 1D model for Miles 0.5 BHP to 18.0 BHP. **It is estimated that approximately 5,250,000 cys would be removed annually by two (2) cutter head dredge (2 mobs and demobs), and 4,250,000 cys being removed by hopper dredges (assumes 3 hopper contracts and 3 mobs and demobs).** If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the



event the dredging industry is unable to meet the O&M needs. Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, while material removed by hopper dredges would be placed within the hopper dredge disposal area (HDDA) within Pass A Loutre or the ODMDS located adjacent to the entrance bar channel via the dredge-and-haul method.

Jetty and Bar Channel Reach; Mile 19.5 BHP to approx. 22.1 BHP

As the ERDC 1D model did not account to for this reach of the channel, previous historical quantities were utilized in developing and average annual quantity to be dredged. **It is estimated that approximately 3,750,000 cys would be removed annually by hopper dredge. (Assumes one contract hopper, so one mob and demob).** This quantity falls with the range of average annual quantities dredged based off averages for the last 5 and 10 years of dredging in the bar channel. The dredged material would be disposed of within the designated EPA ODMDS via the dredge and haul method. However, on occasions when weather and tidal conditions are appropriate, agitation dredging may be performed. If and when the need arises, dredging may also be performed by Government hopper dredge(s) in the event Contract hoppers are unable to meet the O&M needs.

C-4.3.2 Mississippi River Crossings

The ERDC 1D model evaluated shoaling within the Mississippi River at the following crossing locations:

Site	River Miles (AHP)	Site	River Miles (AHP)
Fairview Crossing	115.2 to 117.2	Granada	203.3 to 206.6
Belmont Crossing	152.6 to 155.1	Medora Crossing	211.6 to 212.3
Rich Bend	157.9 to 159.5	Sardine Point	218.7 to 219.9
Smoke Bend	174.5 to 175.9	Red Eye Crossing	223.4 to 225.4
Philadelphia Point	181.72 to 183.6	Baton Rouge Front	228.1 to 232.7
Alhambra	189.4 to 190.9	Wilkerson Point	233.9 to 234.5
Bayou Goula Crossing	197.5 to 198.4		

The model assessed annual dredging that would be required at each of the above crossings for the current -45ft project, as well as the proposed -48ft LWRP and -50ft LWRP project alternatives. The crossing width utilized was the current 500ft to which the current project is maintained. The following table provides the average annual quantities estimated (1D model) to be dredged at each crossing considered in this study, as well as the average annual quantities



removed at each crossing based off of information received from the District's Operations Division covering years 1999 through 2015.

Table C-7 - Estimated Average Annual Dredge Quantities per Crossing

Crossing Sites	48ft Below LWRP (Adjusted NAVD88)	50ft Below LWRP (Adjusted NAVD88)	Average annual quantities for 45ft Below LWRP (Adjusted to NAVD88)
Baton Rouge Front	2244.00	8219.00	1,845,387.00
Red Eye	7,399,138.00	10,080,422.00	4,359,091.00
Sardine	2,942.00	0.00	1,181,210.00
Medora	6,359,640.00	7,249,703.00	1,051,192.00
Granada	4,689.00	6,769.00	1,125,646.00
Bayou Goula	5,268,874.00	6,562,383.00	950,932.00
Alhambra	6,600,408.00	7,278,225.00	2,481,629.00
Philadelphia	3,560.00	1,850.00	256,276.00
Smoke Bend	1,687,483.00	2,002,032.00	518,415.00
Rich Bend	222,823.00	1,046,694.00	15,041.00
Belmont	3,363,272.00	4,039,445.00	1,949,741.00
Fairview	0	0	0.00

As can be seen, the ERDC 1D model results for four (4) of the crossing sites, highlighted in red (Baton Rouge Front, Sardine Point, Granada, and Philadelphia Point), fell well below the average annual quantities captured during O&M dredging of the crossings for the current 45ft project over the last 16 years. (See Annex 2).

As a result of the significant disparity between the current project's annual O&M dredging quantities, and the quantities produced by the 1D model for the 48ft and 50ft deepening alternatives, the average annual quantities gathered for the 45ft project at these crossing sites were taken and indexed by factors to bring them closer to the percentage increases that were produced for the other eight crossings. For these crossings, we compared the percentage increase that were projected between the model results and the average annual CYS dredged, and simply projected the following: **a) for the 48ft project, a 70% increase over the annual O&M quantities for the current 45ft project, and b) for the 50ft project, a 130% increase over the annual O&M quantities for the current 45ft project.** These percentages fell in line with (for the most part less than) the percentage increases/dredging indexes that are reflective of the "more aggressive dredging schedule" 1D model results provide by ERDC. (See **Section C2.1.1.4.**) The following table depicts the quantity comparisons between the ERDC 1D model results for Baton Rouge Front, Sardine Point, Granada, and Philadelphia Point (in **RED**) and **the adjusted quantities for**



the 48ft and 50ft alternatives that were used to obtain costs (in **GREEN**). Those crossings showing significantly high increases in maintenance dredging were not adjusted.

Table C-8 - Quantity Comparisons between ERDC 1D Model Results and Adjusted Quantities Used to Obtain Dredging Costs

Crossing Sites	48ft Below LWRP (Adjusted NAVD88)	50ft Below LWRP (Adjusted NAVD88)	Average annual quantities for 45ft Below LWRP (Adjusted to NAVD88)	48ft Below LWRP (Adjusted NAVD88) Adjusted Quantities	50ft Below LWRP (Adjusted NAVD88) Adjusted Quantities
Baton Rouge Front	2244.00	8219.00	1,845,387.00	3,137,000.00	4,235,000.00
Red Eye	7,399,138.00	10,080,422.00	4,359,091.00		
Sardine	2,942.00	0.00	1,181,210.00	2,008,000.00	2,711,000.00
Medora	6,359,640.00	7,249,703.00	1,051,192.00		
Granada	4,689.00	6,769.00	1,125,646.00	1,914,000.00	2,583,000.00
Bayou Goula	5,268,874.00	6,562,383.00	950,932.00		
Alhambra	6,600,408.00	7,278,225.00	2,481,629.00		
Philadelphia	3,560.00	1,850.00	256,276.00	436,000.00	588,000.00
Smoke Bend	1,687,483.00	2,002,032.00	518,415.00		
Rich Bend	222,823.00	1,046,694.00	15,041.00		
Belmont	3,363,272.00	4,039,445.00	1,949,741.00		
Fairview	0	0	0.00		

For all crossings, it is projected that O&M dredging would be accomplished via contract (1) and Government (1-2) dustpan dredges, with the material dredged from the crossings disposed of adjacent to the crossings and put back into the system for the material to be carried downstream and to fallout into deeper holes within the river.

The 48 ft. and 50 ft. dredge quantities for each individual crossing were used to formulate different benefit and cost alternative combinations of deepening throughout the project area

C-4.4 Additional O&M Needs

In order to properly maintain the project, there are other existing features that would warrant O&M, but for which cannot be accommodated due to shortfalls in the annual O&M budget. The following is a list of O&M needs and projected "annual costs" that need to be captured in the overall project costs for the deepening study. The breakdown of those annual costs/needs is as follows:

- O&M dredging of New Orleans Harbor - While dredging is not projected to increase from that currently performed for the existing -45ft MLG project, the average annual costs required to maintain the NO harbor is estimated to be approx. \$4.5 Million/ Year;



- O&M of the Hopper Dredge Disposal Area at HOP - Continued O&M will be required and is estimated to cost approx. \$17 Million/ Year;
- O&M for the Saltwater Barrier Sill - Average annual cost is estimated to be approximately \$1.2 Million/ Year; and
- O&M of training works (i.e. foreshore and pile dike repairs, jetty repairs, and existing dikes in crossings) - Average annual cost is estimated to be approximately \$15 Million/ Year.
- TOTAL - \$37.7 Million/ Year

These are estimated annual O&M requirements and some of these costs are due to the fact that the project has not been properly budgeted in the past to perform some of these O&M needs. And while these are needs for the current project that simply do not get funded, they still need to be captured in the annual costs developed for this deepening study.

C-4.5 Relocations

C-4.5.1 Purpose

Relocation data was collected, tabulated and detailed in this appendix by the U.S. Army Corps of Engineers, New Orleans District, Engineering Division, Relocations Team, to a feasibility level of design, prior to the selection of a Tentatively Selected Plan (TSP). The Relocations Team reviewed proposed designs against existing facility maps and databases to obtain information on existing facilities. Historical project files were also reviewed against the scope of this effort. As is typical for feasibility level design, ownership of the facilities listed has not been confirmed at this time.

The Relocations Team then made assumptions based on the proposed feasibility level project design and project location to determine project relocation requirements. These requirements are based on the latest relocation methods previously used by other facility owners on other Corps projects. The cost estimates presented in this report were developed by New Orleans District. These relocation costs represent a feasibility level of design and will be further refined once a TSP is chosen and approved costs estimates submitted by the affected utility owners.

C-4.5.2 Scope

Improvements for the Mississippi River will involve dredging to a bottom depth of 50 feet MLLW. The list of affected facilities in Table C9 covers those facilities located from River Mile 233.0 to River Mile 158.0 (non-continuous).



C-4.5.3 Estimated Relocations Costs

The total estimated cost for relocations of pipe, power and communication lines is \$40,008,000. This figure includes basic costs for the relocation items but does not include contingency and escalation. Estimated relocation costs for utilities are summarized in Table C-9.

Table C-9. River Deepening Facilities Relocation Costs

Owner	River Mile (AHP)	Quantity	Size	Description*	Cost to Relocate Per Linear Foot Per Pipeline
River Mile 234 to 229					
Enterprise	233.4	1	16 inch	Natural Gas	\$267.00
Acadian	233	3	10.75 inch	TBD	\$190.00
Acadian	233	1	16 inch	TBD	\$267.00
Mid La Gas	233	1	12 inch	TBD	\$219.00
Bengal	233	1	24 inch	Maintenance	\$415.00
Dow	232.7	1	4 inch	LPG	\$94.00
Exxon	232.7	4	12 inch	CRD	**ASC
Exxon	232.7	3	varies	LPG/OHV	**ASC
Exxon	232.6	1	8 inch	Propylene	**ASC
Exxon	232.6	1	6 inch	TBD	**ASC
Exxon	232.5	2	TBD	TBD	**ASC
Exxon	232.5	1	12.75 inch	TBD	**ASC
Exxon	232.5	4	12 inch	TBD	**ASC
Exxon	231.9	2	8 inch	TBD	**ASC
Exxon	231.9	2	12 inch	TBD	**ASC
Exxon	231.9	3	4 inch	TBD	**ASC
Exxon	231.9	2	TBD	TBD	**ASC
Exxon	231.9	1	6 inch	TBD	**ASC
Exxon	231.9	2	6 inch	TBD	**ASC
Exxon	231.9	2	8.63 inch	TBD	**ASC
River Mile 199 to 194					



TBD	197.9	2	12 inch	Brine	\$219.00
River Mile 193 to 188					
Enterprise	190.2	1	TBD	NG	\$219.00
KinderMorgan	190.2	2	24 inch	NG	\$415.00
El Paso	190.2	1	5 inch	Gas	\$112.00
Southern Natural Gas Co	190.1	4	12 inch	Gas	\$219.00
Southern Natural Gas Co	190.1	4	30 inch	Gas	**ASC
Southern Natural Gas Co	190.1	4	24 inch	Gas	**ASC
El Paso	190	1	5 inch	Gas	\$112.00
KinderMorgan	190	1	30 inch	NG	\$525.00
Enterprise	189.8	2	8.63 inch	EGL	\$159.00
Shell	189.7	6	TBD	TBD	\$219.00
River Mile 185 to 181					
El Paso	183.5	1	TBD	OHV	**ASC
Gulf South	183.4	3	TBD	NG	\$219.00
Boardwalk	183.3	1	30 inch	NG	\$525.00
Concha	183	1	10 inch	Propylene	\$181.00
Shell	182.9	1	TBD	HVL	\$219.00
Enterprise	182.9	1	10 inch	HVL	\$181.00
Enterprise	182.7	1	4 inch	NG	\$94.00
Shell	182.1	1	10 inch	HVL	\$181.00
Enterprise	182.6	1	4 inch	NG	**ASC
River Mile 179 to 172					
Central Bell Tel. Co.	175.5	3	TBD	TBD	\$219.00
La Power & Lt. Co	175.4	1	TBD	TBD	\$219.00
River Mile 160 to 155					
Marathon Ashland	159.5	1	30 inch	TBD	\$525.00
Shell	159.5	1	40 inch	EPL	\$700.00
Marathon	159.5	3	30 inch	CRD	\$525.00
Equilon	159.3	1	40 inch	Oil	\$700.00
Acadian	159.2	1	8.63 inch	NG	**ASC
Shell	159.3	1	40 inch	CRD	**ASC
Marathon	159.3	1	40 inch	CRD	**ASC



Boardwalk	158.2	1	TBD	NG	\$219.00
Monterey	158.2	1	6 inch	Gas	\$127.00
*Facility descriptions based on available records. Not all acronyms are known; descriptions to be clarified with facility owners upon TSP selection.					
**ASC = Assumed Sufficient Clearance based on preliminary data. Owners to be contacted upon TSP selection for verification					

C-5.0 ENVIRONMENTAL ENGINEERING

C-5.1 Environmental Objectives and Requirements

Environmental objectives and requirements described herein will be fulfilled by compliance with plans for the management of dredged material and by adopting and enforcing prudent and reasonable measures to avoid impacts and by the completion of measures described in the Environmental Impact Statement (EIS) prepared for this study.

C-5.2 Environmental Considerations

C-5.2.1 Environmental Effects of the Project

- Emissions from the dredging vessel and other heavy equipment will locally degrade air quality during channel dredging and dredged material pumping operations.
- Water clarity and quality at the dredging and disposal sites will be temporarily affected by the dredging process. Some soil particles are temporarily lost in the water column during the dredging process. With time, the sediments are winnowed out, and settle back down on the channel and disposal area water bottoms thus re-establishing water clarity and quality as it existed prior to the dredging and disposal operations.
- The benthic microorganism community will be temporarily affected in disposal area water bottom habitats while the area adjusts to the new environment created by the project.

C-5.2.2 Integration of Environmental Sensitivity into All Aspects of the Project

Environmental sensitivity has been incorporated into all aspects of project design, with an emphasis on the proposed plan for disposal of dredged material. Avoidance and minimization of adverse impacts have been incorporated into the project construction and maintenance plan to the maximum extent practicable. Shoal material removed from Southwest Pass by cutterhead dredges will be placed in shallow open water and eroded marsh areas for the purpose of creating and restoring coastal habitat in the Mississippi River delta. Dredged material placement sites used for



coastal habitat development will be monitored annually by acquisition of aerial photography used to determine land loss/gain.

C-5.2.3 Lessons Learned During Past Projects

Dredged material placement sites that have been utilized over the past 30 years will continue to be utilized for this project. Lessons learned over this period will be incorporated into disposal operations to help maintain the channel while contributing positively to Louisiana coastal restoration efforts.

C-5.2.4 Incorporation of Environmental Compliance

There are numerous environmental laws and regulations which govern protection of the public and environment during the construction phase of a project that are incorporated into the feasibility design for this project. Environmental compliance measures for this project are related primarily to the methods used for dredged material disposal during both project construction and project maintenance. The plan for dredged material disposal is contained in the project EIS.

Local, State and Federal environmental compliance measures incorporated into the project include:

- Protection of Environmental Resources
- Preservation and Recovery of Historical, and Cultural Resources
- Protection of Water Resources
- Protection of Fish and Wildlife Resources
- Protection of Air Resources
- Pollution Prevention

C-5.2.5 Mitigation for Unavoidable Impacts

Partial implementation of the deep draft Mississippi River Ship Channel Project to a depth of 45 feet resulted in increased frequency and duration of salinity intrusion events along the Lower Mississippi River channel. These salinity intrusion events affect municipal and industrial river water supplies below River Mile 64 AHP. Engineering measures capable of mitigating water quality problems were included with channel deepening design studies.

Principal components of the salinity intrusion mitigation plan are:

1. Measures to increase Plaquemines Parish water treatment capacity of Belle Chasse, LA water treatment (River Mile 75.8 AHP)



2. Water transmission lines and booster pump stations to connect the additional capacity at Belle Chasse to other water treatment plans on west bank of Mississippi River at West Pointe-a-la-Hache and Boothville, LA.
3. Previously constructed improvements for East Bank Mitigation Works
4. Conversion of existing community pond at Davant, LA to a storage reservoir
5. Construction of a siphon from the Mississippi River to the reservoir for purpose of replenishing fresh water in reservoir;
6. Construction of transmission lines from reservoir to water treatment plan on east bank of Mississippi River at East Pointe-a-la-Hache, LA.
7. Upgrades, as necessary to provide for future increases in demand for potable water in the affected region of Plaquemines Parish, LA at such time as average consumption increases by an increment of 25 percent over average consumption in the last two years preceding beginning of construction of the mitigation plan.
8. Construction of a submarine barrier sill in the Mississippi River, Louisiana, between River Miles 65.1 AHP and 63.1 AHP

Since completion of the 45-foot channel, the submarine barrier sill has been constructed three times, in 1988, 1999, and 2012.

C-5.3 Hazardous Toxic and Radioactive Waste (HTRW)

Historic dredging events within the channel have not encountered HTRW. Therefore, based upon the HTRW assessment performed as described in the EIS and prior in-house investigations, it has been determined that there would be a low probability of encountering contaminated sites or toxic substances during project construction and maintenance activities.

C-6.0 COST ESTIMATES

C-6.1 Basis of Cost Estimate

Detailed cost estimates for all alternatives studied are included in Annex 3 of this report. The final initial construction cost estimate for the selected plan was also finalized utilizing the Micro-Computer Aided Cost Estimating System (M-CACES), and is included in Annex 3. The cost estimate reflects current and applicable pricing and addresses specific construction procedures for the various line items in the estimate.



The estimated costs were based upon an analysis of each line item evaluating quantity, production rate, and time, together with the appropriate equipment, labor, and material costs. Some cost are actual cost for dredging provided by Operations Division of Memphis District and New Orleans District. In addition, these costs were based on actual in-house knowledge and experience by MVN cost engineers who either personally designed or estimated similar projects.

All the construction work is common to MVN.

C-6.2 Contingencies

Contingencies for the cost estimates were based upon similar cost estimates that had a risk analysis performed using the Abbreviated Risk Analysis.

Contingencies for engineering and design are based on uncertainties involved in the preparation of plans and specifications, and in engineering during construction.

These include cost of field data collection; unanticipated design problems; change in design based on the review of the report, changes in design criteria; and changes in overhead rates.

Contingencies for construction management are based on using historical average of time growth for similar type contracts in the area. The time growth includes additional duration for unusually severe weather and unknown changes to the contracts.

C-6.3 Detailed Estimate

The project cost estimate for the selected plan in M-CACES format is included in Annex 3 of this report. The project estimate of first cost, which included costs for lands and damages, and real estate costs during construction, as well as construction cost is included in Annex 3. Annex 3 also includes cost estimates for all alternatives studied.



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ANNEXES

ANNEX 1	DREDGING RESULTS FROM 1D MODEL
ANNEX 2	AVERAGE ANNUAL DREDGING QUANTITIES FOR 45ft PROJECT
ANNEX 3	MCACES
ANNEX 4	DQC COMMENT REPORTS FROM DRCHECKS

ANNEX 1 - DREDGING RESULTS FROM 1D MODEL

ANNEX 2 - AVERAGE ANNUAL DREDGING QUANTITIES FOR 45ft PROJECT

Fiscal Year	Alhambra	Belmont	Smoke Bend	Medora	Red Eye	Baton Rouge Front	Missouri Bend	Sardine Point	Philadelphia Point	Bayou Goula	Granada	81 Mile Point	Rich Bend	Unknown	Total CYS
2015	1,462,302	3,911,537	253,740	1,729,408	5,624,707	971,116	0	490,000	0	1,015,955	2,083,005	0	0	0	17,541,770
2014					2,065,000			1,653,920							
2014	764,030	1,720,110	330,120	368,506	1,352,769	1,494,797	294,074	397,978	259,140	205,533	293,133				
2014	764,030	1,720,110	330,120	368,506	3,417,769	1,494,797	294,074	2,051,898	259,140	205,533	293,133	0	0	0	11,199,110
2013	964,860	2,755,000			1,124,073				288,620	106,900	377,026				
2013	1,381,383	151,000	782,420	653,478	2,886,549	470,263	287,489	1,083,656	289,144	688,195	1,552,301				
2013	2,346,243	2,906,000	782,420	653,478	4,010,622	470,263	287,489	1,083,656	577,764	795,095	1,929,327	0	0	0	15,842,357
2012					1,474,743										
2012	1,829,880	1,589,050	489,600	899,620	477,195	1,748,144		1,448,116							
2012	2,565,039	158,088	266,045	1,792,265	3,365,894	2,863,034	477,196	1,207,490	238,436	873,253	647,175		112,890		
2012	4,394,919	1,747,138	755,645	2,691,885	5,317,832	4,611,178	477,196	2,655,606	238,436	873,253	647,175	0	112,890	0	24,523,153
2011		293,668													
2011		481,120													
2011		177,715													
2011	3,356,680	1,374,522	598,040					2,002,605		1,147,363					
2011	235,051	796,377	182,932	1,360,873	5,992,014	1,485,331		198,333	572,510	410,984	1,156,767				
2011	3,591,731	3,123,402	780,972	1,360,873	5,992,014	1,485,331	0	2,200,938	572,510	1,568,347	1,156,767	0	0	0	21,822,885
2010		1,796,658													
2010		995,879	477,095	1,182,938	1,368,260						225,290				
2010	2,839,155	392,049	949,291	794,089	5,247,949	2,390,678	577,308	620,065		621,614	1,297,291				
2010	2,839,155	3,184,586	1,426,386	1,977,027	6,616,209	2,390,678	577,308	620,065	0	621,614	2,741,532	0	0	0	22,994,560
2009	882,645	1,362,580	1,151,743	860,648	7,492,725	4,094,395	96,467	448,794	571,176	893,004	454,794		127,763		
2009	2,861,971	156,541		524,808				1,095,205		301,316	976,444				
2009		704,328		274,272						939,063					
2009	3,744,616	2,223,449	1,151,743	1,659,728	7,492,725	4,094,395	96,467	1,543,999	571,176	2,133,383	1,431,238	0	127,763	0	26,270,682
2008	2,862,616	1,750,716	432,795	447,366	3,117,293	2,695,046	414,709	596,074	867,248	214,793	320,297				
2008	2,516,019	229,932	711,662	579,265	3,359,384			1,132,462		1,950,574	1,238,552				
2008		874,328													
2008		696,639		496,305						102,006	117,747				
2008		349,601		53,419											
2008	5,378,635	3,901,216	1,144,457	1,576,355	6,476,677	2,695,046	414,709	1,728,536	867,248	2,267,373	1,676,596	0	0	0	28,126,848
2007	1,144,748	555,320	187,730		3,804,170	222,703	1,060,694	950,476	104,859	249,846	392,768	588,755		421,542	
2007	784,096	901,885								392,494					
2007	1,928,844	1,457,205	187,730	0	3,804,170	222,703	1,060,694	950,476	104,859	642,340	392,768	588,755	0	421,542	11,762,086
2006	1,349,945	655,931	191,918		355,195	1,212,909		1,131,372		407,667	542,390				
2006		739,782	197,733		1,441,994	296,773				184,899					
2006	1,349,945	1,395,713	389,651	1,245,098	1,797,189	1,509,682	0	1,131,372	0	592,566	542,390	0	0	0	9,953,606
2005	1,547,799	1,371,671	210,434	1,680,784	5,156,586	2,791,086		637,173		1,659,015	746,114				
2005	962,687	1,130,864	206,066	330,612	517,576	265,903					154,570				
2005	2,510,486	2,502,535	416,500	2,011,396	5,674,162	3,056,989	0	637,173	0	1,659,015	900,684	0	0	0	19,368,940
2004	759,375	609,517	42,889	590,039	1,426,494	1,168,591		698,241		322,983	630,547				
2004					1,404,112	1,003,724									
2004	759,375	609,517	42,889	590,039	2,830,606	2,172,315	0	698,241	0	322,983	630,547	0	0	0	8,656,512
2003	1,286,452	792,433	62,144	759,914	1,064,350	1,445,393		483,605		371,777	904,933				
2003	976,969	612,098	87,248	302,654	2,367,533			482,098		555,802	465,422				
2003										83,608					
2003	2,263,421	1,404,531	149,392	1,062,568	3,431,883	1,445,393	0	965,703	0	1,011,187	1,370,355	0	0	0	13,104,433
2002	1,152,876	1,325,671	410,537	380,340	203,973	210,414		994,873	165,728	316,631	1,466,208				
2002	1,179,907	190,616		371,620	1,867,064	1,331,221		360,184	297,287	369,205					
2002				80,003	517,774			144,148							
2002	2,332,783	1,516,287	410,537	831,963	2,588,811	1,541,635	0	1,499,205	463,015	685,836	1,466,208	0	0	0	13,336,280
2001	356,623	362,920	79,994	161,724	1,764,615	493,897		161,334		513,441	308,641				
2001	1,168,865	641,713			1,567,964	46,133		517,803		410,316	805,790				
2001	483,445	342,967									506,624				
2001	2,008,933	1,347,600	79,994	161,724	3,332,579	540,030	0	679,137		923,757	1,621,055	0	0	0	10,694,809
2000	1,445,296	82,088	246,206	137,084	996,229	410,212		224,822	370,500	253,941	315,119				
2000		293,008			68,822	690,835					272,399				
2000		331,150													
2000	1,445,296	706,246	246,206	137,084	1,065,051	1,101,047	0	224,822	370,500	253,941	587,518	0	0	0	6,137,711
1999	1,182,992	748,001			417,366	2,939,777		228,525	75,765	151,025	141,680				
1999	864,656	702,315		73,986	2,957,375	197,703				174,670	481,362				
1999										342,999					
1999	2,047,648	1,450,316	0	491,352	5,897,152	694,702	0	228,525	75,765	668,694	623,042	0	0	0	12,177,196
Sum Total	39,706,060	31,195,851	8,294,642	16,819,076	69,745,451	29,526,184	3,207,937	18,899,352	4,100,413	15,214,917	18,010,335	588,755	240,653	421,542	255,971,168
Annual Average	2,481,629	1,949,741	518,415	1,051,192	4,359,091	1,845,387	200,496	1,181,210	256,276	950,932	1,125,646	36,797	15,041	26,346	15,998,198

ANNEX 3 - MCACES

Miss River Ship Channel Deepening Alternatives

Print Date Fri 30 September 2016
Eff. Date 7/22/2016

U.S. Army Corps of Engineers
Project STUDY: MISSISSIPPI RIVER DEEPENING
ALT-Mississippi Rver Ship Channel Deepening

Time 11:29:42
Title Page

MISSISSIPPI RIVER DEEPENING
Fuel \$2.25 per gallon for fuel.

Estimated by	Benjamin Salamone	Designed by	US Army Corps of Engineers
Prepared by	Benjamin Salamone		
Preparation Date	7/22/2016	Effective Date of Pricing	7/22/2016
	Estimated Construction Time	Days	

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Labor ID: NOL2015 EQ ID: EP14R03

Currency in US dollars

TRACES MII Version 4.3

Description	ContractCost	ProjectCost
ProjectTop Level Cost Summary	669,890,909.64	669,890,909.64
01 LANDS AND DAMAGES	2,000,000.00	2,000,000.00
02 RELOCATIONS	40,008,000.00	40,008,000.00
09 CHANNELS AND CANALS	627,882,909.64	627,882,909.64
09 01 CHANNELS	627,882,909.64	627,882,909.64
09 01 01 Construction	212,414,200.60	212,414,200.60
Construction-50-ft Depth MLLW	78,106,290.78	78,106,290.78
Construction Crossings - 50-ft Depth - MLLW	24,144,353.56	24,144,353.56
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)]	8,342,720.00	8,342,720.00
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)]	45,619,217.22	45,619,217.22
Construction-48-ft Depth MLLW	56,668,065.78	56,668,065.78
Construction Crossings - 48-ft Depth - MLLW	16,592,567.94	16,592,567.94
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)]	6,134,500.00	6,134,500.00
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)]	33,940,997.84	33,940,997.84
Construction-48-ft Depth MLLW FROM 45-FT MLLW	77,639,844.05	77,639,844.05
Construction Crossings - 48-ft Depth - MLLW FROM 45-FT MLLW	16,592,567.94	16,592,567.94
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW	9,358,336.00	9,358,336.00
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW	51,688,940.11	51,688,940.11
09 01 02 Maintenance	415,468,709.04	415,468,709.04
Maintenance-48-ft Depth MLLW	198,072,011.07	198,072,011.07
O&M Dredging 48-ft Depth MLLW	160,372,011.07	160,372,011.07
O&M Additional Annual Cost	37,700,000.00	37,700,000.00
Maintenance-50-ft Depth - MLLW	217,396,697.97	217,396,697.97
O&M Dredging 50-ft Depth	179,696,697.97	179,696,697.97
O&M Additional Annual Cost	37,700,000.00	37,700,000.00

<u>Description</u>	<u>DirectLabor</u>	<u>DirectEQ</u>	<u>DirectMatl</u>	<u>DirectSubBid</u>	<u>DirectCost</u>	<u>ContractCost</u>	<u>CostToPrime</u>
Project Cost Summary	6,975,913.44	34,980,686.78	0.00	590,797,747.23	632,754,347.45	669,890,909.64	135,042,044.32
01 LANDS AND DAMAGES	0.00	0.00	0.00	2,000,000.00	2,000,000.00	2,000,000.00	0.00
02 RELOCATIONS	0.00	0.00	0.00	40,008,000.00	40,008,000.00	40,008,000.00	0.00
09 CHANNELS AND CANALS	6,975,913.44	34,980,686.78	0.00	548,789,747.23	590,746,347.45	627,882,909.64	135,042,044.32
09 01 CHANNELS	6,975,913.44	34,980,686.78	0.00	548,789,747.23	590,746,347.45	627,882,909.64	135,042,044.32
09 01 01 Construction	5,181,735.09	25,987,297.76	0.00	152,936,526.44	184,105,559.29	212,414,200.60	102,940,513.86
09 01 02 Maintenance	1,794,178.34	8,993,389.02	0.00	395,853,220.79	406,640,788.16	415,468,709.04	32,101,530.46

Description	Page
ProjectTop Level Cost Summary.....	1
1 LANDS AND DAMAGES.....	1
2 RELOCATIONS.....	1
09 CHANNELS AND CANALS.....	1
09 01 CHANNELS.....	1
09 01 01 Construction.....	1
Construction-50-ft Depth MLLW.....	1
Construction Crossings - 50-ft Depth - MLLW.....	1
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)].....	1
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)].....	1
Construction-48-ft Depth MLLW.....	1
Construction Crossings - 48-ft Depth - MLLW.....	1
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)].....	1
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)].....	1
Construction-48-ft Depth MLLW FROM 45-FT MLLW.....	1
Construction Crossings - 48-ft Depth - MLLW FROM 45-FT MLLW.....	1
Construction Southwest Pass Bar Channel - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW.....	1
Construction Southwest Pass - 48-ft Depth - MLLW - [51-ft (MLG)] FROM 45-FT MLLW.....	1
09 01 02 Maintenance.....	1
Maintenance-48-ft Depth MLLW.....	1
O&M Dredging 48-ft Depth MLLW.....	1
O&M Additional Annual Cost.....	1
Maintenance-50-ft Depth - MLLW.....	1
O&M Dredging 50-ft Depth.....	1
O&M Additional Annual Cost.....	1
Project Cost Summary.....	2
1 LANDS AND DAMAGES.....	2
2 RELOCATIONS.....	2
09 CHANNELS AND CANALS.....	2
09 01 CHANNELS.....	2
09 01 01 Construction.....	2
09 01 02 Maintenance.....	2

Miss River Ship Channel Deepening TSP

Print Date Fri 7 October 2016
Eff. Date 10/7/2016

U.S. Army Corps of Engineers
Project STUDY: MISSISSIPPI RIVER DEEPENING
Mississippi Rver Ship Channel Deepening-TSP

Time 13:54:19

Title Page

MISSISSIPPI RIVER DEEPENING
Fuel \$2.25 per gallon for fuel.

Estimated by	Benjamin Salamone	Designed by	US Army Corps of Engineers
Prepared by	Benjamin Salamone		
Preparation Date	10/7/2016	Effective Date of Pricing	10/7/2016
	Estimated Construction Time	Days	

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Labor ID: NLS2015

EQ ID: EP14R08

Currency in US dollars

TRACES MII Version 4.3

Description	ContractCost	ProjectCost
ProjectTop Level Cost Summary	206,282,590.93	206,282,590.93
01 LANDS AND DAMAGES	2,000,000.00	2,000,000.00
02 RELOCATIONS	11,600,000.00	11,600,000.00
09 CHANNELS AND CANALS	192,682,590.93	192,682,590.93
09 01 CHANNELS	192,682,590.93	192,682,590.93
09 01 01 Construction	58,992,199.86	58,992,199.86
Construction-50-ft Depth MLLW	58,992,199.86	58,992,199.86
Construction Crossings - 50-ft Depth - MLLW	4,848,573.13	4,848,573.13
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)]	8,342,720.00	8,342,720.00
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)]	45,800,906.73	45,800,906.73
09 01 02 Maintenance	133,690,391.08	133,690,391.08
Maintenance-50-ft Depth - MLLW	133,690,391.08	133,690,391.08
O&M Dredging 50-ft Depth	95,990,391.08	95,990,391.08
O&M Additional Annual Cost	37,700,000.00	37,700,000.00

<u>Description</u>	<u>DirectLabor</u>	<u>DirectEQ</u>	<u>DirectMatl</u>	<u>DirectSubBid</u>	<u>DirectCost</u>	<u>ContractCost</u>	<u>CostToPrime</u>
Project Cost Summary	2,700,318.94	13,772,879.82	0.00	175,491,308.19	191,964,506.94	206,282,590.93	52,065,759.95
01 LANDS AND DAMAGES	0.00	0.00	0.00	2,000,000.00	2,000,000.00	2,000,000.00	0.00
02 RELOCATIONS	0.00	0.00	0.00	11,600,000.00	11,600,000.00	11,600,000.00	0.00
09 CHANNELS AND CANALS	2,700,318.94	13,772,879.82	0.00	161,891,308.19	178,364,506.94	192,682,590.93	52,065,759.95
09 01 CHANNELS	2,700,318.94	13,772,879.82	0.00	161,891,308.19	178,364,506.94	192,682,590.93	52,065,759.95
09 01 01 Construction	1,803,229.77	9,183,470.37	0.00	38,126,872.78	49,113,572.91	58,992,199.86	35,922,279.79
09 01 02 Maintenance	897,089.17	4,589,409.45	0.00	123,764,435.41	129,250,934.03	133,690,391.08	16,143,480.17

Description	Page
ProjectTop Level Cost Summary	1
1 LANDS AND DAMAGES.....	1
2 RELOCATIONS.....	1
09 CHANNELS AND CANALS.....	1
09 01 CHANNELS.....	1
09 01 01 Construction.....	1
Construction-50-ft Depth MLLW.....	1
Construction Crossings - 50-ft Depth - MLLW.....	1
Construction Southwest Pass Bar Channel - 50-ft Depth - MLLW - [53-ft (MLG)].....	1
Construction Southwest Pass - 50-ft Depth - MLLW - [53-ft (MLG)].....	1
09 01 02 Maintenance.....	1
Maintenance-50-ft Depth - MLLW.....	1
O&M Dredging 50-ft Depth.....	1
O&M Additional Annual Cost.....	1
Project Cost Summary	2
1 LANDS AND DAMAGES.....	2
2 RELOCATIONS.....	2
09 CHANNELS AND CANALS.....	2
09 01 CHANNELS.....	2
09 01 01 Construction.....	2
09 01 02 Maintenance.....	2

ANNEX 4 - DQC COMMENT REPORTS FROM DRCHECKS

UNCLASSIFIED\\FOR OFFICIAL USE ONLY

Comment Report: All Comments

Project: (MRSC) Miss River Ship Channel Deepening Study Review: Draft Engineering Appendix DQC Review

Displaying 56 comments for the criteria specified in this report.

1591 ms to run this page

Id ▲	Discipline	Section/Figure	Page Number	Line Number
6687960	Environmental	n/a	3	Last paragraph, 3rd line

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

It is incorrect to refer to the entire dredging area in the lower river as "Southwest Pass". Another name must be used when discussing the river above Mile 0.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-1	Evaluation Concurred As the reach of dredging referred to as the "Southwest Pass dredging reach", was intended to cover the entire reach from Venice, La to the Gulf of Mexico, this sentence will be revised as follows for clarification purposes: "The reach of the navigation channel that is referred to as the Southwest Pass dredging reach, is comprised of the Mississippi River, extending downstream from Venice, LA, to the Head of Passes (river Mile 0.0), and the reach below Mile 0.0 which extends downstream through Southwest Pass and the Southwest Pass Bar Channel. The bar channel terminates at approximate river Mile 22.0 BHP. (See Figure C1) The Mississippi River- Southwest Pass is the longest single dredging reach and has been maintained to a depth of 45ft relative to Mean Low Gulf (MLG) since 1987." Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016
1-2	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
1-3	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
	Current Comment Status: Comment Closed

6687971	Environmental	Figure C1	5	n/a
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Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

"Southwest Pass Dredging Reach" is a very misleading term to use to describe the entire area dredged in the lower river above and below Head of Passes. The Corps cannot redefine the limits of geographic features. Another term needs to be used.

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016

1-0	Evaluation Concurred The description under Figure C1 should be revised as follows: "The reach of dredging referred to as the "Southwest Pass" dredging reach, is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 AHP, and the Head of Passes (HOP), river Mile 0.0. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower
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	half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA). as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging."			
	Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			
	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6687974	Environmental	Figure C1 and C2	5 and 6	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Figure C1 shows the dredging area (erroneously referred to as the Southwest Pass dredging reach in both figures) extending to Mile 10 AHP, while Figure C2 shows it extending to mile 15 AHP. Some explanation should be added to note that the figures are showing different reaches of the channel.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Proposed modification to first sentence of caption C2: "Average annual transport and fate of sediment passing the Venice Discharge Range (RM 12.5) and entering the Southwest Pass dredging reach estimated from multi-decade 1D sedimentation model simulations." I agree that the Southwest Pass dredging reach terminology is awkward; but, it is consistent with historical reporting of dredging volumes, e.g., see p. 342 of ERDC/CHL TR-13-15, West Bay Sediment Diversion Effects. Other than the expanded text proposed in responses to 6687960 and 6687971, the next option would be to find or define an appropriate name for the entire reach, e.g. Mississippi River Delta Dredging Reach.			
	Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			
	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6687975	Environmental	Figure C3	7	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Recommend replacing this figure with the updated, similar figure contained in the Engineering Plates file.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Figure will be replaced with the one contained in the plates.			
	Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			
	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			

6687982	Environmental	C3.2.2.1 and elsewhere	30	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Verify that the District (Geotech) would send boring plots to anyone requesting them without a FOIA request and at no charge. If they would, no problem with text.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Concur. Will update the text to include that a FOIA will be required. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6687984	Environmental	C3.2.3.5	33	4
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Remove "Gulf Outlet".				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Concur, will remove. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6687988	Environmental	C3.2.3.5	34	1
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Reference sentence beginning with "Continued and increasing..." It is unclear what this sentence means. Who or what is restricting crops? Maybe it means less land would be available for crops due to development. If so, it should be made clear.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred This paragraph was cited from the 1981 report. I will rewrite or remove this portion to clarify. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			

6687993	Environmental	Figure: River Deepening Facilities Relocation Costs	37	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Need to add explanation of acronyms used in table.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred The acronyms are provided from the various databases accessed in the first stages of investigation and are not always accurate; accurate facility descriptions, sizes and depths will be obtained from the owners when a TSP is selected. Submitted By: Zane Janicki (504-862-1328) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
Current Comment Status: Comment Closed				
6687995	Environmental	C5.2.5 - First sentence in section	39	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Add "Partial" to beginning of sentence and add "to a depth of 45 feet" after the word "Project".				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Agreed Submitted By: Edward Creef (504-862-2521) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
Current Comment Status: Comment Closed				
6688024	Environmental	Multiple figures	44 through 55	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Note that the text in these figures is too small to be read if printed on normal size paper. Either the figures need to be reprinted with larger text or they will need to be bound on tabloid (11x17 inch) paper.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 05 2016				
1-0	Evaluation Concurred Figures will be replaced with larger size prints. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			

Current Comment Status: Comment Closed				
6688753	Environmental	n/a	Appendix C1, pg. 22	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
The following sentence references a model's boundaries, but there is no information about the model or boundary location.				
"Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data for the reach of the river south of the model boundaries suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012)."				
Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Modified sentence as follows: Although sand transport modeling results suggest the lower river conveys appreciable sand bed load and will continue to for several hundred years, recently collected bed sediment data suggest that shoaling of sediments (especially sand) in the river channel south of the Old River Control Complex is occurring due to reduced stream power (Nittrouer and Viparelli 2014, Allison et al. 2012). Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016			
Current Comment Status: Comment Closed				
6688767	Environmental	n/a	Appendix C1, pg. 24-27	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Discussion should be added regarding deepening alternatives effect on salinity intrusion and resultant water quality impacts to freshwater intakes south of New Orleans.				
Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Language added to address 3D model development and that this section will be updated once model results availalbe to assess potential impacts. Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016			
Current Comment Status: Comment Closed				
6688783	Hydraulics	Figure C2	Appendix C1, page 6	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
There is a "Deposited" element in the legend but it is not apparent where this appears in the chart body.				

Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred The model computed slightly less than 1 million cubic yards of annual deposition in this reach that is not removed by dredging. That volume is not visible in the printed half-page plot. The simple solution is to remove the "Deposited" element from the legend since this volume is insignificant compared to other "Fates". Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 11 2016		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016		
		Current Comment Status: Comment Closed		
6688917	Environmental	C4 Civil Design	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Tables and figures need to be numbered consistent with other sections of the appendix.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred Tables and figures will be renumbered to be consistent with other sections of the appendix. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016		
		Current Comment Status: Comment Closed		
6688929	Environmental	C4.1.1 second paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Reference sentence beginning with "For this reach..." Remove the first "and" and add St. Bernard to the list of ports. Also, this sentence needs to be split into at least 2 sentences as it is grammatically incorrect.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred This portion of the 2nd paragraph has been revised to read as follows: "For this reach, an advance maintenance of 6' below each alternative depth was applied, along with an overdepth of 2'. This advance maintenance and allowable overdepth will account for inaccuracies in the dredging process, as well shoaling during construction and maintenance dredging, and facilitate obtaining the full advance maintenance. For the reach of river extending upstream of Mile 13.4 AHP, the project depths of 48' and 50' below the LWRP (Low Water Reference Plane) were evaluated and adjusted using the 2007 LWRP NAVD88 elevations obtained from the curves provided in the following graph. The project reach of extends through the Ports of St Bernard, New Orleans, South Louisiana, and Baton Rouge upstream to Mile 232.4 AHP." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016		
	1-1	Backcheck Recommendation Close Comment Closed without comment.		

Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016				
Current Comment Status: Comment Closed				
6688936	Hydraulics	n/a	Appendix C1, page 8	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
The following sentence is somewhat misleading: "It should be noted that the 1D model does not address potential increases in the extent or frequency of salinity intrusion due to channel deepening or relative sea level rise." This implies that the 1D model is capable of resolving existing salinity intrusion conditions. In reality it is only capable of resolving the relationship between low water conditions and resultant sedimentation in the lower river which is due to multiple factors including impacts of salinity intrusion.				
Submitted By: Steve Ayres ((504)862-2427). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Proposed revision to sentence 1: "It should be noted that the 1D model does not address the extent or frequency of salinity intrusion." Proposed revision to next to last sentence in the same paragraph: "Increased frequency and extent of salinity intrusion, due to channel deepening or relative sea level rise, could increase the contact area between fresh and saline water." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 11 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Steve Ayres ((504)862-2427) Submitted On: Oct 13 2016			
Current Comment Status: Comment Closed				
6688938	Environmental	C4.1.2 first paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Sentence beginning with "As stated in...". It appears that allowable overdepth is missing from this discussion. This comment is also applicable to the similar sentence in Section 4.1.3.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred The following was inserted in the 1st paragraph of 4.1.2 and 4.1.3: "An allowable overdepth of 2' was also accounted for." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
Current Comment Status: Comment Closed				
6688941	Environmental	C4.1.2 first paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Last sentence. Something wrong - needs editing.				

Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
<div><div>1-0</div><div>Evaluation Concurred Last sentence was revised as follows: "For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016</div></div>				
<div><div>1-1</div><div>Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016</div></div>				
Current Comment Status: Comment Closed				
6688945	Environmental	C4.1.2 second paragraph	n/a	n/a
Comment Classification: Unclassified\For Official Use Only (U\FOUO) Sentence beginning with "In addition...". Something is missing from the sentence. Same problem in Section C4.1.3. Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016 Revised Oct 06 2016.				
<div><div>1-0</div><div>Evaluation Concurred Revised last sentence to reads as follows: For this reason, surveys of the crossings performed in late fall and winter of 2014, following the completion of O&M dredging, were utilized in determining construction dredging quantities. Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016</div></div>				
<div><div>1-1</div><div>Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016</div></div>				
Current Comment Status: Comment Closed				
6688947	Environmental	C4.2.2 second sentence	n/a	n/a
Comment Classification: Unclassified\For Official Use Only (U\FOUO) Change 19.5 AHP to 19.5 BHP. Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
<div><div>1-0</div><div>Evaluation Concurred Thanks . Correction Made Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016</div></div>				
<div><div>1-1</div><div>Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016</div></div>				

Current Comment Status: Comment Closed				
6688948	Environmental	C4.2.2 Fourth sentence	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
This sentence is a repeat of the first sentence. Delete it.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred Redundant sentence deleted		
		Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016		
	1-1	Backcheck Recommendation Close Comment Closed without comment.		
		Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016		
Current Comment Status: Comment Closed				
6688951	Environmental	C4.2.3 First sentence	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Delete "During this study" as it adversely affects the way the sentence reads.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred Correction Made		
		Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016		
	1-1	Backcheck Recommendation Close Comment Closed without comment.		
		Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016		
Current Comment Status: Comment Closed				
6688976	Environmental	C4.2.3 First paragraph, last sentence	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Explain what "next phase" refers to.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
	1-0	Evaluation Concurred The last sentence has been revised as follows: "Other locations that will be reconsidered during the next phase of this re-evaluation study, based off of future channel surveys and 2-D model results, will include: Missouri Bend and 81 Mile Point."		
		This is simply stating that when we proceed to the next phase of the study, which will include results of the ERDC 2-D model, all crossings will be re-evaluated using the 2-D model results, as well as verification of quantities, dredging reaches, and possibly the addition of		

	other crossing that may need to be constructed and maintained.			
	Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			
	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6688980	Environmental	C4.3 first sentence	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
As written, the sentence states the entire reach of the river from the Gulf to Baton Rouge will require annual dredging. Sentence needs rewriting.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred First sentence has been revised to read as follows: "Annual maintenance dredging will be required within the reaches of the Mississippi River addressed in this re-evaluation report. Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			
	Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6688984	Environmental	C4.3.1 second paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Rewrite "It was agreed to by all...". Maybe state "The ERDC model predicted..."				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred This paragraph has been revised to read as follows: "While the projected annual quantities from the 1-D model were, for the most part, in line with those obtained during historical O&M dredging of the channel, there were some issues with the results that were projected for the Head of Passes and Fairway/ Anchorage at Pilottown reaches where the model projections were well above the average annual quantities dredged within these reaches. The District and ERDC both agreed that shoaling and maintenance dredging needs within the lower portion of the Mississippi River, from Venice, Louisiana (Mile 11 AHP) to the Gulf entrance channel (Mile 22.1 BHP), would remain essentially the same as for the current 45' project. As a result, the dredging needs for both the 48' and 50' channel alternatives in this reach were based off of average annual quantities obtained from historical dredging performed within the above reaches of the Mississippi River - SW Pass channel. The following annual maintenance plan was developed through coordination with the District's Operations Manager and used in obtaining the average annual O&M dredging costs for both the -48' MLLW and -50' MLLW alternatives:" Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment.			

Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016
Current Comment Status: **Comment Closed**

6688989	Environmental	C4.3.1 second paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Second sentence beginning with "However, while the...". Add river miles to define the reaches.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Mileages added Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			

6688992	Environmental	C4.3.1 paragraph numbered "1")	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Last sentence. Not all material from this reach would be beneficially used. Much of the material disposed in the HDDA located at the head of Pass a Loutre is swept downstream. Need to remove the statement about 100% beneficial use.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
Revised Oct 06 2016.				
1-0	Evaluation Non-concurred This is 100% beneficial use is referring to the disposal of material that is dredged and disposed of by "cutterhead" dredges, for which disposal is 100% beneficial. However, I revised the last sentence to read as follows in hopes of further clarifying this. "Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre via the dredge-and-haul method." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
Current Comment Status: Comment Closed				

6688996 Environmental C4.3.1 Paragraph numbered "2)" n/a n/a

Comment Classification: **Unclassified\\For Official Use Only (U\\FOUO)**

Last sentence is wrong. Material hauled to the HDDA and the ODMDS is not 100% beneficial. What is dredged out of the HDDA could be considered 100% beneficial, but not 100% of what is dumped into the HDDA. None of what goes to the ODMDS is beneficial use.				
Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Non-concurred As for para 1); the last sentence has been revised as follows for further clarification : "Disposal of material dredged within the reach of the channel would be for 100% beneficial use through cutterhead dredging, and material removed by hopper dredges placed within the hopper dredge disposal area (HDDA) within Pass A Loutre or the ODMDS located adjacent to the entrance bar channel via the dredge-and-haul method." Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6688999	Environmental	C4.3.2 second to last paragraph	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO) Sentence beginning with "These percentages fell...". Add reference to Section C2.1.1.4. where the "more aggressive dredging schedule" is described. Submitted By: Richard Boe ((504)862-1505). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Added "(See Section C2.1.1.4.)" Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Richard Boe ((504)862-1505) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6689101	Geotechnical	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO) Geotech has reviewed the report and has no comments. Submitted By: Kathryn Chaisson (504-862-2985). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Thank you for your review. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Kathryn Chaisson (504-862-2985) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			

6689105	Engineering Management	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
From the 2013 Mississippi River Hydrographic Survey Book (File No. H-5-55630, ISBN 978-0-09848572-2-7), Narrative Sheet:				
"Low Water Reference Plane (LWRP) is a hydraulic-based reference plane established from long-term observations of the river's stage, discharge rates, and flow duration periods developed about the 97% flow duration line and/or the 97% stage exceedance of daily lows for the period of record at a specific site. Per EM 1110-2-1003, Engineering and Design Hydrographic Surveying [EM], construction and improvement along the middle and lower Mississippi river are performed relative to the LWRP at a particular point."				
The Civil write generically references LWRP, while in their drawings they reference LWRP (2007). The Civil write-up , or somewhere else in the overall document, it should be stated that the Deepening Study is utilizing LWRP of 2007 epoch, or restated Year 2007 recomputation. (Ralph Scheid)				
Submitted By: Leslie Lombard (504-862-2490). Submitted On: Oct 06 2016				
1-0	Evaluation Non-concurred Paragraph C4.1.1, 2nd paragraph, as well as the 3 charts in C4.1.1, address utilization of the 2007 LWRP Submitted By: richard broussard (504-862-2402) Submitted On: Oct 06 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 18 2016			
	Current Comment Status: Comment Closed			
6689324	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
1. The MII is using the 2012 Costbook. A newer 2015 version is available for use. Suggest updating to latest version.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Mii is revised. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689325	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
2. Estimate is using current labor, equipment and fuel libraries/rates.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Noted.			

	Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689326	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
3. No subcontractors are being used on the estimate. This is unusual but not necessarily wrong.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Noted. The surveying could be contracted out but the estimate does not do this. Project is dredging and disposal with no dike construction. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689327	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
4. All folders under folder 09 01 "Channels" does not have a contractor assigned. This means no contractor markups were assigned to these costs since they were not included in the CEDEP file.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Noted. The Crossings estimate used includes a markup since it is an ACTUAL COST for the Dustpan Dredges to do work. The folder containing Southwest Pass DOES have a contractor assigned and is marked up correctly. The Bar Channel folders do not need a contractor assigned because the hopper dredging work is marked up in CEDEP. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689328	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
5. Item "Mobilization and Demobilization of Dust Pan Dredge" for the Belmont channel has a zero value on the quantity.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				

1-0	Evaluation Concurred Concur. The cost for mobilization is captured in the folder named Initial Mobilization and Demobilization. The folder named Mobilization and Demobilization with zero cost will be removed. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689329	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
6. Folders "Fairview Point" and "Rich Bend" are empty since they are a no cost item. Suggest including an item with zero cost to make sure they appear in the cost report. Otherwise they will be omitted from the report.				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Concur. An item was inserted into the Mii. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689330	Cost Engineering	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
7. On the MII, the cost for the dust pan dredge were provided by Operations Division of Memphis District which may be used during the plan formulation period but may not pass the review by MCX which requires a more detailed estimate (Crews, labor, equip, etc.).				
Submitted By: Miguel Ramos (504-862-2617). Submitted On: Oct 06 2016				
1-0	Evaluation Concurred Do not concur. The cost provided by Memphis District are the ACTUAL COST for dust pan dredges to do work. Two of the dredges are government owned dredges and one is a procurement negotiated with a contractor. The unit price for this work was conservatively selected from the unit price of the Dust Pan Dredge Hurley which is the most expensive plant to operate. The dredge production rates for construction were adjusted to mimic a virgin cut. The maintenance production was as provided by Memphis District. Submitted By: BENJAMIN SALAMONE (504-862-1676) Submitted On: Oct 07 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Miguel Ramos (504-862-2617) Submitted On: Oct 12 2016			
	Current Comment Status: Comment Closed			
6689927	Engineering Support	n/a	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				

No comment.				
Submitted By: Gaynell Morrison (504-862-2034). Submitted On: Oct 07 2016				
1-0		Evaluation Concurred Thank you for your review. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 11 2016		
1-1		Backcheck Recommendation Close Comment Closed without comment. Submitted By: Gaynell Morrison (504-862-2034) Submitted On: Oct 19 2016		
		Current Comment Status: Comment Closed		
6693649	Civil	n/a	Page 1 - Table of Contents	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
The Appendix title is labeled "Appendix C 1". Assume this is "Appendix C"?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0		Evaluation Non-concurred The Engineering Appendix is divided into two parts. Appendix C 1 contains the main report which includes an annex. Appendix C 2 is reserved for the Technical Plates. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016		
1-1		Backcheck Recommendation Close Comment Understood, comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6693667	Civil	n/a	Page 3	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Paragraph C1 - GENERAL Recommend this paragraph be greatly enhanced to include a solid description to include (1) actual project limits [for instance, what is actual upper limit?] and breakout of specific reaches, (2) current method of maintenance [crossings dredged, dredge type, disposal plan, discuss HDDA cleanout, soft dikes, structures, etc.]. The reader should be able to understand the existing project prior to getting into the proposed enhancements. (3) Currently authorized vs. currently maintained. Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0		Evaluation Concurred As the engineering appendix this section is intended to document the engineering requirements. The items listed such as project limits, reaches, maintenance methods, etc. are described in the main body of the report (Chapters 1 and 3). With the exception of HDDA cleanout soft dikes and other structures. These are not described as they are not existing OMRR&R features, and are not relevant to the comparison of alternatives. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 14 2016		
1-1				

	Backcheck Recommendation Open Comment The Chapters 1 and 3 were not provided for review under this current review; and review of those items may alleviate the feeling of inadequacy in the contents of the Engineering Appendix opening paragraph. However, the HDDA cleanout, and maintenance of channel training structures are indeed existing OMRR&R features, and are major components in the future maintenance of the project. For the sake of independent reviewers trying to understand the overall project, and explanation of these features should be provided. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
2-0	Evaluation Concurred Chapters 1 and 3 have been provided to the reviewer. The channel training structures had been scoped at the beginning of this study such that they would not be investigated for each alternative. They were identified as low risk items in terms of how they would impact the evaluation and selection of an alternative. Therefore the information requested for these features were not gathered ahead of time. This information, as well as that for the HDDA cleanout, will have to be gathered together in order to provide the requested explanation. Currently there is not sufficient time to pursue this effort. Though, time may allow this effort for the Final Report Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 27 2016			
2-1	Backcheck Recommendation Close Comment Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 28 2016			
Current Comment Status: Comment Closed				
6693671	Civil	n/a	Page 3	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Paragraph C2.1.1.2. Already, we have confusion regarding datum reference. The paragraph is mentioning MLG and MLLW elevations interchangeably.(authorized to 55 MLG. Currently maintained to 45 MLG. evaluating 48 or 50 MLLW.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation For Information Only The first paragraph refers only to navigation depths (or draft). The choice of a datum is location dependent. The second and third paragraphs refer to historical practice and reference the appropriate datum for each location. The flow of this section might be improved if the first sentence of the second paragraph became the last sentence of the first paragraph. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Close Comment Thank you for that explanation - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
Current Comment Status: Comment Closed				
6693673	Civil	n/a	Page 4	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Paragraph C2.1.1.2. At the end of this paragraph, add enhanced discussion something like, "Actual annual dredging requirements can vary greatly, and can be correlated directly to the stage hydrograph for any given year. During years of high river flow or multiple peaks in the hydrograph, dredging requirements are greater. Conversely, lesser maintenance dredging is required during years of low/moderate hydrographs."				

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
	1-0	Evaluation Concurred Proposed addition: "Annual dredging requirements can vary greatly. In Southwest Pass, dredging requirements are strongly influenced by sediment supply. Thus, dredging requirements tend to be higher in years with significant floods or prolonged periods of higher than normal flow. Conversely, dredging requirements tend to be lower during years dominated by low to moderate flows. While sediment supply is a significant factor in dredging requirements at crossings, other factors such as hydrograph shape also influence requirements. For example, dredging of a crossing is more likely to be required after a rapid fall in stage than after a slow fall of similar magnitude." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016		
	1-1	Backcheck Recommendation Close Comment Thank you - concur with proposed addition; comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6693676	Civil	n/a	Page 5	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Figure C1. The caption below this figure appears to limit disposal of this reach to either HDDA or ODMDS. Cutterhead dredging in this reach of river uses material beneficially via direct pump into marsh creation areas.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
	1-0	Evaluation Concurred Caption has been revised: "The reach of dredging referred to as the "Southwest Pass" dredging reach, is comprised of the Mississippi River, between Venice, LA, approximate river Mile 10.0 AHP, and the Head of Passes (HOP), river Mile 0.0. From this point, the channel extends downstream through Southwest Pass and the Southwest Pass Bar Channel, terminating at the outer limit of the bar channel at approximate river Mile 22.0 BHP. Typically, dredged material from the lower half of the Pass (below Mile 11.0 BHP) is placed within the offshore disposal site (ODMDS), as well as areas adjacent to the channel for beneficial use, and dredged material from locations upstream of Mile 11.0 BHP is placed at the Head of Passes, Hopper Dredged Disposal Area (HDDA). as well as areas adjacent to the channel for beneficial use. The upper five miles of this reach (Miles 10.0 AHP to 5.0 AHP) seldom requires dredging." Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016		
	1-1	Backcheck Recommendation Close Comment Thank you - concur with revised caption. Comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6693694	Civil	n/a	Page 6	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
[Critical/Flagged]				
Paragraph C2.1.1.4. This paragraph appears to state that the model was run for 45, 48 and 50 MLG(??) There is no alternate plan for 48 or 50' MLG channels. If projected construction and/or maintenance requirements were based on MLG elevations, this would result in a potential problem with all quantities/cost estimates derived.				

Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0		Evaluation For Information Only All elevations in the model are referenced to NAVD 1988 (see paragraph 2 of section C2.1.1.3). I will restate this in section C2.1.1.4. Table C1 is a summary of a more detailed spreadsheet, supplied by the PDT, describing this conversion for the dredging templates referenced to MLG-SWP. Table C2 is a corresponding summary for the crossings where channel depths are referenced to the Low Water Reference Plane. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016		
1-1		Backcheck Recommendation Close Comment Response Part 1 - Understood and concur. Response Part 3 - Understood and concur. Response Part 2 - Still confused as to how the 50' draft project relates to a dredging template of -53.2 NAVD88 = -53.7 MLLW(?) It still appears that dredging is extending approximately 3 feet below the proposed target depth of -50.0 MLLW, which has significant impacts to computations of future maintenance dredging. This misunderstanding will be discussed with our H&H PDT representative and resurfaced if an actual concern is realized. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6693699	Civil	n/a	Page 7	n/a
Comment Classification: Unclassified\For Official Use Only (U\FOUO)				
Figure C3. Several minor comments as follows: (1) "BELMONT" is misspelled in the label. (2) the river miles shown are not readable, (3) FAIRVIEW is not in the inset table if it is suppose to be. (4) Why do some crossings appear red and others blue? Does this signify anything?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0		Evaluation Concurred The figure is being updated to include additional and readable labeling. A clearer background image will be added. The misspelling will be corrected. Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 13 2016		
1-1		Backcheck Recommendation Close Comment Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6693710	Civil	n/a	Page 7	n/a
Comment Classification: Unclassified\For Official Use Only (U\FOUO)				
For this reviewer, while the trigger elevation for the "less aggressive dredging schedule" (1 ft below authorized)is clear, the trigger elevation for the "more aggressive dredging schedule" is not understood. Does this propose dredging when the entire advanced maintenance template is still clean?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0		Evaluation Concurred Proposed revision to second sentence:		

	"Traditionally, the trigger elevation has been based on the amount of over-dredging allowed in the dredging template, thus simulated dredging operations are initiated whenever sediment deposition exceeds the depth of over-dredging."			
	Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Close Comment Understood - the label of "more aggressive dredging schedule" is certainly justifiable. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6693720	Civil	n/a	Page 8	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Table C1. Again, this table shows project dredging depths to -53.2 NAVD88. The deepest proposal is -50 MLLW. Were these inverts used to compute dredge quantities?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Non-concurred Table C1 is a summary of a detailed set of dredging template elevations approved by the PDT for use in the 1D model. This comment may indicate a need to better explain the relationship between MLLW and MLG. Seasonal variations in the mean level of the Gulf of Mexico are similar in magnitude to the tidal range. A channel designed solely to MLLW would be unreliable at lower low tide coincident with a seasonal low level of the Gulf. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Open Comment Concur - it appears a better relationship is needed between MLLW and MLG if that will resolve this concern, or an explanation of exactly what the authorized dredging template represents. Again, the reviewer was of the opinion that the channel authorization would be a dredging template of -50.0' MLLW + 6' advanced maintenance + an allowable 2' overdepth dredging. This results in a maximum environmentally cleared dredging template to a depth of -58.0' MLLW. The table C1 indicates a maximum allowable dredge depth of -61.2' NAVD88, which converts roughly to -61.5' NAVD88. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
2-0	Evaluation Concurred The text describing table C1 has been revised to clarify the datums used for template construction: "For this study, all of the historical dredging templates used in the model were adjusted as needed to incorporate design channel widths and side slopes. At the time of model construction, template invert elevations in the Venice to the Gulf of Mexico reach were referenced to MLG-SWP. Subsequent model studies, including the multi-dimensional model studies described in sections C2.1.2 and C2.1.3, will use templates referenced to MLLW. Template invert elevations in the crossing reaches were referenced to the LWRP. In the 1D model, all template invert elevations were converted to NAVD 1988 as described in Tables C1 and C2. Dredging template elevations were not adjusted for eustatic sea level rise during the model simulations. Thus, computed dredging quantities near the end of the 50-year simulation are probably over-estimated for the NRC 3 scenario and to a much lesser extent for the NRC 1 scenario." The volume of computed dredging in the Venice to the Gulf reach was relatively insensitive to channel deepening. Under existing conditions, the channel traps nearly all of the available sand and most of the silt transported into the reach. Thus, the primary effect of channel deepening in this reach is to shift deposition slightly upstream. Computed dredging volumes are probably more sensitive to estimates of water and sediment diversion from this reach than to the channel depth (see Figure C2).			

	Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 27 2016			
2-1	Backcheck Recommendation Close Comment Comment closed as requested. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 28 2016			
	Current Comment Status: Comment Closed			
6693749	Civil	n/a	Page 9	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
First paragraph after Table C2 discusses that "while dredging descriptions used in earlier models produced reasonable reproductions of observed dredging in the 1990's, these descriptions do not reproduce subsequent increases in observed dredging." Could this be a result of hydro-power coming in line in the early 1990's? If so, it should be stated here.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation For Information Only Changes in operation of the Old River Control Complex represent one of a number of factors, that could be responsible for an increase in dredging and a reported change in the characteristics of the dredged material. MRG&P Report 6, ORCC Sedimentation Investigation, concluded that current sediment diversions are inadequate and ERDC/CHL TR-14-5, Miss River Geomorphic Assessment, indicates that downstream reaches are aggradational. Definitive attribution remains elusive because multiple changes are occurring in a complex system. Given the cost of maintenance, further investigation of the causes and possible mitigation is certainly merited. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 13 2016			
1-1	Backcheck Recommendation Close Comment Concur with evaluation - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6693778	Civil	n/a	Page 9	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
First paragraph below Table C2 clearly states that "neither schedule matched the historical distribution of dredging among individual sites." In fact, the entire write-up does not promote any confidence in the model results; yet the TSP was based on model findings. It should be CLEARLY stated that additional analysis is required to verify the TSP selection.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Concurred The TSP was based on the quantities for construction and operation as provided by waterways. These quantities were a combination of model results and historical dredging practices. It is recognized in the main body of the report (Chapter 8) that the TSP is subject to change and development. The following is included in Chapter 8 "Recommendation." "Information found in this document may be subject to change and further development during feasibility analysis, to include additional hydraulic modeling, as well as from review and resolution of comments received: from both the public other agencies; the Agency Technical Review (ATR); and Independent External Peer Review (IEPR), all of which will help refine the Tentatively Selected Plan (TSP). The information provided in this chapter is based on the TSP as currently defined and may be refined and/or changed prior to publication of the final report."			

	Submitted By: Leslie Lombard (504-862-2490) Submitted On: Oct 14 2016			
1-1	Backcheck Recommendation Close Comment The quantities provided by waterways for operation were based on 1D model results! However, if the main report clarifies the concern that additional analysis will likely revise the information currently found in the report in conjunction with resolution of comments to certainly be received on this subject during ATR and IEPR, I am willing to close this comment at this time. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6693803	Civil	n/a	Page 24	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Paragraph C2.2.4 title states that the recommended plan is deepening the SW Pass and the Crossings to 50 feet. I thought the TSP was not dredging the crossing in the Baton Rouge Port region. In fact, how many alternatives were analyzed? C2.2.4 speaks of "Alternative B" and C2.2.5 speaks of "Alternative A". Were any other combinations combined as alternative actions?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Non-concurred Per discussion with Environmental Manager, the selected plan as you describe is not an actual alternative that was analyzed as part of the SEIS alternatives analysis. For legal and environmental clearance, the SEIS and the WQ section will match as written in the Water Quality section of the report. Planning will write to the new, "hybrid" alternative in a different section of their report. The alternatives in the WQ section (No Action, Alt A, and Alt B) are correct from a NEPA standpoint and will provide environmental clearance for Planning to negotiate the new, "hybrid" alternative discussed at TSP. Submitted By: Danny Wiegand (504-862-1373) Submitted On: Oct 14 2016			
1-1	Backcheck Recommendation Close Comment Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6693810	Civil	n/a	Page 30	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Two corrections should be made to paragraph C3.2.1.2 "Project Design Criteria". (1) indicates a channel width of 750' for the entire SWP reach; the bar channel is a 600' width. (2) For the crossings, the channel depth should be defined in NAVD88 as referenced to the LWRP.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Concurred Concur Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			

6693814	Civil	n/a	Page 33	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
Paragraph C3.2.3.5. The 4th line references the mouth of the Mississippi River-Gulf Outlet". Is this in reference to the MRGO or the mouth of the Mississippi River?				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Concurred This is in reference to the mouth of the Mississippi River and has been changed. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6693823	Civil	n/a	Page 35	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
The entire Geotechnical section speaks of available data, geologic profiles, etc. There is no actual discussion of any actual designs that have been performed or need to be performed. Were any slope stability analysis for navigation dredging performed or needed.				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 13 2016				
1-0	Evaluation Concurred Analyses have not yet been performed, but will be as needed, and the final report will be updated. Submitted By: Valerie Desselles (504-862-2254) Submitted On: Oct 17 2016			
1-1	Backcheck Recommendation Close Comment Understood - comment closed. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016			
	Current Comment Status: Comment Closed			
6695087	Civil	Sectionh 4.3.2	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO)				
In the paragraph following the yellow and blue "Average Annual Dredging Quantities for 45' Project" table, recommend adding an explanatory sentence towards the end of this text which reads something like, "The significant increase in specific crossing dredge quantities based on the 1D model results appears highly questionable as compared to the historic average; for instance, Redeye (70% increase), Medora (500% increase), Bayou Goula (450% increase), Alhambra (166% increase), and Smoke Bend (225% increase)for the 48' project. Dredging requirements for these crossing need to be further analyzed with the 2D model results."				
Submitted By: Keith OCain (504 862-2746). Submitted On: Oct 14 2016				
1-0	Evaluation Concurred Recommend adding the following text at the end of C2.1.15 (prior to discussion of the the 2D modeling work): "Since the model estimates of dredging at individual crossings were not reliable, the best available option to account for the potential increase in the sediment trap efficiency of a deeper channel is to apply the estimated dredging index to recent historical dredging			

		requirements. Modeling efforts to date indicate that the observed increase in dredging in the crossings over the last decade may not be entirely due to increased river flows. Little and Biedenharn (2014) suggest that this reach of the river switched from a degradational or equilibrium state to an aggradational state in the 1990's. Additional studies are needed to determine what factors are responsible for this shift and if the shift is likely to persist into the future. The two-dimensional sedimentation model currently under development (section C2.1.2) may provide some additional insights into specific processes, e.g., rate of point bar development, affecting dredging requirements." Additional Reference: Little, Charles D, Jr. and Biedenharn, David S. (2014). Mississippi River Hydrodynamic and Delta Management Study (MRHDM)?Geomorphic Assessment, ERDC/CHL Technical Report TR-14-5, US Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, MS. In keeping with the spirit of the first sentence above, the section C4.3.2 estimates of 70% and 130% avoid double-counting the difference between computed and observed dredging requirements for the 45 ft channel. The raw dredging index produced from the model results is most likely an overly conservative estimate of the dredging requirements in the deeper channels. Submitted By: Ronald Heath (601-634-3592) Submitted On: Oct 19 2016		
	1-1	Backcheck Recommendation Close Comment Proposed language will certainly assist in the concerns of overly conservative estimating of future maintenance requirements, which currently appear to result in the omission of the Baton Rouge Harbor reach of channel from recommended deepening. Await the potential for additional insight from future analysis. Concur with the recommendation for this additional language. Submitted By: Keith OCain (504 862-2746) Submitted On: Oct 20 2016		
		Current Comment Status: Comment Closed		
6695942	Civil	Relocations	n/a	n/a
Comment Classification: Unclassified\\For Official Use Only (U\\FOUO) The relocations sections should be sustainably rewritten to include a detail write-up that identifies what is being relocated (pipeline/utilities that cross under the channel bed of the Mississippi); what assumptions were made to estimate impacted utilities (pipelines permitted after xx date were assumed to below the required depth); the assumptions used to develop the cost estimate (construction type/size etc). If necessary refer to the 1983 GDM for example text. Submitted By: Jennifer Vititoe (504-862-1252). Submitted On: Oct 14 2016				
	1-0	Evaluation Concurred There are three comments here, responses are as follows: *The table in the write-up includes the best information available for facilities within the work (i.e. dredging) limits. As noted in the write-up, more information will be obtained once a TSP is selected and owners provide details on the facilities. *The table will be revised to include any facilities that were believed to be of sufficient depth that relocation was not included in the cost estimate. The write up will be revised to note that while these facilities were not believed to require relocation, the owners will be contacted for confirmation. *regarding assumptions on costs, the write up states: "The cost estimates presented in this report were developed by New Orleans District Costs Section." Please contact Cost section for any necessary clarification. Submitted By: Zane Janicki (504-862-1328) Submitted On: Oct 17 2016		
	1-1			

	Backcheck Recommendation Close Comment Closed without comment.
	Submitted By: Jennifer Vititoe (504-862-1252) Submitted On: Oct 20 2016
	Current Comment Status: Comment Closed

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APPENDIX C – TECHNICAL PLATES

**Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
48' Project Depth**

Channel Template and Quantities to 6' Advance
Maintenance (2015 Surveys)

Southwest Pass - Bar Channel, -51' MLG (-54 MLLW)

STA.	AREA (SF)	Vol. (CF)	Vol. (CY)
0	319.76		
1000	1,214.85	767,305.00	28,418.70
2000	1,477.79	1,346,320.00	49,863.70
3000	1,638.57	1,558,180.00	57,710.37
4000	1,454.27	1,546,420.00	57,274.81
5000	1,563.57	1,508,920.00	55,885.93
6000	2,168.22	1,865,895.00	69,107.22
7000	2,062.54	2,115,380.00	78,347.41
8000	1,982.17	2,022,355.00	74,902.04
9000	1,839.28	1,910,725.00	70,767.59
10000	2,585.00	2,212,140.00	81,931.11
10019	4,674.00	68,960.50	2,554.09
10219	2,192.39	686,639.00	25,431.07
10474.52	1,771.69	506,450.86	18,757.44
10761.58	2,010.88	542,912.27	20,107.86
11000	2,156.01	496,734.96	18,397.59
12000	1,994.99	2,075,500.00	76,870.37
13000	3,066.94	2,530,965.00	93,739.44
13038	3,090.55	116,992.27	4,333.05
14000	2,553.91	2,714,983.00	100,554.93
14045	2,517.37	114,103.74	4,226.06

Total: 989,180.80 CY

**Mississippi Ship Channel Deeping Study,
Mississippi River, Bar Channel,
Construction Dredging
50' Project Depth**

Channel Template and Quantities to 6' Advance
Maintenance (2015 Surveys)

Southwest Pass - Bar Channel, -53 (MLG)

STA.	AREA (SF)	Vol. (CF)	Vol. (CY)
0	1,027.68		
1000	2,339.25	1,683,465.00	62,350.56
2000	2,687.89	2,513,570.00	93,095.19
3000	2,936.31	2,812,100.00	104,151.85
4000	2,743.65	2,839,980.00	105,184.44
5000	2,870.38	2,807,015.00	103,963.52
6000	3,519.71	3,195,045.00	118,335.00
7000	3,411.58	3,465,645.00	128,357.22
8000	3,242.95	3,327,265.00	123,232.04
9000	2,947.75	3,095,350.00	114,642.59
10000	3,235.40	3,091,575.00	114,502.78
10019	5,588.15	83,823.73	3,104.58
10219	3,083.67	867,182.00	32,117.85
10474.52	2,617.55	728,387.87	26,977.33
10761.58	2,914.25	793,979.25	29,406.64
11000	3,250.29	734,874.81	27,217.59
12000	3,409.15	3,329,720.00	123,322.96
13000	4,398.28	3,903,713.95	144,582.00
13038	4,411.48	167,385.40	6,199.46
14000	4,068.53	4,078,884.81	151,069.81
14045	4,037.81	182,392.65	6,755.28

Total: 1,618,568.68 CY

Mississippi Ship Channel Deeping Study, Mississippi River, Bar Channel, Construction Dredging <u>48' Project Depth</u> Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)		
48' MLLW Southwest Pass To -51' (MLG)		
STA.	AREA (SF)	Vol. (CF)
2776+29.07	155.20	0.00
2778+29.07	103.20	957.20
2780+29.07	46.20	553.20
2782+29.07	4.20	186.40
2784+29.07	0.00	15.40
2786+29.07	1.40	5.20
2788+29.07	15.10	61.20
2790+29.07	42.80	214.40
2792+29.07	53.40	356.40
2794+29.07	37.20	335.80
2796+29.07	20.70	214.60
2798+29.07	26.60	175.30
2800+29.07	56.80	309.20
2802+29.07	83.20	518.80
2804+29.07	68.10	560.60
2806+29.07	56.80	462.60
2808+29.07	72.60	479.20
2810+29.07	96.70	627.00
2812+29.07	115.90	787.30
2814+29.07	100.90	802.70
2816+29.07	69.20	629.70
2818+29.07	39.50	402.40
2820+29.07	99.20	513.70
2822+29.07	194.50	1,087.70
2824+29.07	317.70	1,897.10
2826+29.07	343.80	2,450.00
2828+29.07	406.70	2,779.30
2830+29.07	483.40	3,296.60
2832+29.07	534.50	3,770.00
2834+29.07	622.00	4,283.20
2836+29.07	739.90	5,044.20
2838+29.07	832.30	5,823.10
2840+29.07	1,001.50	6,792.00
2842+29.07	1,098.70	7,778.50
2844+29.07	1,191.40	8,481.60
2846+29.07	1,295.70	9,211.50
2848+29.07	1,297.80	9,605.70
2850+29.07	1,263.50	9,486.40

Mississippi Ship Channel Deeping Study, Mississippi River, Bar Channel, Construction Dredging <u>50' Project Depth</u> Channel Template and Quantities to 6' Advance Maintenance (2015 Surveys)		
50' MLLW Southwest Pass To -53 (MLG)		
STA.	AREA (SF)	Vol. (CY)
2776+29.07	477.5	0
2778+29.07	411.7	3293.1
2780+29.07	346.3	2807.4
2782+29.07	288.8	2352.3
2784+29.07	239.5	1956.8
2786+29.07	187.1	1580.3
2788+29.07	165.1	1304.5
2790+29.07	198.6	1346.8
2792+29.07	214.8	1531.1
2794+29.07	194.5	1516
2796+29.07	165.2	1332.3
2798+29.07	200	1352.9
2800+29.07	299.3	1849.2
2802+29.07	361.7	2448.1
2804+29.07	359.1	2669.7
2806+29.07	419.8	2885
2808+29.07	402.2	3044.5
2810+29.07	455.3	3175.8
2812+29.07	542.4	3695.3
2814+29.07	604.2	4246.8
2816+29.07	733.1	4952.9
2818+29.07	856.2	5886.1
2820+29.07	1110.3	7283.2
2822+29.07	1425.6	9392.1
2824+29.07	1713.5	11626.2
2826+29.07	1649.7	12456.5
2828+29.07	1573.1	11936.2
2830+29.07	1575	11659.5
2832+29.07	1821.3	12578.7
2834+29.07	2064.9	14393
2836+29.07	2253.1	15992.6
2838+29.07	2367.6	17114.1
2840+29.07	2521.5	18107.9
2842+29.07	2612.5	19014.6
2844+29.07	2681.9	19608.9
2846+29.07	2766.5	20179.2
2848+29.07	2791.9	20586.7
2850+29.07	2780.4	20638.4

2852+29.07	1,222.90	9,208.90
2854+29.07	1,151.90	8,795.40
2856+29.07	1,063.90	8,206.80
2858+29.07	992.50	7,616.50
2860+29.07	1,267.30	8,369.80
2862+29.07	1,306.40	9,532.40
2864+29.07	1,350.90	9,841.80
2866+29.07	1,330.90	9,932.50
2868+29.07	1,280.90	9,673.20
2870+29.07	1,358.40	9,775.30
2872+29.07	1,499.50	10,585.00
2874+29.07	1,613.30	11,529.10
2876+29.07	1,728.90	12,378.60
2878+29.07	1,854.20	13,270.70
2880+29.07	1,987.60	14,228.80
2882+29.07	1,983.60	14,708.10
2884+29.07	1,905.50	14,404.30
2886+29.07	1,837.00	13,861.40
2888+29.07	1,891.60	13,809.80
2890+29.07	1,917.70	14,108.60
2892+29.07	1,975.00	14,417.50
2894+29.07	2,064.10	14,959.70
2896+29.07	2,180.90	15,722.30
2898+29.07	2,304.50	16,612.60
2900+29.07	2,440.00	17,572.30
2902+29.07	2,566.10	18,541.20
2904+29.07	2,682.00	19,437.50
2906+29.07	2,691.80	19,903.00
2908+29.07	2,553.40	19,426.80
2910+29.07	2,409.80	18,382.30
2912+29.07	2,285.80	17,391.20
2914+29.07	2,193.60	16,590.60
2916+29.07	2,100.00	15,902.50
2918+29.07	2,004.70	15,202.60
2920+29.07	2,038.60	14,975.10
2922+29.07	2,032.00	15,076.20
2924+29.07	1,865.80	14,436.30
2926+29.07	1,701.90	13,213.80
2928+29.07	1,600.50	12,230.90
2930+29.07	1,559.30	11,702.80
2932+29.07	1,517.70	11,396.40
2934+29.07	1,376.60	10,719.70
2936+29.07	1,239.70	9,690.00
2938+29.07	1,111.70	8,709.10
2940+29.07	980.50	7,749.20
2942+29.07	887.70	6,919.50
2944+29.07	822.80	6,335.20

2852+29.07	2754	20497.8
2854+29.07	2681.1	20129.9
2856+29.07	2585.3	19505.3
2858+29.07	2490.7	18800.2
2860+29.07	2776	19506.4
2862+29.07	2830.6	20765.4
2864+29.07	2887.9	21179.6
2866+29.07	2867.6	21316.5
2868+29.07	2816.8	21053.2
2870+29.07	2899.9	21172.8
2872+29.07	3047.7	22028.1
2874+29.07	3166.9	23017.4
2876+29.07	3285	23896.1
2878+29.07	3413.3	24808.5
2880+29.07	3549.9	25789.5
2882+29.07	3546.6	26283.3
2884+29.07	3467.8	25979.2
2886+29.07	3398.9	25432
2888+29.07	3451.4	25371.4
2890+29.07	3476.5	25658.8
2892+29.07	3533.3	25962.1
2894+29.07	3624.5	26510.6
2896+29.07	3746.7	27301
2898+29.07	3875.7	28231.3
2900+29.07	4013.9	29220.7
2902+29.07	4136.6	30187
2904+29.07	4250.2	31062.4
2906+29.07	4258.3	31513.1
2908+29.07	4119.1	31027.5
2910+29.07	3975.2	29978.9
2912+29.07	3851.8	28988.7
2914+29.07	3760.9	28194.9
2916+29.07	3668.6	27516.6
2918+29.07	3575	26828.3
2920+29.07	3600.4	26575.8
2922+29.07	3588.5	26625.9
2924+29.07	3424.5	25974.1
2926+29.07	3262.8	24767.7
2928+29.07	3163.6	23801.5
2930+29.07	3125	23291.1
2932+29.07	3087.5	23009
2934+29.07	2940.7	22326.5
2936+29.07	2797.3	21251.9
2938+29.07	2661.5	20217.8
2940+29.07	2516.9	19178.9
2942+29.07	2348.5	18020
2944+29.07	2168	16727.9

2946+29.07	783.10	5,947.70
2948+29.07	768.60	5,747.00
2950+29.07	723.00	5,524.50
2952+29.07	545.80	4,699.40
2954+29.07	396.20	3,488.90
2956+29.07	330.40	2,691.20
2958+29.07	318.40	2,403.20
2960+29.07	382.60	2,596.30
2962+29.07	424.40	2,988.90
2964+29.07	499.70	3,422.50
2966+29.07	539.70	3,849.70
2968+29.07	582.10	4,154.80
2970+29.07	636.90	4,514.80
2972+29.07	683.20	4,889.50
2974+29.07	779.90	5,419.20
2976+29.07	986.10	6,541.00
2978+29.07	1,296.50	8,454.20
2980+29.07	1,625.40	10,821.90
2982+29.07	1,660.40	12,169.60
2984+29.07	1,574.10	11,979.50
2986+29.07	1,495.50	11,368.70
2988+29.07	1,408.10	10,754.10
2990+29.07	1,311.40	10,072.20
2992+29.07	1,232.00	9,420.00
2994+29.07	1,406.40	9,772.10
2996+29.07	1,618.90	11,205.00
2998+29.07	1,901.30	13,037.90
3000+29.07	2,254.10	15,390.50
3002+29.07	2,620.90	18,055.40
3004+29.07	2,572.90	19,236.00
3006+29.07	2,517.30	18,852.50
3008+29.07	2,455.10	18,416.50
3010+29.07	2,377.00	17,896.80
3012+29.07	2,302.30	17,330.60
3014+29.07	2,234.90	16,804.40
3016+29.07	2,200.60	16,427.90
3018+29.07	2,099.00	15,924.50
3020+29.07	1,881.80	14,743.80
3022+29.07	1,725.80	13,361.50
3024+29.07	1,804.40	13,074.80
3026+29.07	1,898.00	13,712.60
3028+29.07	1,770.20	13,585.90
3030+29.07	1,501.90	12,119.00
3032+29.07	1,453.70	10,946.80
3034+29.07	1,410.40	10,607.90
3036+29.07	1,445.60	10,577.80
3038+29.07	1,435.00	10,668.90

2946+29.07	2081.3	15738
2948+29.07	2087.3	15439.1
2950+29.07	2028.6	15244.2
2952+29.07	1776.5	14093
2954+29.07	1518.6	12203.8
2956+29.07	1491.4	11147.9
2958+29.07	1503.2	11090.9
2960+29.07	1521.5	11202.4
2962+29.07	1591.6	11529.9
2964+29.07	1668	12072.6
2966+29.07	1754.3	12675.1
2968+29.07	1871.2	13427.9
2970+29.07	2000	14338
2972+29.07	2131.4	15301.6
2974+29.07	2269.6	16300
2976+29.07	2531.7	17782.8
2978+29.07	2862	19976.7
2980+29.07	3198.4	22445.9
2982+29.07	3238.2	23839.4
2984+29.07	3155.2	23679.2
2986+29.07	3076.4	23079.9
2988+29.07	2990.1	22468.7
2990+29.07	2896.4	21802.1
2992+29.07	2815.9	21156.9
2994+29.07	3002.9	21551.2
2996+29.07	3200.9	22977
2998+29.07	3495	24799.5
3000+29.07	3861.5	27246
3002+29.07	4230.1	29968.7
3004+29.07	4178.3	31142.2
3006+29.07	4116.2	30720.5
3008+29.07	4054.1	30260.3
3010+29.07	3983.5	29768.7
3012+29.07	3914.5	29251.9
3014+29.07	3839.4	28718.1
3016+29.07	3796.8	28282
3018+29.07	3691.9	27735.7
3020+29.07	3474.3	26541.4
3022+29.07	3281.2	25020.6
3024+29.07	3396.6	24732.9
3026+29.07	3486.3	25492.3
3028+29.07	3358	25349.2
3030+29.07	3090.6	23883.7
3032+29.07	2898.3	22181.2
3034+29.07	2953	21671.8
3036+29.07	3029.9	22159.1
3038+29.07	3016.1	22392.6

3040+29.07	1,371.30	10,393.50
3042+29.07	1,314.40	9,947.10
3044+29.07	1,216.90	9,375.40
3046+29.07	1,006.30	8,234.10
3048+29.07	977.50	7,347.50
3050+29.07	943.20	7,113.90
3052+29.07	972.20	7,094.20
3054+29.07	1,063.60	7,539.90
3056+29.07	1,035.90	7,775.80
3058+29.07	938.40	7,312.20
3060+29.07	935.50	6,940.50
3062+29.07	872.80	6,697.60
3064+29.07	744.90	5,991.70
3066+29.07	564.00	4,847.90
3068+29.07	577.70	4,228.70
3070+29.07	792.70	5,075.90
3072+29.07	1,007.50	6,667.40
3074+29.07	1,175.60	8,085.40
3076+29.07	1,295.10	9,150.70
3078+29.07	1,316.80	9,673.50
3080+29.07	1,198.60	9,316.30
3082+29.07	1,044.80	8,309.10
3084+29.07	928.70	7,309.20
3086+29.07	742.50	6,189.60
3088+29.07	482.60	4,537.60
3090+29.07	452.50	3,463.50
3092+29.07	457.10	3,369.20
3094+29.07	579.80	3,840.60
3096+29.07	707.60	4,768.10
3098+29.07	937.30	6,092.00
3100+29.07	1,024.00	7,264.00
3102+29.07	1,138.30	8,008.50
3104+29.07	1,430.20	9,512.90
3106+29.07	1,703.60	11,606.60
3108+29.07	1,884.80	13,290.30
3110+29.07	2,129.20	14,866.50
3112+29.07	1,959.20	15,142.00
3114+29.07	1,715.70	13,610.50
3116+29.07	1,699.00	12,646.90
3118+29.07	1,462.90	11,710.60
a 0+29.07	1,114.70	9,546.30
a 2+29.07	1,324.20	9,032.80
a 4+29.07	1,620.90	10,907.60
a 6+29.07	1,951.20	13,230.00
a 8+29.07	2,057.60	14,847.60
a 10+29.07	1,574.70	13,453.10
a 12+29.07	1,562.10	11,617.90

3040+29.07	2951	22100.4
3042+29.07	2880.1	21596.9
3044+29.07	2781.9	20970.5
3046+29.07	2521	19640.3
3048+29.07	2465.8	18469.7
3050+29.07	2360.6	17875.7
3052+29.07	2103.7	16534.5
3054+29.07	2271.7	16205.1
3056+29.07	2403.3	17314.7
3058+29.07	2378.6	17711
3060+29.07	2435.6	17830.7
3062+29.07	2381.6	17841.5
3064+29.07	2274.3	17243.9
3066+29.07	2042.7	15988.9
3068+29.07	1918.8	14672.2
3070+29.07	2188.9	15213.6
3072+29.07	2403.7	17009.8
3074+29.07	2658.8	18750
3076+29.07	2815.3	20274.1
3078+29.07	2823.3	20883.6
3080+29.07	2497	19704.6
3082+29.07	2191	17362.8
3084+29.07	2096.2	15878.5
3086+29.07	1962.2	15030.9
3088+29.07	1622.7	13277.3
3090+29.07	1321	10902.6
3092+29.07	1355.9	9914.6
3094+29.07	1789.8	11650.9
3096+29.07	2175.4	14686
3098+29.07	2453.1	17142.8
3100+29.07	2508	18374.6
3102+29.07	2550.6	18735.5
3104+29.07	2926.8	20286.6
3106+29.07	3298.2	23055.5
3108+29.07	3484.4	25120.7
3110+29.07	3725.3	26702.4
3112+29.07	3547.3	26935.3
3114+29.07	3260.3	25213.2
3116+29.07	3255.8	24133.8
3118+29.07	3018.6	23238.7
a 0+29.07	2677.6	21097.2
a 2+29.07	2785.5	20234
a 4+29.07	3165	22039
a 6+29.07	3502.7	24695.2
a 8+29.07	3630.1	26417.8
a 10+29.07	3140.4	25076
a 12+29.07	3121.3	23191.5

a 14+29.07	1,959.40	13,042.70
a 16+29.07	2,106.70	15,059.60
a 18+29.07	2,400.90	16,694.70
a 20+29.07	2,710.90	18,932.50
a 22+29.07	2,900.00	20,781.30
a 24+29.07	3,007.30	21,878.90
a 26+29.07	2,523.20	20,483.00
a 28+29.07	2,424.60	18,325.00
a 30+29.07	2,697.50	18,970.80
a 32+29.07	2,968.50	20,985.20
a 34+29.07	3,181.60	22,778.00
a 36+29.07	3,081.90	23,197.90
a 38+29.07	2,730.60	21,527.90
a 40+29.07	2,759.10	20,332.10
a 42+29.07	3,074.30	21,604.90
a 44+29.07	2,770.50	21,647.30
a 46+29.07	2,161.90	18,268.20
a 48+29.07	2,187.10	16,107.50
a 50+29.07	2,520.50	17,435.70
a 52+29.07	2,636.10	19,098.70
a 54+29.07	2,498.60	19,017.50
a 56+29.07	2,479.00	18,435.70
a 58+29.07	2,608.30	18,841.80
a 60+29.07	2,594.90	19,270.80
a 62+29.07	2,434.60	18,627.70
a 64+29.07	2,226.40	17,262.90
a 66+29.07	2,053.30	15,850.40
a 68+29.07	2,244.60	15,918.20
a 70+29.07	2,631.10	18,058.10
a 72+29.07	2,780.40	20,042.40
a 74+29.07	2,806.10	20,690.80
a 76+29.07	2,664.80	20,262.90
a 78+29.07	2,375.60	18,668.40
a 80+29.07	2,290.40	17,281.40
a 82+29.07	2,305.70	17,022.30
a 84+29.07	2,316.90	17,120.70
a 86+29.07	2,354.80	17,302.60
a 88+29.07	2,490.70	17,945.90
a 90+29.07	2,699.40	19,222.30
a 92+29.07	2,655.30	19,832.10
a 94+29.07	2,298.80	18,348.50
a 96+29.07	2,135.20	16,422.10
a 98+29.07	2,403.20	16,808.80
a 100+29.07	2,724.40	18,991.20
a 102+29.07	2,652.10	19,913.10
a 104+29.07	2,586.90	19,403.70
a 106+29.07	2,442.50	18,627.10

a 14+29.07	3545.1	24690.4
a 16+29.07	3676.3	26745.9
a 18+29.07	3977.8	28348.5
a 20+29.07	4299.8	30658
a 22+29.07	4498.4	32586
a 24+29.07	4593.8	33674.7
a 26+29.07	4129.3	32307.8
a 28+29.07	4036.6	30244
a 30+29.07	4328.1	30980.3
a 32+29.07	4615.7	33125.3
a 34+29.07	4829.8	34983.3
a 36+29.07	4732.8	35416.9
a 38+29.07	4373.5	33727.1
a 40+29.07	4395.6	32478.3
a 42+29.07	4714.8	33742.3
a 44+29.07	4410.8	33798.7
a 46+29.07	3790.2	30374.3
a 48+29.07	3846.3	28283.5
a 50+29.07	4231.3	29916.9
a 52+29.07	4358.6	31814.2
a 54+29.07	4156.4	31536.8
a 56+29.07	4108.5	30610.7
a 58+29.07	4232.6	30893.2
a 60+29.07	4209.5	31267.2
a 62+29.07	4040.6	30556.1
a 64+29.07	3831.2	29154.8
a 66+29.07	3737.7	28032.7
a 68+29.07	3936.5	28422.9
a 70+29.07	4275.5	30414.9
a 72+29.07	4404	32146.5
a 74+29.07	4440.3	32756.9
a 76+29.07	4292	32341.9
a 78+29.07	3986.9	30662.5
a 80+29.07	3892.2	29181.7
a 82+29.07	3898.9	28855.6
a 84+29.07	3908	28914.3
a 86+29.07	3955.6	29124.6
a 88+29.07	4096.2	29821.5
a 90+29.07	4307	31123
a 92+29.07	4277.7	31795.2
a 94+29.07	3913.6	30338.2
a 96+29.07	3743.8	28361
a 98+29.07	4006.4	28704.7
a 100+29.07	4338.4	30906.7
a 102+29.07	4260.4	31847.4
a 104+29.07	4198.8	31330.6
a 106+29.07	4056.5	30575.4

a 108+29.07	2,352.20	17,758.10
a 110+29.07	2,177.80	16,777.80
a 112+29.07	1,887.10	15,055.10
a 114+29.07	1,800.70	13,658.50
a 116+29.07	1,949.60	13,889.90
a 118+29.07	2,009.70	14,663.80
a 120+29.07	2,089.20	15,181.20
a 122+29.07	2,715.80	17,796.50
a 124+29.07	3,029.00	21,276.90
a 126+29.07	3,179.60	22,994.70
a 128+29.07	2,957.50	22,729.90
a 130+29.07	2,706.40	20,977.20
a 132+29.07	2,426.40	19,010.20
a 134+29.07	2,120.00	16,838.50
a 136+29.07	1,564.90	13,647.70
a 138+29.07	1,529.30	11,459.90
a 140+29.07	1,568.10	11,472.00
a 142+29.07	1,584.70	11,677.30
a 144+29.07	1,569.80	11,683.50
a 146+29.07	1,564.10	11,607.20
a 148+29.07	1,711.50	12,131.90
a 150+29.07	1,846.10	13,176.40
a 152+29.07	2,004.00	14,259.90
a 154+29.07	2,141.80	15,355.10
a 156+29.07	2,322.90	16,536.20
a 158+29.07	2,573.30	18,134.30
a 160+29.07	2,722.40	19,614.00
a 162+29.07	2,765.60	20,326.00
a 164+29.07	2,739.00	20,387.40
a 166+29.07	2,641.10	19,926.40
a 168+29.07	2,329.60	18,410.10
a 170+29.07	2,028.50	16,141.30
a 172+29.07	1,754.80	14,012.50
a 174+29.07	1,487.70	12,009.30
a 176+29.07	1,122.30	9,666.60
a 178+29.07	760.70	6,974.10
a 180+29.07	531.30	4,784.90
a 182+29.07	393.50	3,424.90
a 184+29.07	278.70	2,489.70
a 186+29.07	232.10	1,891.90
a 188+29.07	217.50	1,665.00
a 190+29.07	207.30	1,573.20
a 192+29.07	212.70	1,555.40
a 194+29.07	350.50	2,085.80
a 196+29.07	382.60	2,715.20
a 198+29.07	426.60	2,996.90
a 200+29.07	577.60	3,719.30

a 108+29.07	3979.1	29761.7
a 110+29.07	3790.1	28774.9
a 112+29.07	3456.8	26840.3
a 114+29.07	3346.5	25197.3
a 116+29.07	3516.9	25419.9
a 118+29.07	3588.6	26316.4
a 120+29.07	3577.6	26541.4
a 122+29.07	4253.6	29004.5
a 124+29.07	4540.9	32572.1
a 126+29.07	4678.8	34146.9
a 128+29.07	4417.4	33689.7
a 130+29.07	4136	31679.4
a 132+29.07	3836.3	29527.2
a 134+29.07	3511.4	27213.6
a 136+29.07	3114.9	24541.5
a 138+29.07	2711.3	21578.5
a 140+29.07	2736.2	20176.2
a 142+29.07	2742.1	20290.2
a 144+29.07	2730.1	20267.6
a 146+29.07	2735.4	20242.7
a 148+29.07	3017	21305.3
a 150+29.07	3291.1	23363.3
a 152+29.07	3539.6	25298.7
a 154+29.07	3735.3	26944
a 156+29.07	3928.8	28385.8
a 158+29.07	4175.8	30017.3
a 160+29.07	4317.7	31457.6
a 162+29.07	4346.9	32091.3
a 164+29.07	4307.5	32053.6
a 166+29.07	4204	31524.2
a 168+29.07	3863.7	29880.3
a 170+29.07	3529.9	27383.9
a 172+29.07	3190.9	24891.9
a 174+29.07	2844	22351.5
a 176+29.07	2389.4	19383.2
a 178+29.07	1921.2	15965.2
a 180+29.07	1519.4	12742.8
a 182+29.07	1184.6	10014.9
a 184+29.07	954.3	7922
a 186+29.07	912.9	6915.4
a 188+29.07	970.7	6976.2
a 190+29.07	1121.4	7748.5
a 192+29.07	1352.6	9162.9
a 194+29.07	1676.3	11218
a 196+29.07	1790.8	12841
a 198+29.07	1771.5	13193.5
a 200+29.07	1733.4	12980.8

a 202+29.07	732.00	4,850.30
a 204+29.07	859.10	5,892.80
a 206+29.07	910.80	6,555.10
a 208+29.07	934.70	6,835.00
a 210+29.07	1,005.00	7,184.10
a 212+29.07	1,128.60	7,902.40
a 214+29.07	1,292.50	8,967.10
a 216+29.07	1,421.80	10,052.90
a 218+29.07	1,530.90	10,936.00
a 220+29.07	1,675.70	11,876.20
a 222+29.07	1,826.00	12,969.00
a 224+29.07	1,991.70	14,139.40
a 226+29.07	2,033.20	14,906.90
a 228+29.07	1,938.70	14,710.90
a 230+29.07	1,857.50	14,060.10
a 232+29.07	1,787.60	13,500.30
a 234+29.07	1,726.40	13,014.90
a 236+29.07	1,719.90	12,764.20
a 238+29.07	1,805.80	13,058.00
a 240+29.07	1,921.30	13,804.10
a 242+29.07	2,054.20	14,724.30
a 244+29.07	2,203.20	15,768.30
a 246+29.07	2,273.30	16,579.60
a 248+29.07	2,147.70	16,374.00
a 250+29.07	2,022.80	15,446.10
a 252+29.07	1,898.50	14,523.30
a 254+29.07	1,786.90	13,649.80
a 256+29.07	1,641.00	12,696.10
a 258+29.07	1,368.70	11,147.00
a 260+29.07	1,095.10	9,125.20
a 262+29.07	830.20	7,130.90
a 264+29.07	588.10	5,252.90
a 266+29.07	464.10	3,896.90
a 268+29.07	435.80	3,333.00
a 270+29.07	410.20	3,133.30
a 272+29.07	396.50	2,987.70
a 274+29.07	405.90	2,971.70
a 276+29.07	433.60	3,109.10
a 278+29.07	470.40	3,348.30
a 280+29.07	532.70	3,715.30
a 282+29.07	619.60	4,267.70
a 284+29.07	718.70	4,956.80
a 286+29.07	822.70	5,709.10
a 288+29.07	1,164.40	7,359.90
a 290+29.07	1,596.10	10,224.10
a 292+29.07	2,103.60	13,702.30
a 294+29.07	2,655.80	17,627.40

a 202+29.07	1739	12860.4
a 204+29.07	1804.6	13124.3
a 206+29.07	1866.8	13597.6
a 208+29.07	1962.5	14182.6
a 210+29.07	2081.1	14976.6
a 212+29.07	2199.6	15854.5
a 214+29.07	2316.3	16725.5
a 216+29.07	2460.6	17692.1
a 218+29.07	2626.1	18839.5
a 220+29.07	2800.1	20097
a 222+29.07	2994.1	21460
a 224+29.07	3193.2	22915.8
a 226+29.07	3258.4	23894.8
a 228+29.07	3192.9	23893.8
a 230+29.07	3137.2	23444.9
a 232+29.07	3096.2	23086.8
a 234+29.07	3088.2	22905.3
a 236+29.07	3160.8	23144.5
a 238+29.07	3308.9	23961.8
a 240+29.07	3464.9	25088.2
a 242+29.07	3627	26266.4
a 244+29.07	3796.6	27495
a 246+29.07	3874.3	28410.8
a 248+29.07	3748.2	28231.3
a 250+29.07	3622.8	27299.8
a 252+29.07	3498	26373.4
a 254+29.07	3373.3	25449.3
a 256+29.07	3195.7	24329.4
a 258+29.07	2909.3	22610.8
a 260+29.07	2618.2	20472.1
a 262+29.07	2322.5	18299
a 264+29.07	2023.2	16095.4
a 266+29.07	1834.1	14286.6
a 268+29.07	1824.6	13551
a 270+29.07	1813.5	13474.6
a 272+29.07	1800.8	13386.2
a 274+29.07	1786.5	13286.2
a 276+29.07	1769.6	13170.9
a 278+29.07	1834	13346.7
a 280+29.07	1915.6	13887.6
a 282+29.07	2003	14513.6
a 284+29.07	2091	15162.9
a 286+29.07	2177.6	15809.4
a 288+29.07	2639.6	17841.5
a 290+29.07	3165	21498.5
a 292+29.07	3717.5	25490.8
a 294+29.07	4298.5	29689.1

a 296+29.07	2,809.60	20,242.40
a 298+29.07	2,405.30	19,314.50
a 300+29.07	2,038.40	16,458.30
a 302+29.07	1,745.60	14,015.00
a 304+29.07	1,712.60	12,808.20
a 306+29.07	1,784.60	12,952.60
a 308+29.07	1,613.90	12,587.10
a 310+29.07	1,261.30	10,648.80
a 312+29.07	953.80	8,203.90
a 314+29.07	879.00	6,788.20
a 316+29.07	891.00	6,555.80
a 318+29.07	838.10	6,404.00
a 320+29.07	881.40	6,368.20
a 322+29.07	986.10	6,916.40
a 324+29.07	1,131.30	7,842.10
a 326+29.07	1,136.50	8,399.10
a 328+29.07	1,077.90	8,201.40
a 330+29.07	978.70	7,617.10
a 332+29.07	895.80	6,942.60
a 334+29.07	930.40	6,763.70
a 336+29.07	1,092.80	7,493.30
a 338+29.07	1,260.60	8,716.20
a 340+29.07	1,423.80	9,942.30
a 342+29.07	1,589.30	11,159.60
a 344+29.07	1,726.20	12,279.40
a 346+29.07	1,671.90	12,585.40
a 348+29.07	1,628.60	12,224.00
a 350+29.07	1,658.30	12,173.60
a 352+29.07	1,780.30	12,735.40
a 354+29.07	1,936.70	13,766.50
a 356+29.07	2,079.30	14,873.80
a 358+29.07	2,206.10	15,871.80
a 360+29.07	2,328.90	16,796.60
a 362+29.07	2,451.50	17,705.30
a 364+29.07	2,310.90	17,638.30
a 366+29.07	2,186.40	16,656.50
a 368+29.07	2,092.80	15,848.90
a 370+29.07	2,002.80	15,169.10
a 372+29.07	1,913.90	14,506.50
a 374+29.07	1,808.00	13,784.80
a 376+29.07	1,700.30	12,993.50
a 378+29.07	1,593.90	12,200.70
a 380+29.07	1,491.20	11,426.30
a 382+29.07	1,403.40	10,720.50
a 384+29.07	1,474.60	10,659.20
a 386+29.07	1,576.40	11,300.20
a 388+29.07	1,684.40	12,077.00

a 296+29.07	4462.1	32446.7
a 298+29.07	4039.1	31486
a 300+29.07	3635.2	28423.2
a 302+29.07	3242.6	25473
a 304+29.07	3260.2	24084.2
a 306+29.07	3310.1	24334.2
a 308+29.07	3094.6	23720.8
a 310+29.07	2658.1	21306.1
a 312+29.07	2134.3	17749.6
a 314+29.07	2013	15360.3
a 316+29.07	2221.4	15682.9
a 318+29.07	2304.3	16761.7
a 320+29.07	2414.4	17476.5
a 322+29.07	2495.9	18186.5
a 324+29.07	2569.9	18762.6
a 326+29.07	2595.9	19132.7
a 328+29.07	2555	19077.2
a 330+29.07	2452.8	18547.2
a 332+29.07	2305.5	17623.1
a 334+29.07	2247.8	16863.8
a 336+29.07	2347.3	17018.7
a 338+29.07	2437.2	17720.4
a 340+29.07	2554.1	18486.3
a 342+29.07	2687.8	19414.3
a 344+29.07	2826.2	20421.9
a 346+29.07	2859.6	21058.4
a 348+29.07	2970.9	21594.4
a 350+29.07	3082.6	22420.4
a 352+29.07	3211.7	23312.2
a 354+29.07	3318.8	24187.2
a 356+29.07	3411.3	24926.5
a 358+29.07	3506.8	25622.7
a 360+29.07	3605.1	26340.4
a 362+29.07	3705.8	27077.4
a 364+29.07	3552.4	26882.2
a 366+29.07	3403	25760.5
a 368+29.07	3263.1	24689
a 370+29.07	3139.1	23711.8
a 372+29.07	3033	22859.8
a 374+29.07	2940.9	22125.6
a 376+29.07	2857.8	21476.5
a 378+29.07	2815	21010.4
a 380+29.07	2804.4	20812.9
a 382+29.07	2822.7	20841.2
a 384+29.07	2853.3	21022
a 386+29.07	2892.7	21281.3
a 388+29.07	2952.1	21647.5

a 390+29.07	1,794.70	12,885.30
a 392+29.07	1,906.80	13,709.00
a 394+29.07	1,825.30	13,822.60
a 396+29.07	1,708.70	13,088.80
a 398+29.07	1,596.30	12,240.40
a 400+29.07	1,508.90	11,500.50
a 402+29.07	1,483.80	11,084.10
a 404+29.07	1,462.70	10,913.20
a 406+29.07	1,513.10	11,021.60
a 408+29.07	1,628.80	11,636.60
a 410+29.07	1,750.20	12,514.50
a 412+29.07	1,884.70	13,462.50
a 414+29.07	1,963.20	14,251.60
a 416+29.07	2,006.10	14,701.20
a 418+29.07	2,076.80	15,122.00
a 420+29.07	2,169.20	15,726.20
a 422+29.07	2,282.30	16,487.10
a 424+29.07	2,420.50	17,417.80
a 426+29.07	2,418.20	17,921.10
a 428+29.07	2,347.30	17,650.00
a 430+29.07	2,284.20	17,153.90
a 432+29.07	2,235.20	16,738.70
a 434+29.07	2,209.50	16,462.10
a 436+29.07	2,116.90	16,023.70
a 438+29.07	1,990.80	15,213.60
a 440+29.07	1,915.60	14,468.10
a 442+29.07	1,905.10	14,150.60
a 444+29.07	1,648.70	13,162.10
a 446+29.07	1,371.30	11,185.00
a 448+29.07	1,117.50	9,217.60
a 450+29.07	902.40	7,481.10
a 452+29.07	711.10	5,975.80
a 454+29.07	718.30	5,293.80
a 456+29.07	761.90	5,481.90
a 458+29.07	749.30	5,596.90
a 460+29.07	659.20	5,216.50
a 462+29.07	554.70	4,495.70
a 464+29.07	664.50	4,515.60
a 466+29.07	821.50	5,503.80
a 468+29.07	895.60	6,359.70
a 470+29.07	872.40	6,548.20
a 472+29.07	927.30	6,665.40
a 474+29.07	1,098.40	7,502.50
a 476+29.07	1,203.40	8,525.20
a 478+29.07	1,169.40	8,788.10
a 480+29.07	978.50	7,955.10
a 482+29.07	808.20	6,617.40

a 390+29.07	3044.6	22210.1
a 392+29.07	3146.2	22928.7
a 394+29.07	3078.3	23053.7
a 396+29.07	2989.5	22473.4
a 398+29.07	2928.8	21919.6
a 400+29.07	2914.6	21642.3
a 402+29.07	2905.9	21557.5
a 404+29.07	2997.7	21865.1
a 406+29.07	3109.7	22619.8
a 408+29.07	3225.4	23463.3
a 410+29.07	3345.5	24336.6
a 412+29.07	3479.3	25276.9
a 414+29.07	3553.4	26047.2
a 416+29.07	3599.7	26493.3
a 418+29.07	3691.1	27003.1
a 420+29.07	3783.8	27684.8
a 422+29.07	3878.6	28379.4
a 424+29.07	4002	29187.5
a 426+29.07	3986.7	29587.6
a 428+29.07	3904.3	29225.8
a 430+29.07	3829.4	28643.2
a 432+29.07	3769.4	28143.5
a 434+29.07	3733.5	27788.5
a 436+29.07	3622.3	27243.8
a 438+29.07	3469.5	26266.1
a 440+29.07	3352.6	25267.1
a 442+29.07	3278.7	24560.5
a 444+29.07	2869.6	22771.4
a 446+29.07	2558.6	20104.4
a 448+29.07	2248.5	17804.2
a 450+29.07	1968.2	15617.4
a 452+29.07	1737.9	13726.5
a 454+29.07	1739.7	12880.2
a 456+29.07	1743.2	12899.5
a 458+29.07	1685.8	12700
a 460+29.07	1554.3	12000.5
a 462+29.07	1419.5	11014
a 464+29.07	1580	11109.1
a 466+29.07	1776.3	12430.7
a 468+29.07	1873	13515.8
a 470+29.07	1862.1	13833.8
a 472+29.07	1876.2	13845.7
a 474+29.07	2009	14389.6
a 476+29.07	2084.7	15162.1
a 478+29.07	2038.7	15271.9
a 480+29.07	1852.6	14412.2
a 482+29.07	1600.6	12789.5

a 484+29.07	807.50	5,984.10
a 486+29.07	937.20	6,461.70
a 488+29.07	1,064.50	7,413.50
a 490+29.07	1,174.50	8,292.50
a 492+29.07	1,247.30	8,969.80
a 494+29.07	1,256.90	9,275.00
a 496+29.07	1,229.80	9,210.10
a 498+29.07	1,186.30	8,948.30
a 500+29.07	1,130.20	8,579.60
a 502+29.07	1,065.70	8,132.90
a 504+29.07	1,052.70	7,845.60
a 506+29.07	1,057.60	7,815.70
a 508+29.07	1,075.30	7,899.70
a 510+29.07	1,084.90	8,000.80
a 512+29.07	1,109.60	8,127.60
a 514+29.07	1,200.20	8,554.80
a 516+29.07	1,241.40	9,043.00
a 518+29.07	1,285.60	9,359.20
a 520+29.07	1,320.40	9,652.00
a 522+29.07	1,367.30	9,954.60
a 524+29.07	1,501.60	10,625.50
a 526+29.07	1,650.30	11,673.80
a 528+29.07	1,843.60	12,940.40
a 530+29.07	2,050.20	14,421.40
a 532+29.07	2,215.00	15,796.90
a 534+29.07	2,237.70	16,491.50
a 536+29.07	2,266.40	16,682.00
a 538+29.07	2,303.70	16,926.30
a 540+29.07	2,361.40	17,278.20
a 542+29.07	2,428.10	17,738.80
a 544+29.07	2,503.30	18,264.20
a 546+29.07	2,577.50	18,817.60
a 548+29.07	2,651.00	19,364.70
a 550+29.07	2,729.00	19,925.80
a 552+29.07	2,771.70	20,372.90
a 554+29.07	2,743.10	20,425.10
a 556+29.07	2,722.10	20,241.50
a 558+29.07	2,706.60	20,106.20
a 560+29.07	2,696.40	20,010.80
a 562+29.07	2,638.60	19,759.00
a 564+29.07	2,548.10	19,209.80
a 566+29.07	2,464.80	18,566.10
a 568+29.07	2,388.80	17,976.20
a 570+29.07	2,318.70	17,435.00
a 572+29.07	2,363.00	17,339.50
a 574+29.07	2,515.90	18,070.00
a 576+29.07	2,688.50	19,275.60

a 484+29.07	1618.4	11921.9
a 486+29.07	1782.9	12597.4
a 488+29.07	1935.4	13771.6
a 490+29.07	2057.8	14789.6
a 492+29.07	2143	15558.4
a 494+29.07	2177.5	16001.6
a 496+29.07	2190.3	16176.9
a 498+29.07	2195.8	16244.9
a 500+29.07	2239.3	16426.5
a 502+29.07	2308.6	16844.2
a 504+29.07	2350.7	17256.7
a 506+29.07	2364.1	17462.2
a 508+29.07	2367.4	17523.8
a 510+29.07	2350.6	17474
a 512+29.07	2358.9	17442.7
a 514+29.07	2491.2	17963.5
a 516+29.07	2571.5	18750.8
a 518+29.07	2612.8	19201.3
a 520+29.07	2639.6	19453.7
a 522+29.07	2705.1	19795.3
a 524+29.07	2910.3	20797.9
a 526+29.07	3115.4	22317.6
a 528+29.07	3321.5	23840.2
a 530+29.07	3542.7	25422.9
a 532+29.07	3725.6	26919.6
a 534+29.07	3775	27779.8
a 536+29.07	3828.6	28161.5
a 538+29.07	3884.7	28567.8
a 540+29.07	3941.9	28987.4
a 542+29.07	4008.3	29445.1
a 544+29.07	4090.1	29993.9
a 546+29.07	4173.4	30605.3
a 548+29.07	4267.2	31261.5
a 550+29.07	4355.9	31937.7
a 552+29.07	4399.6	32427.8
a 554+29.07	4369.1	32476.6
a 556+29.07	4348	32285.4
a 558+29.07	4335.6	32161.4
a 560+29.07	4329	32091.2
a 562+29.07	4269	31844.5
a 564+29.07	4171.6	31261.6
a 566+29.07	4081.5	30567.3
a 568+29.07	3999.5	29929.9
a 570+29.07	3926.1	29354.2
a 572+29.07	3973	29255.7
a 574+29.07	4128.5	30005.4
a 576+29.07	4302.1	31224.4

a 578+29.07	2,888.60	20,655.80
a 580+29.07	3,112.50	22,226.20
a 582+29.07	3,064.40	22,877.50
a 584+29.07	2,734.30	21,476.50
a 586+29.07	2,385.10	18,960.70
a 588+29.07	2,026.10	16,337.80
a 590+29.07	1,672.10	13,697.00
a 592+29.07	1,553.60	11,947.00
a 594+29.07	1,559.30	11,529.20
a 596+29.07	1,576.40	11,613.60
a 598+29.07	1,601.20	11,769.00
a 600+29.07	1,632.40	11,976.30
a 602+29.07	1,722.50	12,425.40
a 604+29.07	1,836.10	13,180.10
a 606+29.07	1,953.00	14,033.60
a 608+29.07	2,073.10	14,911.20
a 610+29.07	2,196.90	15,814.50
a 612+29.07	2,266.80	16,532.10
a 614+29.07	2,309.80	16,950.50
a 616+29.07	2,341.20	17,226.10
a 618+29.07	2,361.10	17,416.10
a 620+29.07	2,370.20	17,523.50
a 622+29.07	2,392.60	17,640.00
a 624+29.07	2,437.80	17,890.50
a 626+29.07	2,502.30	18,297.00
a 628+29.07	2,576.10	18,808.90
a 630+29.07	2,661.20	19,397.40
a 632+29.07	2,768.60	20,110.50
a 634+29.07	2,893.00	20,968.80
a 636+29.07	2,980.90	21,754.90
a 638+29.07	2,971.50	22,045.80
a 640+29.07	2,939.60	21,892.90
a 642+29.07	2,815.20	21,314.00
a 644+29.07	2,700.50	20,428.50
a 646+29.07	2,594.30	19,610.30
a 648+29.07	2,488.10	18,823.60
a 650+29.07	2,360.60	17,958.20
a 652+29.07	2,243.30	17,051.50
a 654+29.07	2,134.30	16,213.30
a 656+29.07	2,040.60	15,462.40
a 658+29.07	1,946.70	14,767.80
a 660+29.07	1,855.70	14,083.20
a 662+29.07	1,774.30	13,444.50
a 664+29.07	1,713.40	12,917.40
a 666+29.07	1,779.40	12,936.30
a 668+29.07	1,858.10	13,472.20
a 670+29.07	1,947.60	14,095.10

a 578+29.07	4495.3	32583
a 580+29.07	4708.3	34087.3
a 582+29.07	4653.3	34672.4
a 584+29.07	4314.7	33214.9
a 586+29.07	3959.1	30643.9
a 588+29.07	3593.1	27971
a 590+29.07	3231.7	25277
a 592+29.07	3130.5	23563.9
a 594+29.07	3139.2	23221.1
a 596+29.07	3156.8	23318.3
a 598+29.07	3181	23473.3
a 600+29.07	3212.2	23678.6
a 602+29.07	3302.6	24128.9
a 604+29.07	3417.7	24890.2
a 606+29.07	3536.8	25757.4
a 608+29.07	3659.8	26653.8
a 610+29.07	3786.8	27579.8
a 612+29.07	3867	28347.2
a 614+29.07	3921.4	28845.7
a 616+29.07	3964	29204.9
a 618+29.07	3989.4	29457
a 620+29.07	3993	29564.4
a 622+29.07	4003.7	29617.1
a 624+29.07	4035.7	29775.4
a 626+29.07	4088.8	30090.7
a 628+29.07	4166.3	30574.3
a 630+29.07	4268.8	31240.8
a 632+29.07	4389.8	32068.8
a 634+29.07	4527.8	33028.3
a 636+29.07	4624	33895.7
a 638+29.07	4613.7	34213.9
a 640+29.07	4582.1	34058.6
a 642+29.07	4459.3	33486.6
a 644+29.07	4343.6	32603.3
a 646+29.07	4234.9	31772.3
a 648+29.07	4124.1	30959.5
a 650+29.07	3987.6	30043.6
a 652+29.07	3859.2	29062.4
a 654+29.07	3739.1	28141.9
a 656+29.07	3640.9	27333.3
a 658+29.07	3555.5	26653
a 660+29.07	3471.6	26025.9
a 662+29.07	3388.7	25408.2
a 664+29.07	3326	24869.2
a 666+29.07	3397.6	24902.4
a 668+29.07	3490.9	25513.1
a 670+29.07	3595.2	26244.9

a 672+29.07	2,038.30	14,762.70
a 674+29.07	2,200.30	15,698.80
a 676+29.07	2,365.30	16,909.80
a 678+29.07	2,537.90	18,159.90
a 680+29.07	2,700.30	19,400.70
a 682+29.07	2,420.70	18,966.70
a 684+29.07	2,132.60	16,864.20
a 686+29.07	1,836.00	14,698.60
a 688+29.07	1,545.00	12,522.20
a 690+29.07	1,514.20	11,330.40
a 692+29.07	1,508.70	11,196.10
a 694+29.07	1,573.70	11,416.20
a 696+29.07	1,638.00	11,894.90
a 698+29.07	1,704.00	12,377.50
a 700+29.07	1,771.10	12,870.70
a 702+29.07	1,883.60	13,535.90
a 704+29.07	1,972.70	14,282.50
a 706+29.07	2,042.10	14,869.70
a 708+29.07	2,094.00	15,319.00
a 710+29.07	2,130.30	15,645.50
a 712+29.07	2,187.50	15,992.00
a 714+29.07	2,237.10	16,387.50
a 716+29.07	2,277.60	16,721.10
a 718+29.07	2,335.60	17,086.00
a 720+29.07	2,367.80	17,419.90
a 722+29.07	2,369.80	17,546.80
a 724+29.07	2,341.00	17,447.60
a 726+29.07	2,288.20	17,145.20
a 728+29.07	2,248.10	16,801.10
a 730+29.07	2,213.10	16,523.20
a 732+29.07	2,183.00	16,282.00
a 734+29.07	2,287.00	16,555.40
a 736+29.07	2,393.80	17,336.00
a 738+29.07	2,438.70	17,898.20
a 740+29.07	2,422.30	18,003.70
a 742+29.07	2,359.00	17,708.60
a 744+29.07	2,462.00	17,855.60
a 746+29.07	2,566.30	18,623.20
a 748+29.07	2,625.80	19,229.90
a 750+29.07	2,674.40	19,630.30
a 752+29.07	2,712.10	19,950.00
a 754+29.07	2,757.70	20,258.40
a 756+29.07	2,801.40	20,589.20
a 758+29.07	2,827.60	20,848.20
a 760+29.07	2,840.90	20,994.30
a 762+29.07	2,862.90	21,125.20
a 764+29.07	2,872.50	21,242.30

a 672+29.07	3699.4	27017
a 674+29.07	3868.3	28028.5
a 676+29.07	4040	29290
a 678+29.07	4216.6	30580.1
a 680+29.07	4382.2	31847.7
a 682+29.07	4091.9	31385.6
a 684+29.07	3792.9	29203.1
a 686+29.07	3490.3	26975.1
a 688+29.07	3200.6	24781.4
a 690+29.07	3182	23639.3
a 692+29.07	3174.9	23544
a 694+29.07	3239.7	23757.9
a 696+29.07	3302.9	24232
a 698+29.07	3367.1	24703.8
a 700+29.07	3432.2	25182.6
a 702+29.07	3540.3	25824.2
a 704+29.07	3624.5	26536.2
a 706+29.07	3682.7	27063.4
a 708+29.07	3720.2	27418
a 710+29.07	3737.8	27622.3
a 712+29.07	3780.8	27846.8
a 714+29.07	3823.4	28163.8
a 716+29.07	3860.4	28458.5
a 718+29.07	3933	28864.4
a 720+29.07	3983.2	29319.3
a 722+29.07	4002.8	29577.8
a 724+29.07	3982.6	29575.5
a 726+29.07	3928.6	29300.7
a 728+29.07	3886.8	28946
a 730+29.07	3845.1	28636.6
a 732+29.07	3804.7	28332.6
a 734+29.07	3904.4	28552.4
a 736+29.07	4017.7	29341.2
a 738+29.07	4071.8	29961.3
a 740+29.07	4068.1	30148.1
a 742+29.07	4000.9	29885.2
a 744+29.07	4063.9	29869.4
a 746+29.07	4171.4	30501.1
a 748+29.07	4233.6	31129.7
a 750+29.07	4287.1	31558.2
a 752+29.07	4333.7	31928.9
a 754+29.07	4382.1	32280.5
a 756+29.07	4440.1	32674.6
a 758+29.07	4478.7	33032.4
a 760+29.07	4494.5	33233.9
a 762+29.07	4518.9	33382.8
a 764+29.07	4529.1	33511

a 766+29.07	2,887.30	21,332.60
a 768+29.07	2,906.20	21,457.30
a 770+29.07	2,881.10	21,434.20
a 772+29.07	2,883.80	21,351.50
a 774+29.07	2,912.50	21,467.90
a 776+29.07	2,956.60	21,737.50
a 778+29.07	2,967.60	21,941.50
a 780+29.07	2,959.80	21,953.10
a 782+29.07	2,928.00	21,806.50
a 784+29.07	2,870.10	21,474.20
a 786+29.07	2,879.40	21,294.40
a 788+29.07	2,909.90	21,442.00
a 790+29.07	2,960.30	21,741.60
a 792+29.07	3,025.40	22,169.20
a 794+29.07	3,049.30	22,498.80
a 796+29.07	3,065.40	22,647.00
a 798+29.07	3,078.70	22,755.90
a 800+29.07	3,092.70	22,857.30
a 802+29.07	3,173.90	23,209.80
a 804+29.07	3,279.50	23,901.40
a 806+29.07	3,402.40	24,747.60
a 808+29.07	3,546.70	25,737.40
a 810+29.07	3,656.20	26,677.30
a 812+29.07	3,752.30	27,438.90
a 814+29.07	3,836.90	28,108.20
a 816+29.07	3,904.60	28,672.00
a 818+29.07	3,866.50	28,781.70
a 820+29.07	3,827.40	28,496.00
a 822+29.07	3,794.90	28,230.80
a 824+29.07	3,768.60	28,013.00
a 826+29.07	3,792.90	28,005.60
a 828+29.07	3,829.40	28,230.50
a 830+29.07	3,876.00	28,538.20
a 832+29.07	3,931.20	28,915.30
a 834+29.07	3,915.30	29,061.10
a 836+29.07	3,917.60	29,010.90
a 838+29.07	3,936.00	29,087.50
a 840+29.07	3,970.20	29,282.40
a 842+29.07	3,954.00	29,348.90
a 844+29.07	3,935.00	29,218.40
a 846+29.07	3,928.20	29,123.00
a 848+29.07	3,939.60	29,140.30
a 850+29.07	3,776.90	28,579.90
a 852+29.07	3,598.80	27,317.50
a 854+29.07	3,447.70	26,098.10
a 856+29.07	3,342.60	25,149.30
a 858+29.07	3,344.90	24,768.80

a 766+29.07	4544.4	33605.4
a 768+29.07	4562.4	33728.8
a 770+29.07	4523.9	33652.8
a 772+29.07	4511.8	33465.3
a 774+29.07	4537.3	33515
a 776+29.07	4594.8	33822.4
a 778+29.07	4615.1	34110.5
a 780+29.07	4611	34170.7
a 782+29.07	4578.9	34036.7
a 784+29.07	4518.5	33694
a 786+29.07	4515.8	33460.4
a 788+29.07	4534.2	33518.5
a 790+29.07	4572.9	33729.8
a 792+29.07	4636.7	34109.7
a 794+29.07	4659.7	34431.4
a 796+29.07	4679.3	34589.2
a 798+29.07	4702.2	34746.3
a 800+29.07	4728.2	34927.1
a 802+29.07	4805.8	35311
a 804+29.07	4909.6	35983
a 806+29.07	5033.6	36826.9
a 808+29.07	5187.6	37856.4
a 810+29.07	5316.4	38903.9
a 812+29.07	5433.5	39814.5
a 814+29.07	5533	40616.7
a 816+29.07	5613	41281.5
a 818+29.07	5567.6	41409.7
a 820+29.07	5519.6	41064
a 822+29.07	5473	40713.6
a 824+29.07	5432.3	40390.1
a 826+29.07	5453.6	40318.2
a 828+29.07	5489	40528
a 830+29.07	5534.3	40826.8
a 832+29.07	5590.1	41201.6
a 834+29.07	5563	41307.8
a 836+29.07	5559.5	41194.4
a 838+29.07	5584.5	41274.2
a 840+29.07	5626.2	41521.1
a 842+29.07	5603.5	41591.5
a 844+29.07	5575.8	41404.8
a 846+29.07	5568.7	41275.7
a 848+29.07	5584.4	41307.6
a 850+29.07	5422.3	40765.7
a 852+29.07	5250.5	39528.9
a 854+29.07	5107.4	38362.6
a 856+29.07	5011.1	37475.9
a 858+29.07	5014.4	37131.3

a 860+29.07	3,351.50	24,801.60
a 862+29.07	3,356.90	24,845.70
a 864+29.07	3,360.40	24,878.70
a 866+29.07	3,332.30	24,787.90
a 868+29.07	3,294.50	24,543.80
a 870+29.07	3,247.00	24,227.80
a 872+29.07	3,188.80	23,836.30
a 874+29.07	3,229.70	23,772.40
a 876+29.07	3,295.50	24,167.50
a 878+29.07	3,386.40	24,747.60
a 880+29.07	3,496.30	25,491.20
a 882+29.07	3,461.80	25,770.70
a 884+29.07	3,377.90	25,332.30
a 886+29.07	3,252.80	24,558.10
a 888+29.07	3,089.00	23,488.30
a 890+29.07	3,249.20	23,474.90
a 892+29.07	3,425.20	24,719.90
a 894+29.07	3,580.70	25,947.70
a 896+29.07	3,716.00	27,024.80
a 898+29.07	3,746.20	27,637.60
a 900+29.07	3,619.90	27,281.90
a 902+29.07	3,502.60	26,379.80
a 904+29.07	3,317.90	25,260.90
a 906+29.07	3,129.40	23,878.70
a 908+29.07	3,159.10	23,290.60
a 910+29.07	3,164.60	23,420.90
a 912+29.07	3,103.20	23,214.00
a 914+29.07	2,960.30	22,457.40
a 916+29.07	2,867.10	21,582.80
a 918+29.07	2,828.80	21,096.10
a 920+29.07	2,814.60	20,901.50
a 922+29.07	2,817.20	20,858.40
a 924+29.07	2,783.00	20,741.40
a 926+29.07	2,759.90	20,529.00
a 928+29.07	2,745.20	20,389.10
a 930+29.07	2,738.30	20,309.30
a 932+29.07	2,699.30	20,139.30
a 934+29.07	2,660.80	19,852.40
a 936+29.07	2,626.00	19,580.70
a 938+29.07	2,595.80	19,340.00
a 940+29.07	2,564.90	19,113.90
a 942+29.07	2,552.30	18,952.50
a 944+29.07	2,562.70	18,944.30
a 946+29.07	2,587.90	19,076.10
a 948+29.07	2,452.60	18,668.20
a 950+29.07	2,363.60	17,837.70
a 952+29.07	2,300.60	17,274.80

a 860+29.07	5020.1	37164.7
a 862+29.07	5025	37203.9
a 864+29.07	5031.6	37246.7
a 866+29.07	5008.2	37184.5
a 868+29.07	4974.7	36973.6
a 870+29.07	4931.4	36689.2
a 872+29.07	4876	36323.8
a 874+29.07	4909.1	36241.3
a 876+29.07	4968	36581.8
a 878+29.07	5052.1	37111.3
a 880+29.07	5162.2	37830.6
a 882+29.07	5136.9	38144.9
a 884+29.07	5058.8	37762
a 886+29.07	4939.6	37031
a 888+29.07	4779.1	35995
a 890+29.07	4937.1	35985.8
a 892+29.07	5109.3	37208.8
a 894+29.07	5261	38408.5
a 896+29.07	5392.4	39457.1
a 898+29.07	5414	40023.8
a 900+29.07	5299.1	39678.4
a 902+29.07	5182.5	38821
a 904+29.07	4984.2	37654.7
a 906+29.07	4786	36185.9
a 908+29.07	4835.8	35636.1
a 910+29.07	4850	35873.1
a 912+29.07	4783.3	35678.7
a 914+29.07	4630.1	34864.4
a 916+29.07	4546.5	33987.5
a 918+29.07	4521.8	33586.2
a 920+29.07	4509.4	33448.8
a 922+29.07	4509.7	33404.3
a 924+29.07	4474.7	33275.9
a 926+29.07	4447.4	33045.1
a 928+29.07	4427.7	32870.7
a 930+29.07	4415.9	32754
a 932+29.07	4379.7	32576.3
a 934+29.07	4343.8	32309.3
a 936+29.07	4311.1	32055.2
a 938+29.07	4280.6	31821.1
a 940+29.07	4238	31550.3
a 942+29.07	4219.9	31325.6
a 944+29.07	4228.2	31289.4
a 946+29.07	4256.7	31425.5
a 948+29.07	4106.9	30976.2
a 950+29.07	4016.5	30086.7
a 952+29.07	3962.4	29551.5

a 954+29.07	2,254.60	16,871.10
a 956+29.07	2,316.10	16,928.40
a 958+29.07	2,519.70	17,910.20
a 960+29.07	2,653.10	19,158.40
a 962+29.07	2,694.40	19,805.30
a 964+29.07	2,692.30	19,950.60
a 966+29.07	2,765.70	20,214.60
a 968+29.07	2,803.30	20,625.90
a 970+29.07	2,716.20	20,442.90
a 972+29.07	2,541.70	19,474.00
a 974+29.07	2,609.10	19,077.20
a 976+29.07	2,780.50	19,961.60
a 978+29.07	2,766.40	20,544.20
a 980+29.07	2,722.40	20,328.70
a 982+29.07	2,749.80	20,267.30
a 984+29.07	2,746.70	20,357.40
a 986+29.07	2,832.20	20,662.50
a 988+29.07	3,086.80	21,922.20
a 990+29.07	3,310.00	23,691.90
a 992+29.07	3,501.60	25,228.20
a 994+29.07	3,512.20	25,976.90
a 996+29.07	3,693.80	26,688.90
a 998+29.07	3,891.20	28,092.70
a 1000+29.07	4,094.60	29,577.00
a 1002+29.07	4,572.50	32,100.20
a 1004+29.07	4,486.90	33,553.00
a 1006+29.07	2,631.50	26,364.40
a 1008+29.07	2,614.20	19,428.70
a 1010+29.07	2,519.40	19,013.30
a 1012+29.07	2,561.20	18,817.00
a 1014+29.07	2,765.80	19,729.80
a 1016+29.07	2,748.50	20,423.30
a 1018+29.07	2,611.00	19,849.80
a 1020+29.07	2,695.30	19,653.00
a 1022+29.07	2,869.20	20,609.50
a 1024+29.07	2,735.10	20,756.90
a 1026+29.07	2,705.20	20,149.50
a 1028+29.07	2,891.60	20,728.80
a 1030+29.07	2,876.20	21,361.90
a 1032+29.07	2,789.50	20,983.80
a 1034+29.07	2,844.60	20,866.90
a 1036+29.07	3,088.60	21,974.90
a 1038+29.07	3,142.80	23,079.20
a 1040+29.07	3,099.10	23,118.10
a 1042+29.07	3,131.90	23,077.80
a 1044+29.07	3,326.40	23,919.70
a 1046+29.07	3,441.30	25,065.70

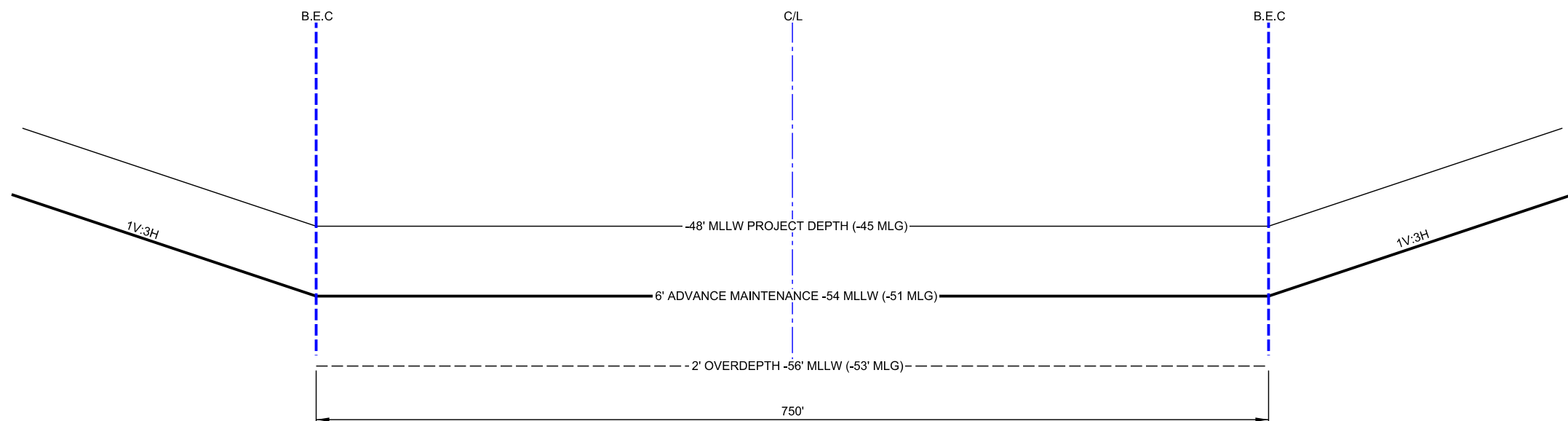
a 954+29.07	3920.4	29195.5
a 956+29.07	3982.6	29270.4
a 958+29.07	4205.2	30325.3
a 960+29.07	4340.8	31652.1
a 962+29.07	4376.3	32285.8
a 964+29.07	4385.1	32449.8
a 966+29.07	4467.7	32788.1
a 968+29.07	4505.5	33233.8
a 970+29.07	4418.5	33051.6
a 972+29.07	4226.3	32017.7
a 974+29.07	4297.9	31571
a 976+29.07	4487.9	32539.8
a 978+29.07	4484	33229.2
a 980+29.07	4428.6	33009.7
a 982+29.07	4460.1	32921.1
a 984+29.07	4465.4	33057.4
a 986+29.07	4559.9	33426.9
a 988+29.07	4823.6	34753.4
a 990+29.07	5037.8	36523.7
a 992+29.07	5193.4	37893.6
a 994+29.07	5275.6	38774.3
a 996+29.07	5471.8	39805.1
a 998+29.07	5666.8	41253.9
a 1000+29.07	5858	42684.3
a 1002+29.07	6335.2	45160
a 1004+29.07	6186.9	46378.3
a 1006+29.07	4023.5	37816.2
a 1008+29.07	3950.9	29534.6
a 1010+29.07	3887.1	29029.7
a 1012+29.07	3968.2	29093.9
a 1014+29.07	4191.7	30222.1
a 1016+29.07	4157	30921.3
a 1018+29.07	4015.8	30269.7
a 1020+29.07	4151.3	30248.4
a 1022+29.07	4302.2	31309.2
a 1024+29.07	4155.8	31326.1
a 1026+29.07	4159.5	30797.7
a 1028+29.07	4340.5	31481.6
a 1030+29.07	4331	32116.7
a 1032+29.07	4243.8	31758.5
a 1034+29.07	4280.6	31571.8
a 1036+29.07	4516.4	32581.4
a 1038+29.07	4572.6	33662.9
a 1040+29.07	4531.5	33719
a 1042+29.07	4562.9	33683.3
a 1044+29.07	4754.8	34510.2
a 1046+29.07	4870.9	35650.6

a 1048+29.07	3,273.00	24,867.90
a 1050+29.07	3,313.80	24,395.70
a 1052+29.07	3,628.00	25,710.40
a 1054+29.07	3,730.50	27,253.80
a 1056+29.07	3,732.10	27,639.30
a 1058+29.07	3,629.60	27,265.60
a 1060+29.07	3,588.50	26,733.70
a 1062+29.07	3,428.40	25,988.30
a 1064+29.07	3,311.70	24,963.10
a 1066+29.07	3,261.10	24,343.40
a 1068+29.07	3,316.40	24,360.90
a 1070+29.07	3,349.80	24,689.50
a 1072+29.07	3,007.60	23,545.90
a 1074+29.07	2,812.60	21,556.40
a 1076+29.07	2,883.60	21,097.10
a 1078+29.07	2,920.50	21,496.50
a 1080+29.07	2,516.30	20,136.10
a 1082+29.07	2,359.40	18,058.10
a 1083+69.58	2,514.40	12,681.60

Total: 10,578,135.90

a 1048+29.07	4707.9	35477
a 1050+29.07	4752.7	35039.4
a 1052+29.07	5072.2	36388.5
a 1054+29.07	5184	37985.9
a 1056+29.07	5190.8	38425.1
a 1058+29.07	5105.1	38132.9
a 1060+29.07	5079.8	37722.1
a 1062+29.07	4926.7	37061.3
a 1064+29.07	4816.3	36085.3
a 1066+29.07	4765.6	35488.5
a 1068+29.07	4826.7	35526.8
a 1070+29.07	4867.1	35902.8
a 1072+29.07	4530.1	34804.3
a 1074+29.07	4340.2	32852.9
a 1076+29.07	4404.1	32386.2
a 1078+29.07	4438.8	32751.5
a 1080+29.07	4041.9	31410.2
a 1082+29.07	3882.9	29351.1
a 1083+69.58	4027.2	20582

Total: 18,281,269.70

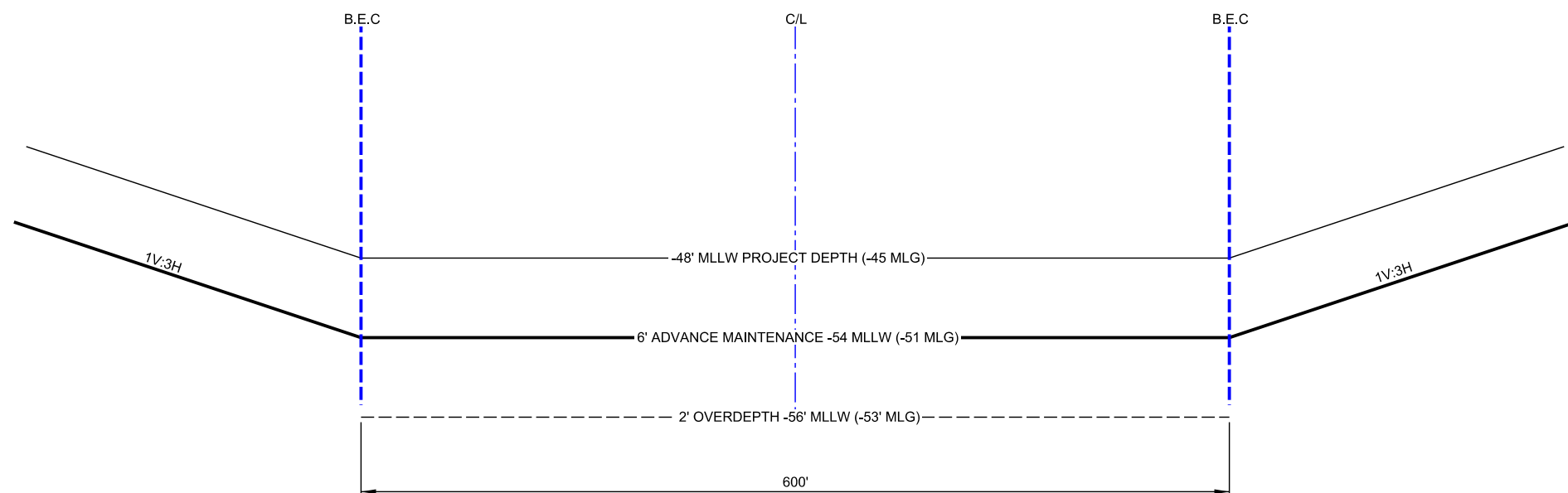


-48' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION 2776+29 (APPROX. MILE 8 AHP)

TO

STATION a990+00 (APPROX. MILE 17.5 BHP)



-48' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION a990+00 (APPROX. MILE 17.5 BHP)

TO

STATION a1090+00 (APPROX. MILE 19.5 BHP)



**US Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

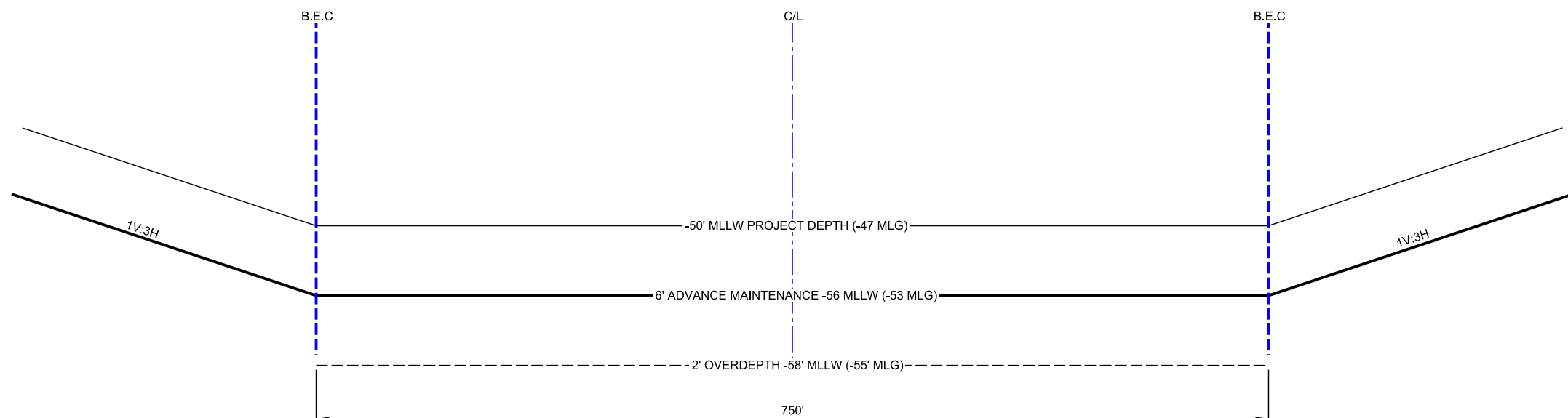
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U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA		DESIGNED BY: PATRICK G. GREY	DATE:
DRAWN BY: PRG	CAD BY: PRG	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.:	
PLOT SCALED:	PLOT DATE:	FILE NUMBER:	
8601	29 SEPT 2016	SIZE:	FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING

48' PROJECT DEPTH,
DREDGING TEMPLATE

SHEET
IDENTIFICATION
G-04

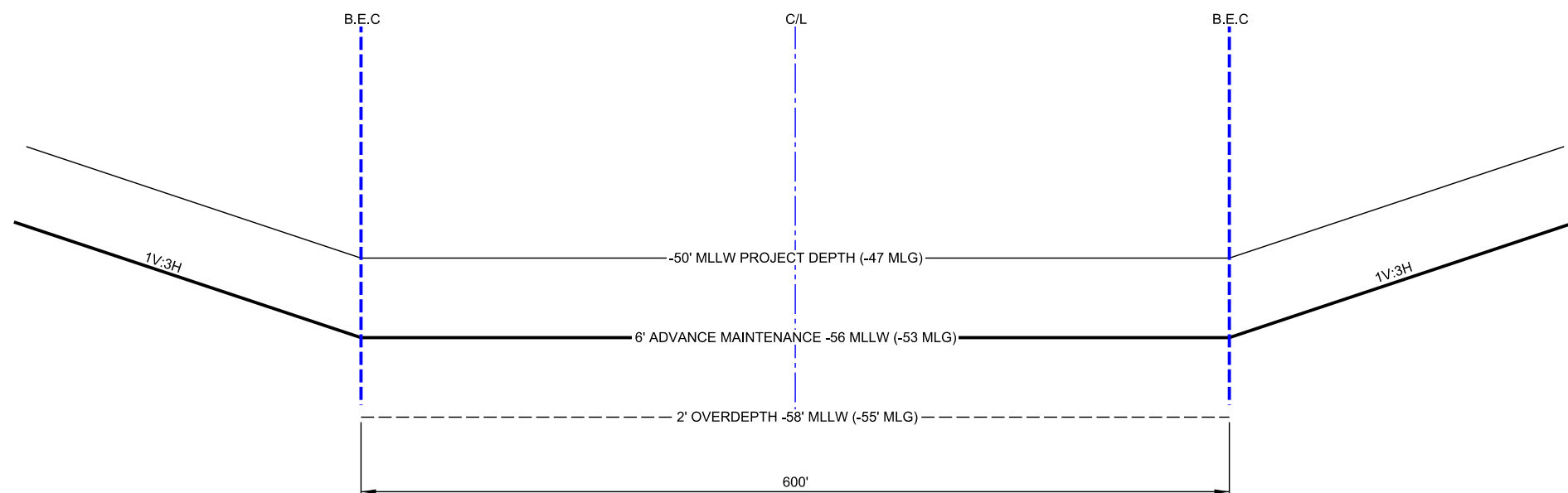


-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION 2776+29 (APPROX. MILE 8 AHP)

TC

STATION a990+00 (APPROX. MILE 17.5 BHP)



-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE

STATION a990+00 (APPROX. MILE 17.5 BHP)

TO

STATION a1090+00 (APPROX. MILE 19.5 BHP)



**US Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

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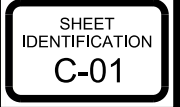
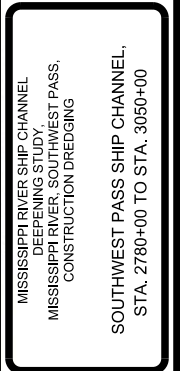
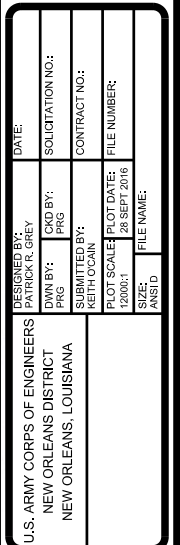
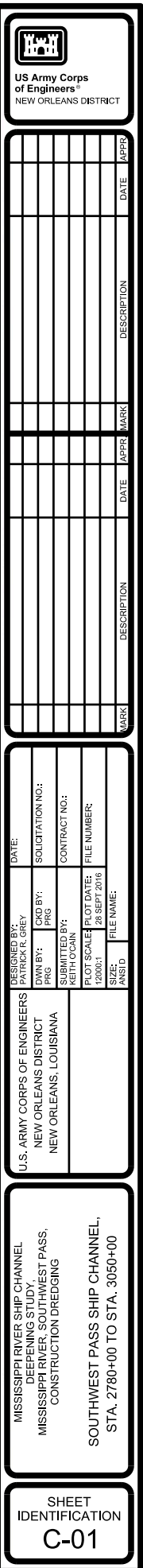
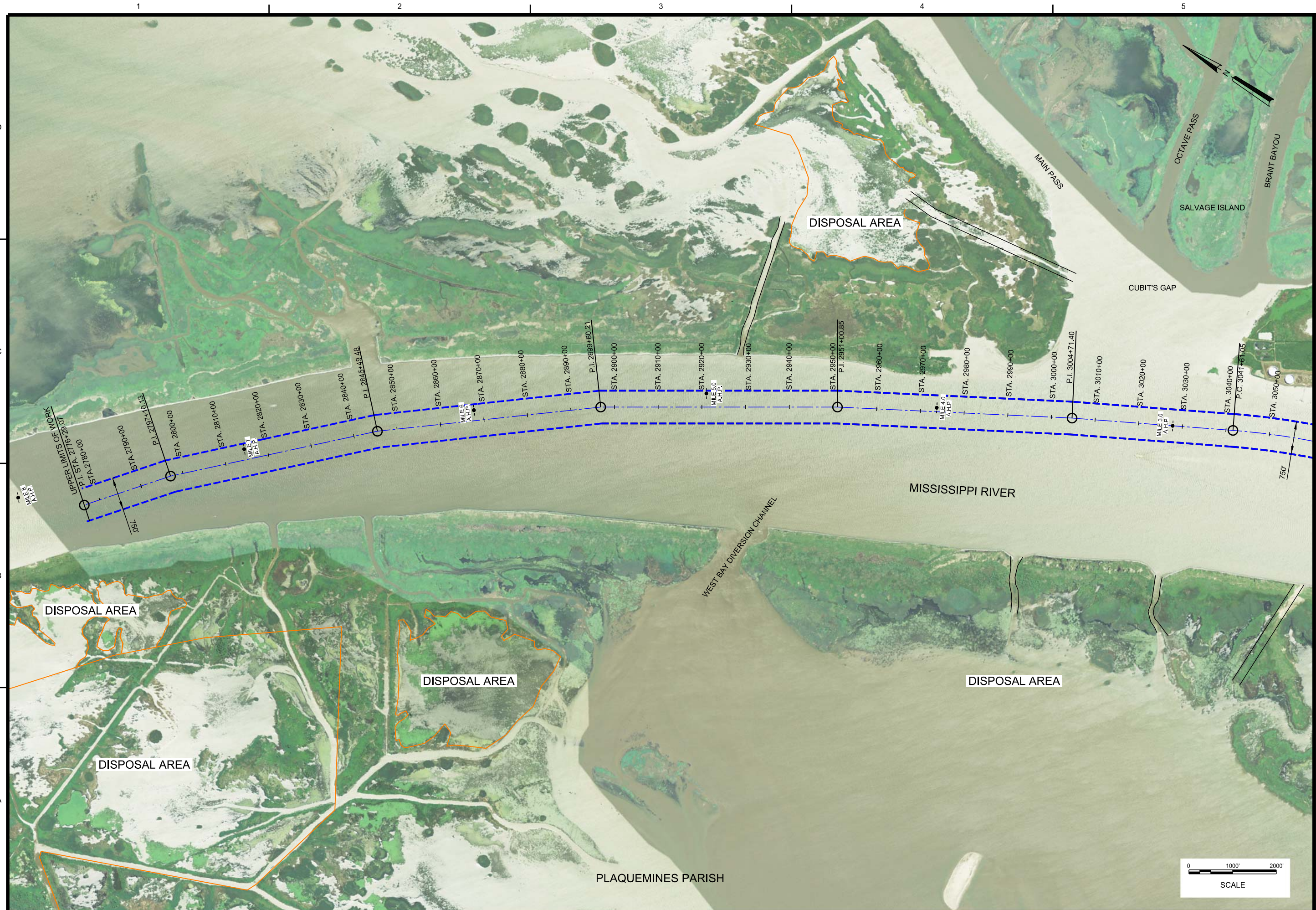
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	DRAWN BY:	SOLICITATION NO.:
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	860716	28 SEPT 2016
	SIZE:	FILE NAME:

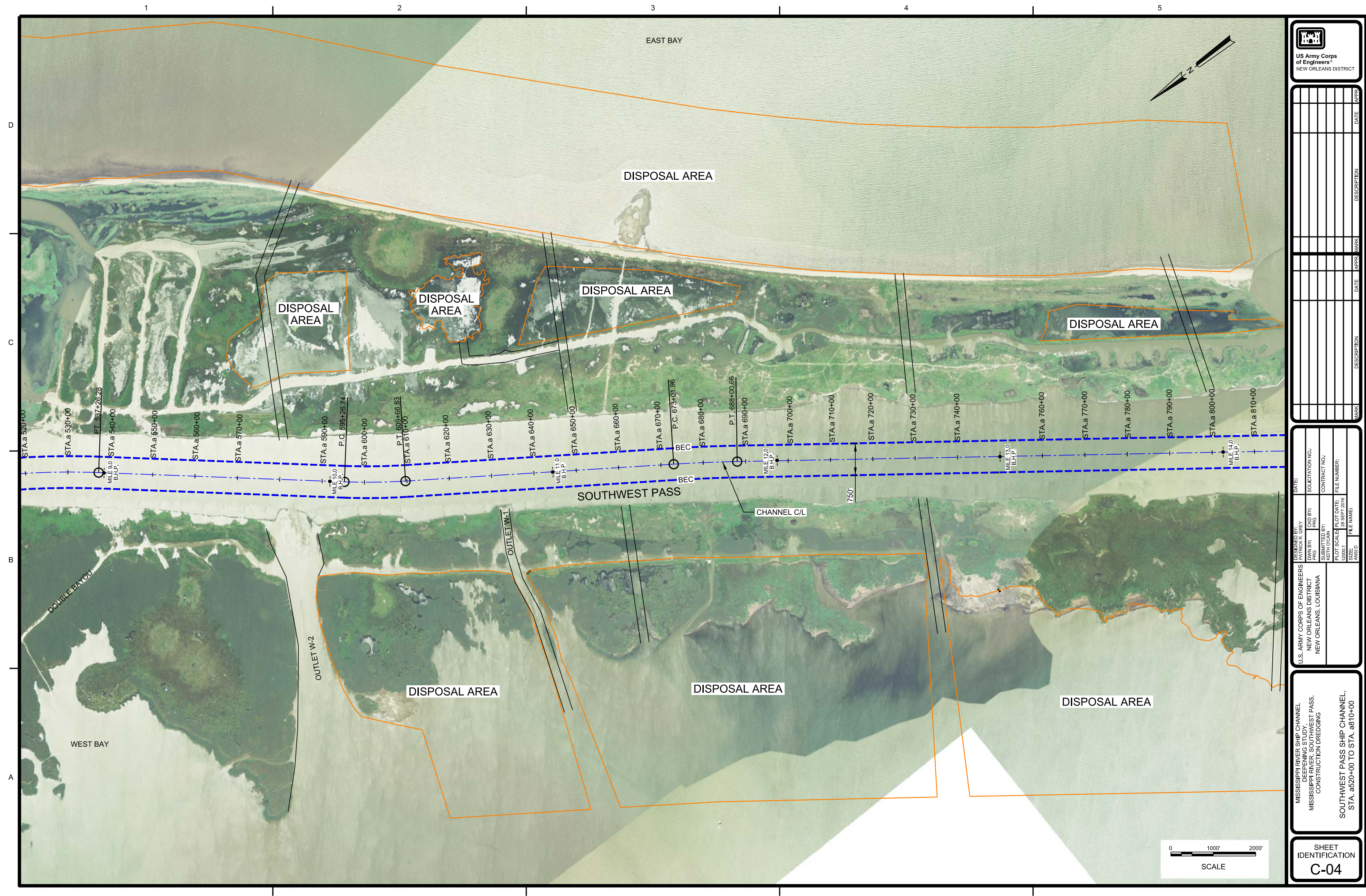
MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING

50' PROJECT DEPTH,
DREDGING TEMPLATE

SHEET IDENTIFICATION

G-05



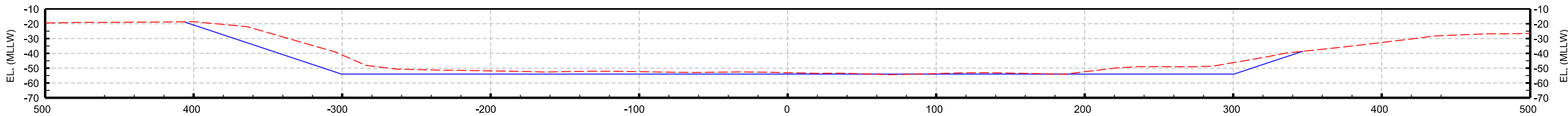


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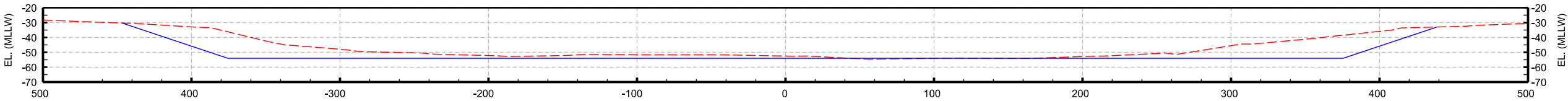
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B

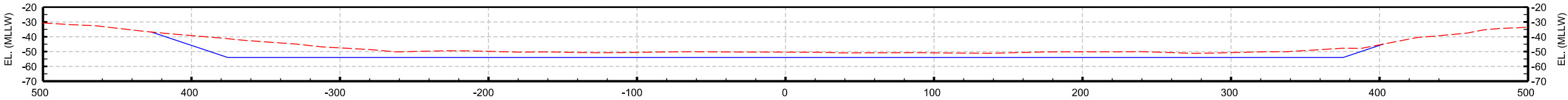
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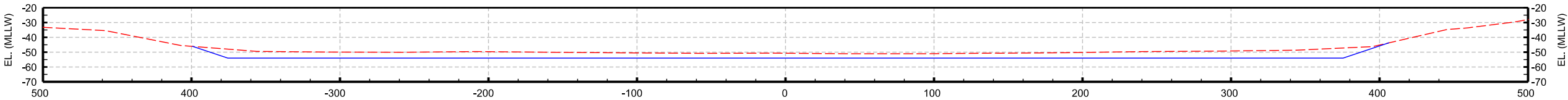
STA. a1083+70



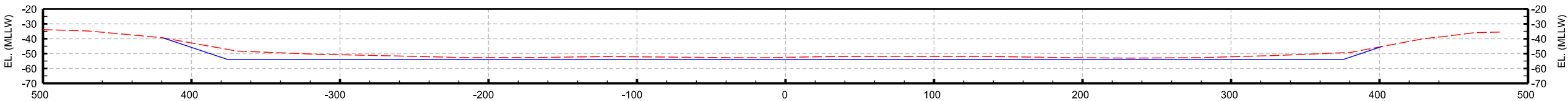
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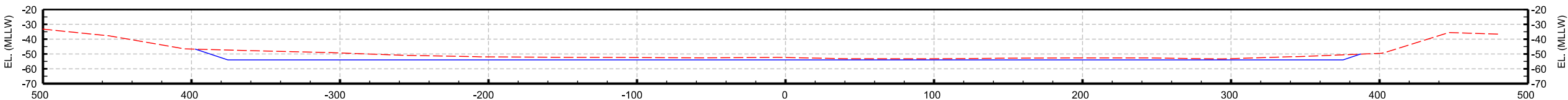
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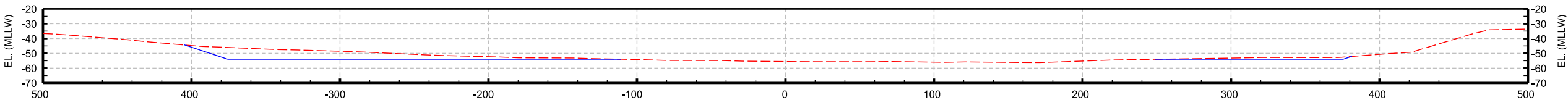
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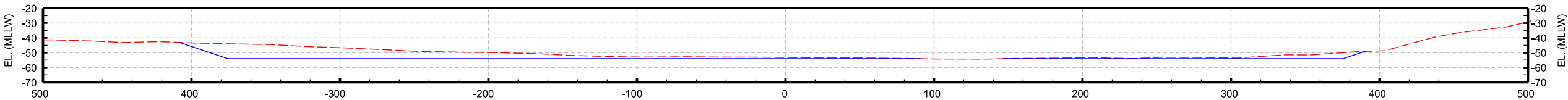
STA. a700+29



STA. a600+29




STA. a500+29



STA. a400+29

NOTE: CROSS SECTIONS TO -54 (MLLW) DREDGE TEMPLATE FOR 6' ADVANCE MAINTENANCE.



US Army Corps
of Engineers®
NEW ORLEANS DISTRICT

DESIGNED BY:		DATE:	
PAVAKA, GARY	DESIGNED BY:		

SUBMITTED BY:		SOLICITATION NO.:	
KEITH O'GAIN	SUBMITTED BY:		

PLOT SCALE:		PLOT DATE:	
48x1	PLOT SCALE:	28 SEPT 2016	PLOT DATE:

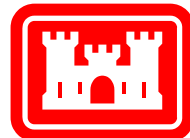
FILE NAME:		CONTRACT NO.:	
	FILE NAME:		

MARK		DESCRIPTION		DATE		APPR	
	MARK		DESCRIPTION		DATE		APPR

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING

CROSS SECTIONS
48' PROJECT DEPTH,
STA. a400+29 TO STA. a1083+70

SHEET
IDENTIFICATION
C-07



US Army Corps
of Engineers
New Orleans District

MISSISSIPPI SHIP CHANNEL DEEPENING STUDY,
MISSISSIPPI RIVER,
BAR CHANNEL,
CONSTRUCTION DREDGING

SEPT 2016



**US Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	DESIGNED BY: PATRICK R. GREY	DATE:
	DRAWN BY: PRG	SOLICITATION NO.:
	CHKD BY: PRG	CONTRACT NO.:
	SUBMITTED BY: KEITH O'CAIN	FILE NUMBER:
	PLOT SCALE:	PLOT DATE: 25 SEPT 2016
		1:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY
MISSISSIPPI RIVER, SOUTHWEST PASS,
CONSTRUCTION DREDGING
COVER SHEET

SHEET
IDENTIFICATION
G-01

[illegible]

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA		DESIGNED BY: PATRICK A. GREY	DATE:
DRAWN BY: PRG	CAD BY: PRG	SOLICITATION NO.:	
SUBMITTED BY: PRG	DATE SUBMITTED:	CONTRACT NO.:	
PLOT SCALES: 1:1	PLOT DATE: 28 SEP 2016	FILE NUMBER:	
		SIZE:	FILE NAME:

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, BAR CHANNEL,
CONSTRUCTION DREDGING

INDEX, GENERAL NOTES,
AND ABBREVIATIONS

SHEET
IDENTIFICATION
G-03

INDEX OF DRAWINGS

NO.	SHEET TITLE
G-01	COVER SHEET
G-02	VICINITY AND PROJECT LOCATION MAP
G-03	INDEX, GENERAL NOTES, AND ABBREVIATIONS
G-04	40' AND 50' PROJECT DEPTH. DREDGING TEMPLATE
C-01	BAR CHANNEL
C-02	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 0+00 TO STA. 50+00
C-03	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 60+00 TO STA. 101+19
C-04	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 102+19 TO STA. 130+00
C-05	CROSS SECTIONS, 48' PROJECT DEPTH, STA. 130+38 TO STA. 140+45
C-06	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 0+00 TO STA. 50+00
C-07	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 60+00 TO STA. 101+19
C-08	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 102+19 TO STA. 130+00
C-09	CROSS SECTIONS, 50' PROJECT DEPTH, STA. 130+38 TO STA. 140+45

GENERAL NOTES:

1. SURVEY DATA FOR CROSS SECTIONS ARE 2015 SURVEYS AND OBTAINED FROM MVN OPERATIONS. SURVEYS WERE TAKEN IN MLG ELEVATIONS. PROJECT DEPTHS FOR THE 48' AND 50' PROJECTS ARE IN MLLW ELEVATIONS. CROSS SECTION WERE CUT TO CORRESPONDING MLG ELEVATIONS AND OFFSET 3 FT LOWER TO REPRESENT MLLW AS SHOWN ON SHEETS G-04.
2. ELEVATIONS ON CROSS SECTIONS REFER TO MLLW UNLESS OTHERWISE NOTED.
3. AERIAL PHOTOGRAPHY FLOWN (2010).
4. ALL XY COORDINATES ARE LOUISIANA STATE PLANE, SOUTH, US SURVEY FEET.

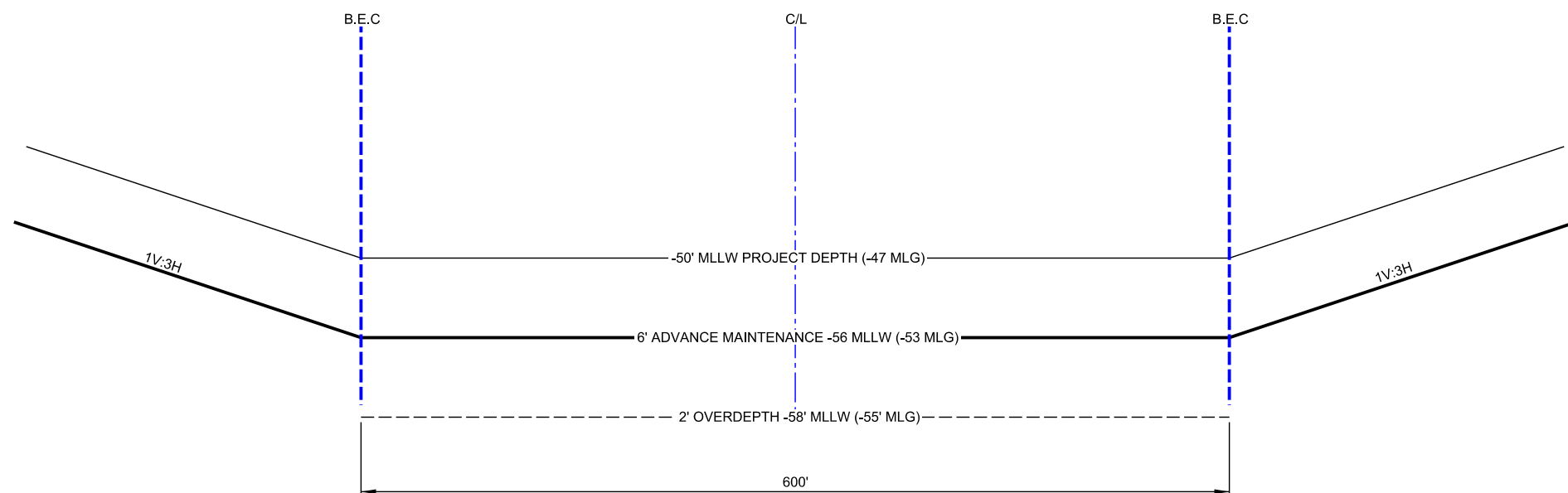
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3. AERIAL PHOTOGRAPHY FLOWN (2010).
4. ALL XY COORDINATES ARE LOUISIANA STATE PLANE, SOUTH, US SURVEY FEET.

3. AERIAL PHOTOGRAPHY FLOWN (2010).

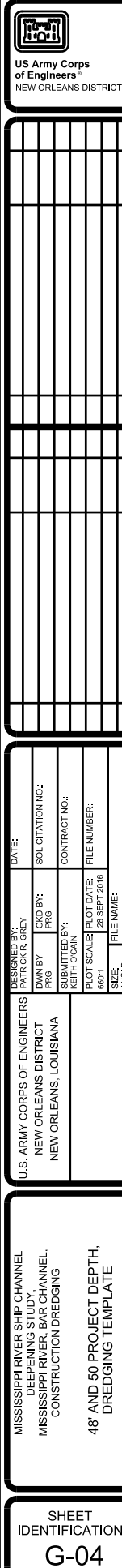
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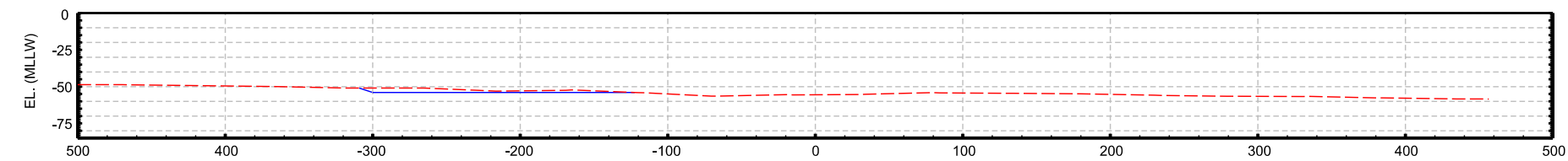
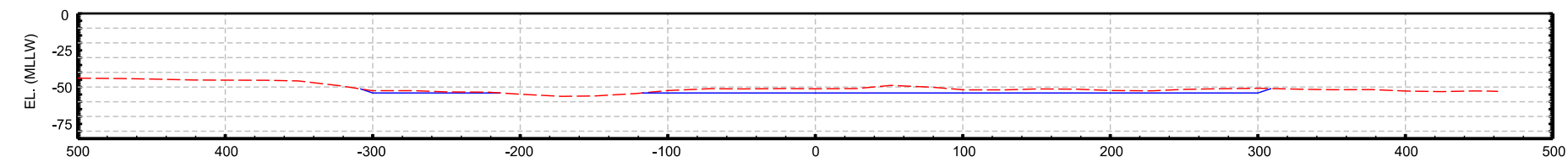
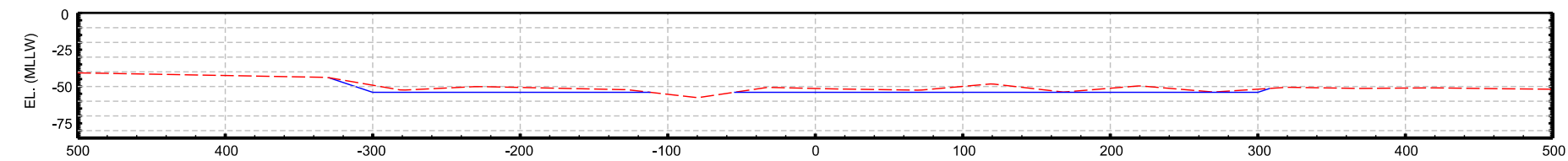
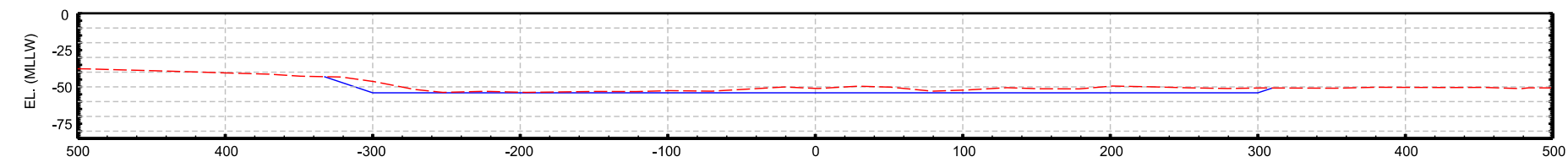
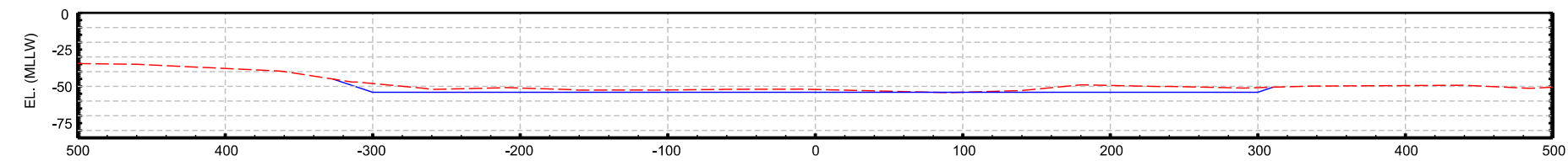
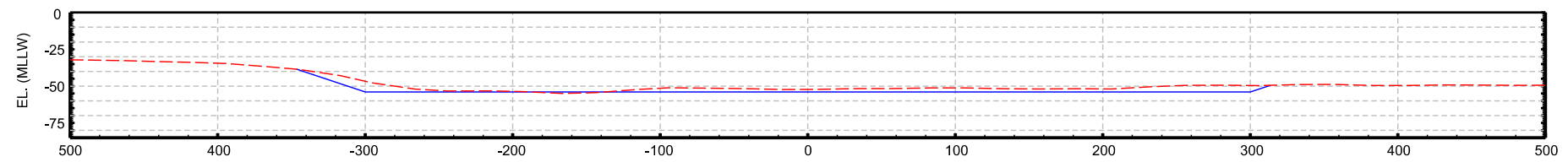
ABBREVIATIONS

APPROX.	APPROXIMATE
AHP	ABOVE HEAD OF PASSES
BEC	BOTTOM EDGE OF CUT
BHP	BELOW HEAD OS PASSES
C/L	CENTERLINE
EL.	ELEVATION
H	HORIZONTAL
MLLW	MEAN LOWER LOW WATER
MLG	MEAN LOW GULF
STA.	STATION
V	VERTICAL



-50' (MLLW) PROJECT DEPTH DREDGING TEMPLATE





NOTE: CROSS SECTIONS
-54 MLLW DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.



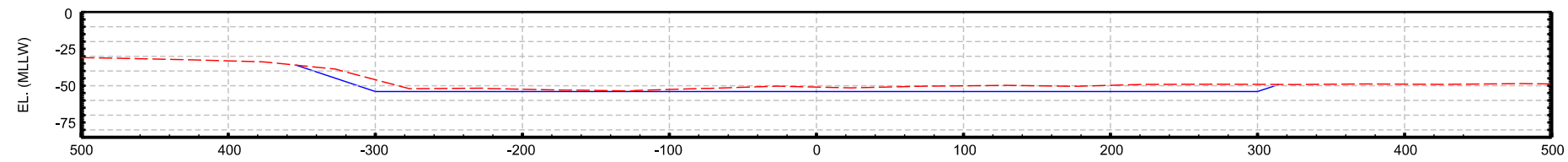
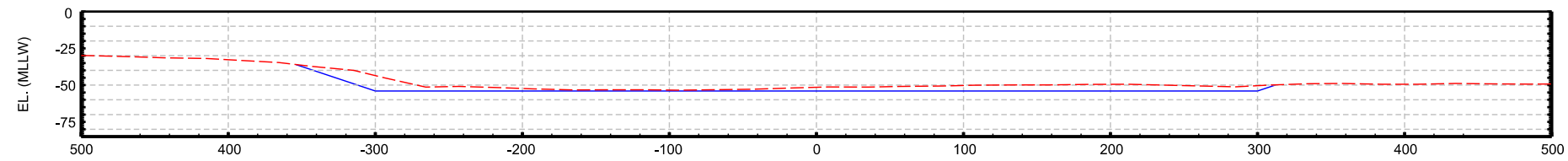
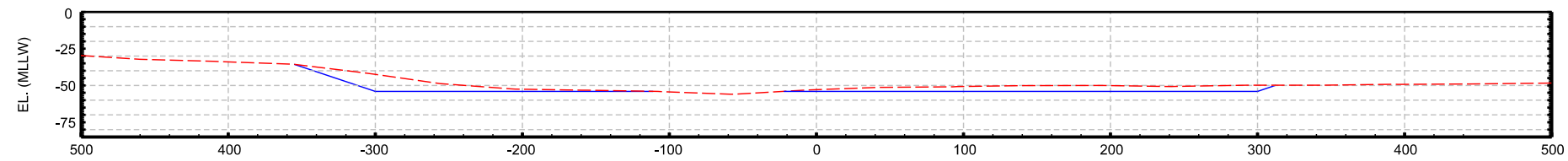
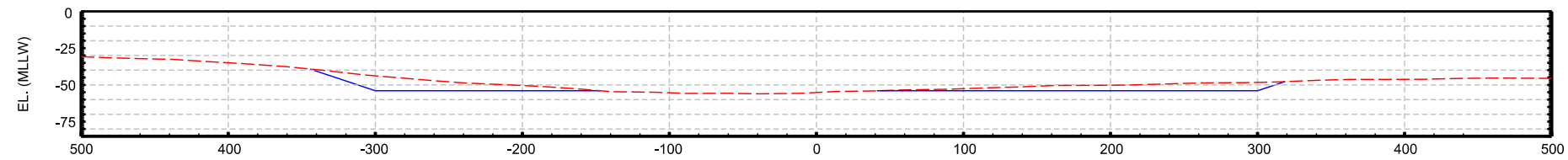
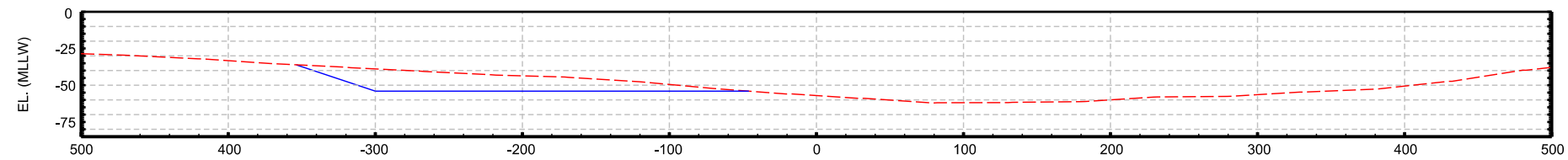
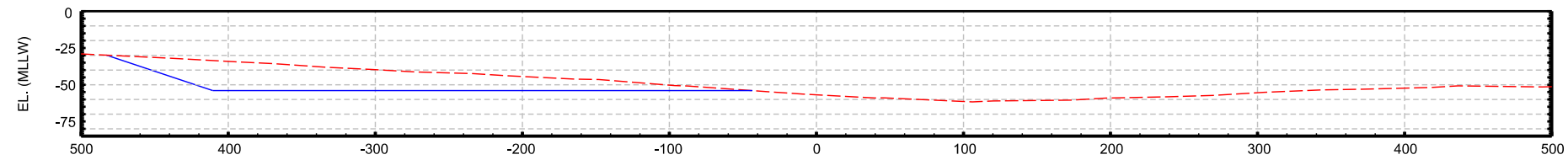
**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

NEW ORLEANS DISTRICT		SOLICITATION NO.:	
NEW ORLEANS, LOUISIANA			
DRAW BY:	CRD BY:		
PRG	PRG		
SUBMITTED BY:		CONTRACT NO.:	
KEITH O'CAIN			
PLOT SCALER:		FILE NUMBER:	
6601272016			
DATE:	FILE NAME:		
2016-07-20	C-12.dgn		

CROSS SECTIONS
48' PROJECT DEPTH,
STA. 0+00 TO STA. 50+00

SHEET
IDENTIFICATION
C-02



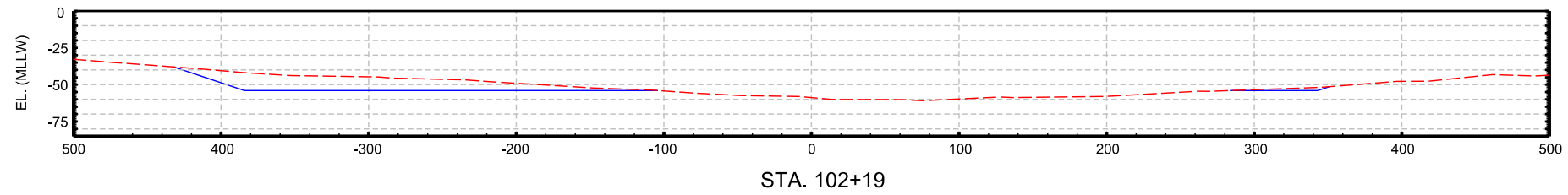
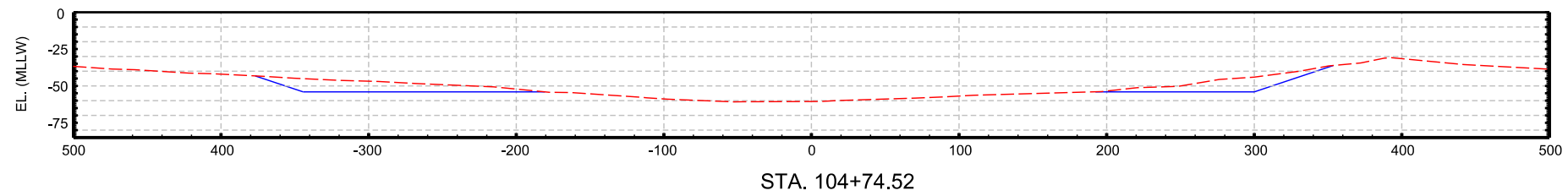
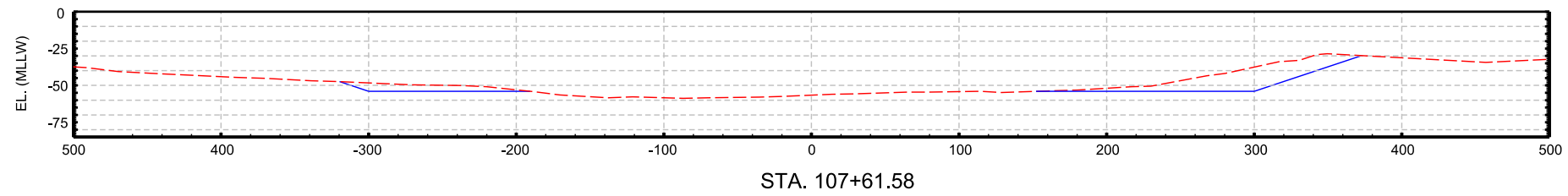
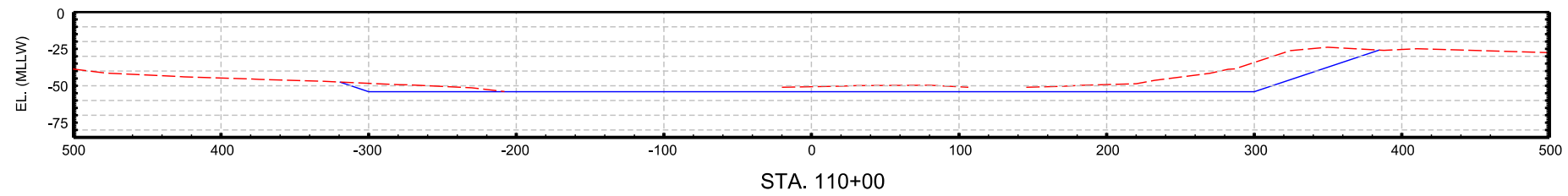
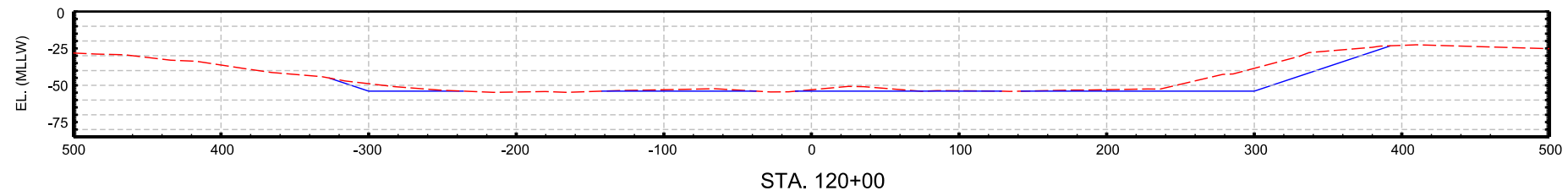
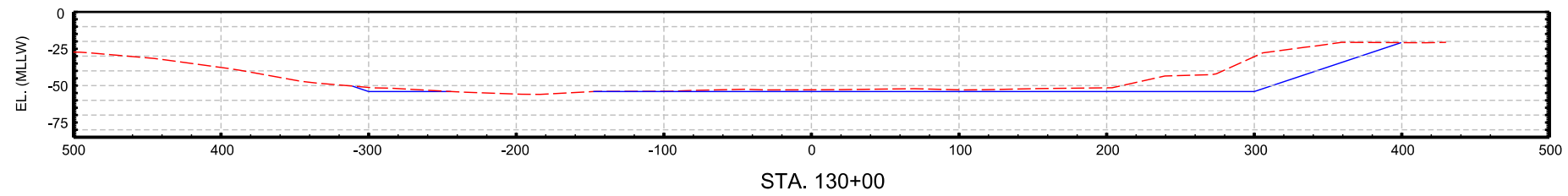
NOTE: CROSS SECTIONS
TO -54 (MLLW) DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.

[illegible]

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA		DRA BY: PRG CSD BY: PRG SUBMITTED BY: KEITH O'CAIN PLOT SCALED 6601 SIZE: FILE NAME: ANSLD	SOLICITATION NO.: CONTRACT NO.: FILE NUMBER: PLOT DATE: 29 SEPT 1916 FILE NAME:
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CROSS SECTIONS
48' PROJECT DEPTH,
STA. 60+00 TO STA. 100+19

SHEET
IDENTIFICATION
C-03



NOTE: CROSS SECTIONS
TO -54 (MLLW) DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.



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NEW ORLEANS DISTRICT

[illegible]

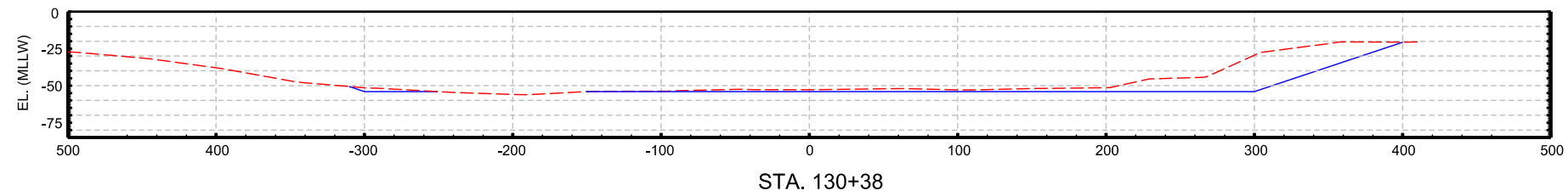
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PATRICK K GREY	PRG		
SUBMITTED BY:		FILE NUMBER:	
PLOT SCALER		PLOT DATE:	
6801		28 SEPT 2016	
SIZE:		FILE NAME:	
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MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, BAR CHANNEL,
CONSTRUCTION DREDGING

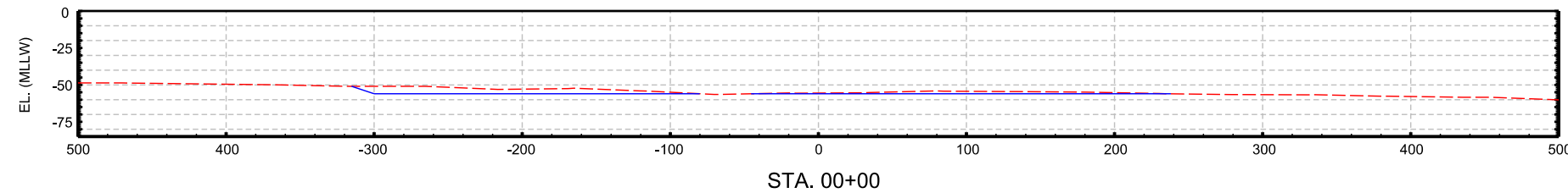
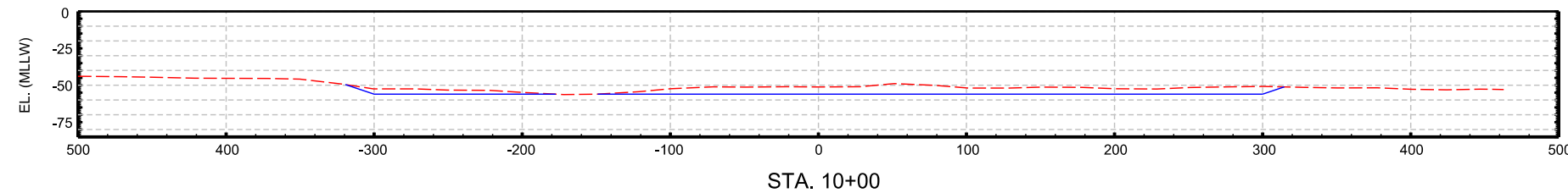
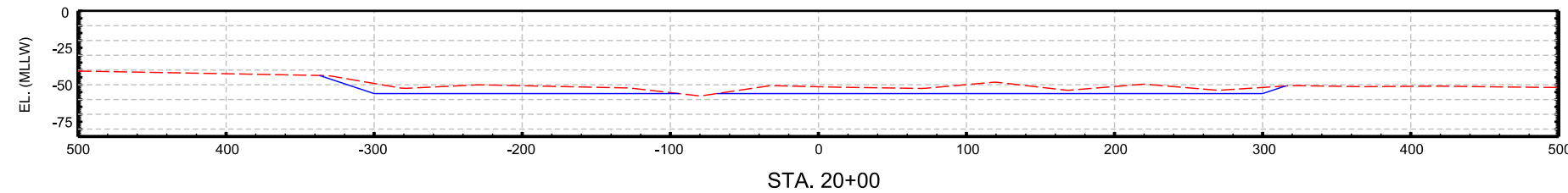
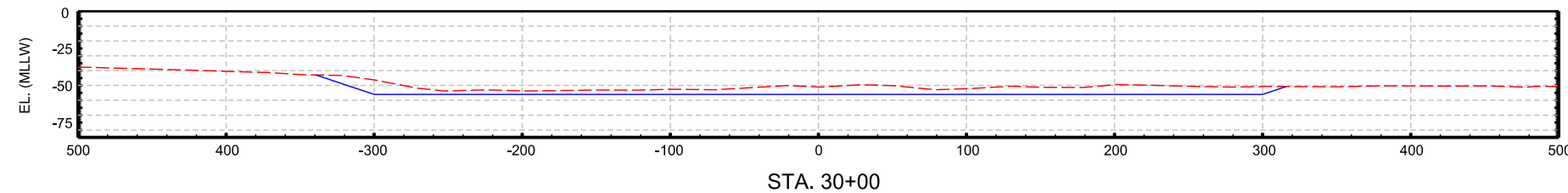
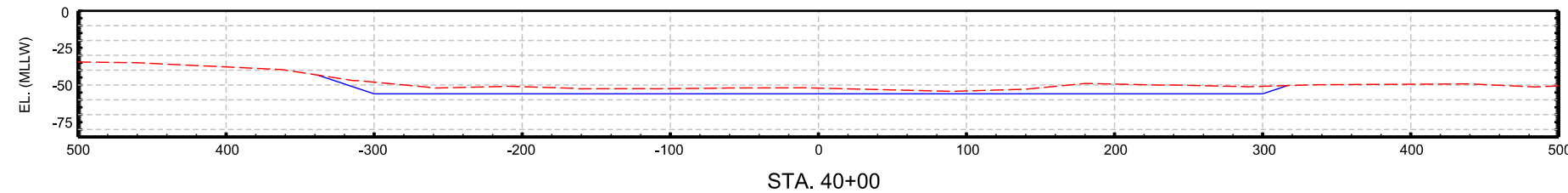
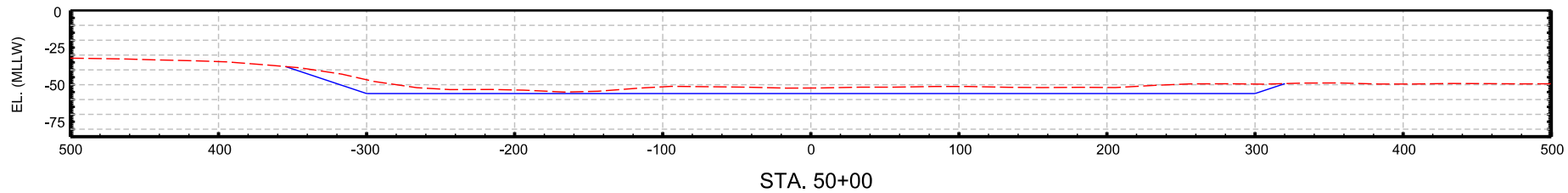
CROSS SECTIONS
48' PROJECT DEPTH,
STA. 102+19 TO STA. 130+00

SHEET
IDENTIFICATION
C-04

A


[illegible]

D



NOTE: CROSS SECTIONS
TO -56 (MLLW) DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.

A



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NEW ORLEANS DISTRICT

DESIGNED BY:		DATE:	
PAVACA & LEE	DATE:		
DESIGNED BY:	DATE:		
PAVACA & LEE	DATE:		

SUBMITTED BY:		SOLICITATION NO.:	
KEITH OGAM	DATE:		
PAVACA & LEE	DATE:		
PAVACA & LEE	DATE:		

PLOT SCALE:		CONTRACT NO.:	
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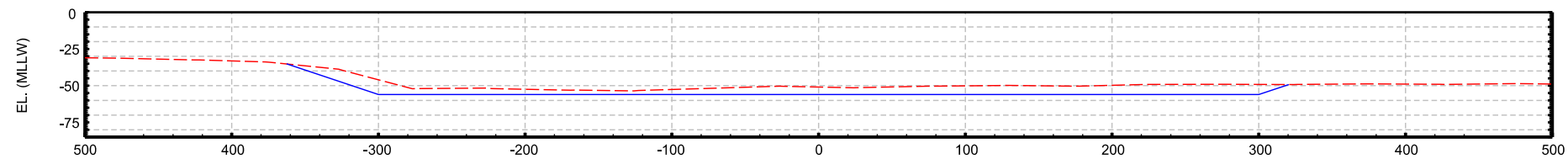
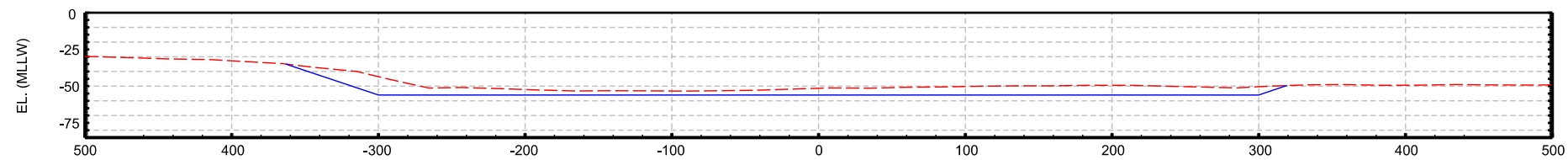
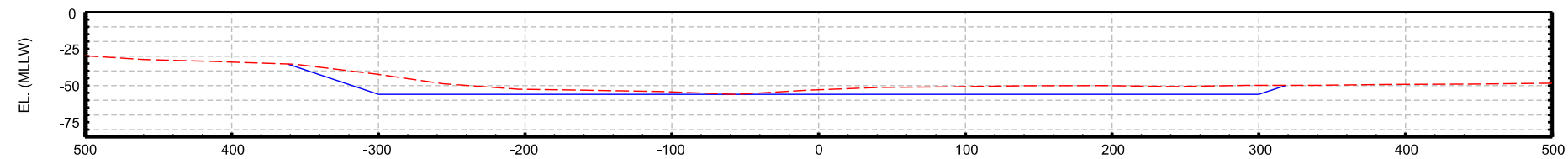
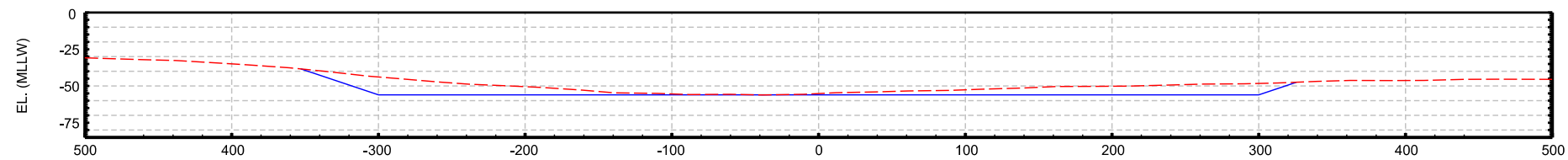
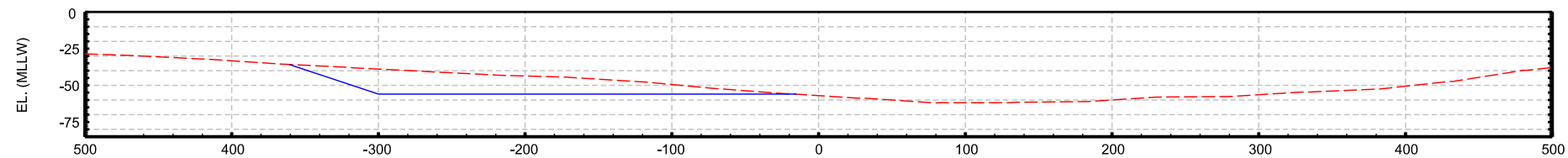
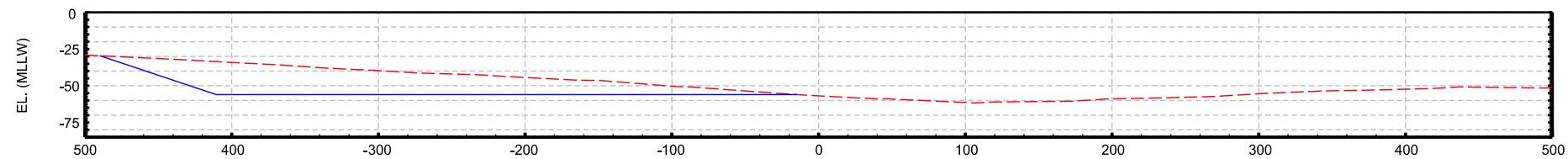
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U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT
NEW ORLEANS, LOUISIANA

MISSISSIPPI RIVER SHIP CHANNEL
DEEPENING STUDY,
MISSISSIPPI RIVER, BAR CHANNEL,
CONSTRUCTION DREDGING

CROSS SECTIONS
50' PROJECT DEPTH,
STA. 0+00 TO STA. 50+00

SHEET
IDENTIFICATION
C-06



NOTE: CROSS SECTIONS
TO -56 (MLLW) DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.

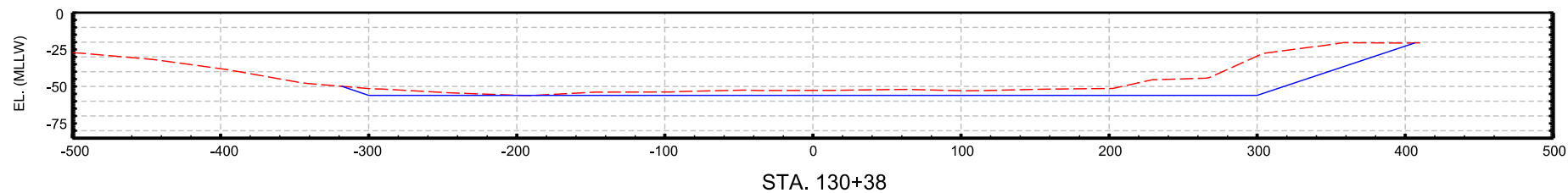
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U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	DATE:	
	PATRICK R. GREY	
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	CREG BY: PRG	
	SUBMITTED BY: KEITH O'DAIN	CONTRACT NO.:
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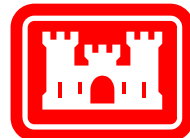
CROSS SECTIONS
50' PROJECT DEPTH,
STA. 60+00 TO STA. 100+19

SHEET
IDENTIFICATION
C-07

A



NOTE: CROSS SECTIONS
TO -56 (MLLW) DREDGE
TEMPLATE FOR 6'
ADVANCE MAINTENANCE.



US Army Corps
of Engineers
New Orleans District

MISSISSIPPI SHIP CHANNEL DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

SEPT 2016



**US Army Corps
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NEW ORLEANS DISTRICT

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	DESIGNED BY: PATRICK T. GREY	DATE:
	DRAW BY: CWD BY: PRG	SOLICITATION NO.:
	SUBMITTED BY: KEITH O'CAIN	CONTRACT NO.:
	PILOT SCALED NTS	PILOT DATE: 25-SEP-2010

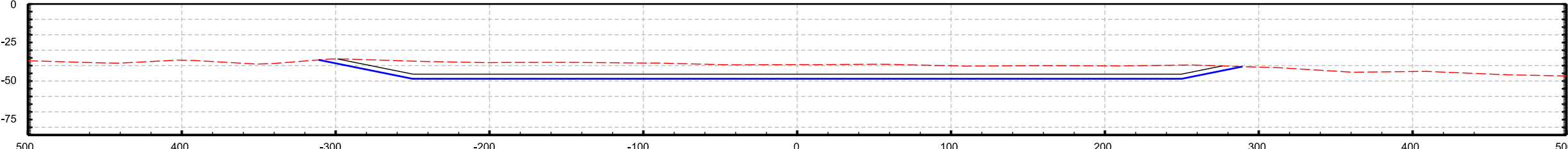
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DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

COVER SHEET

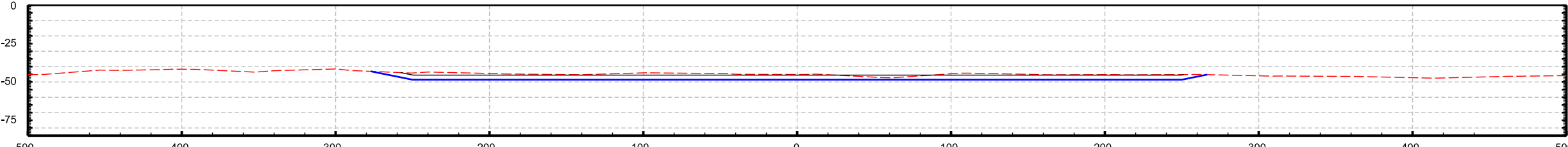
SHEET
IDENTIFICATION
G-01

BATON ROUGE FRONT CROSSING - 48' PROJECT DEPTH CROSS SECTIONS

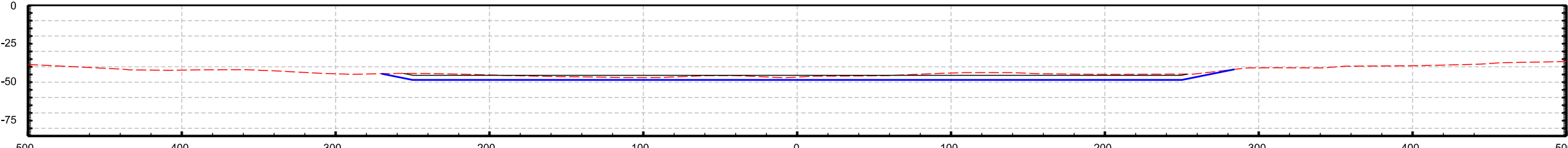
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 — PROPOSED AUTHORIZED GRADE (-45.50' NAVD88)
 — 3' ADVANCE MAINTENANCE (-48.50' NAVD88)



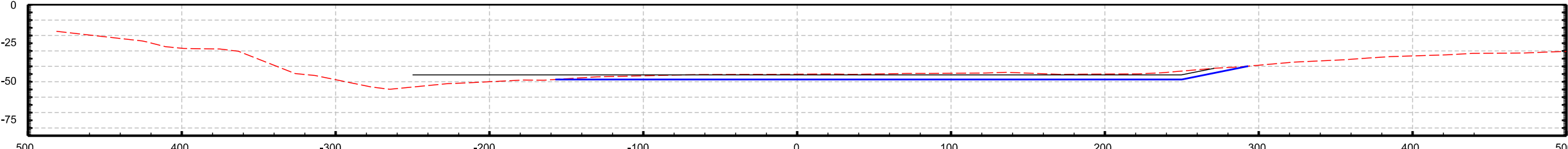
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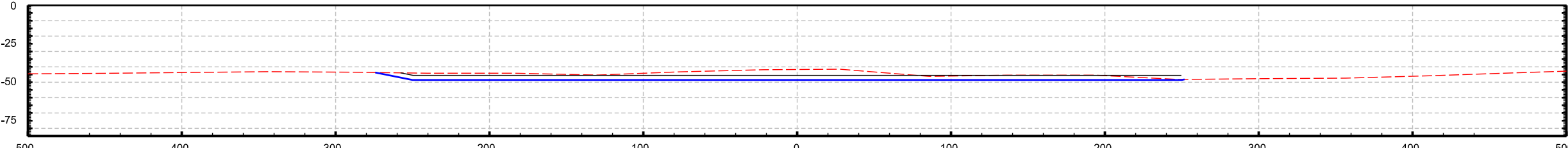
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SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS



**U.S. Army Corps
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NEW ORLEANS DISTRICT

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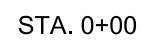
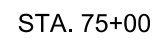
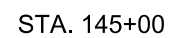
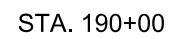
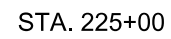
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	PROJ. NO.	CONTRACT NO.
	REVISED BY:	FILE NUMBER:
	REVISED BY:	
	REVISED BY:	
PERMITTED BY: AUTHORITY:	PLANT DATE: 14 SEP 2018	FILE NAME:
SIZE:	AZURE	

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-01A

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-47.50' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-50.50' NAVD88)



SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

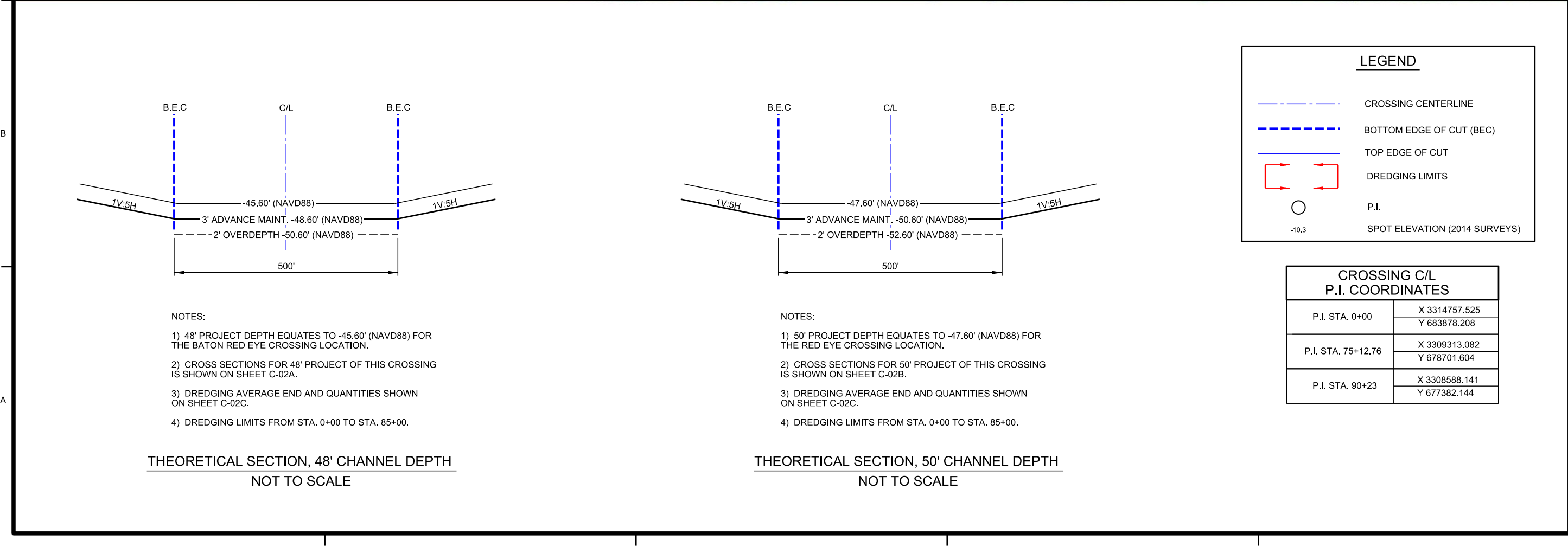
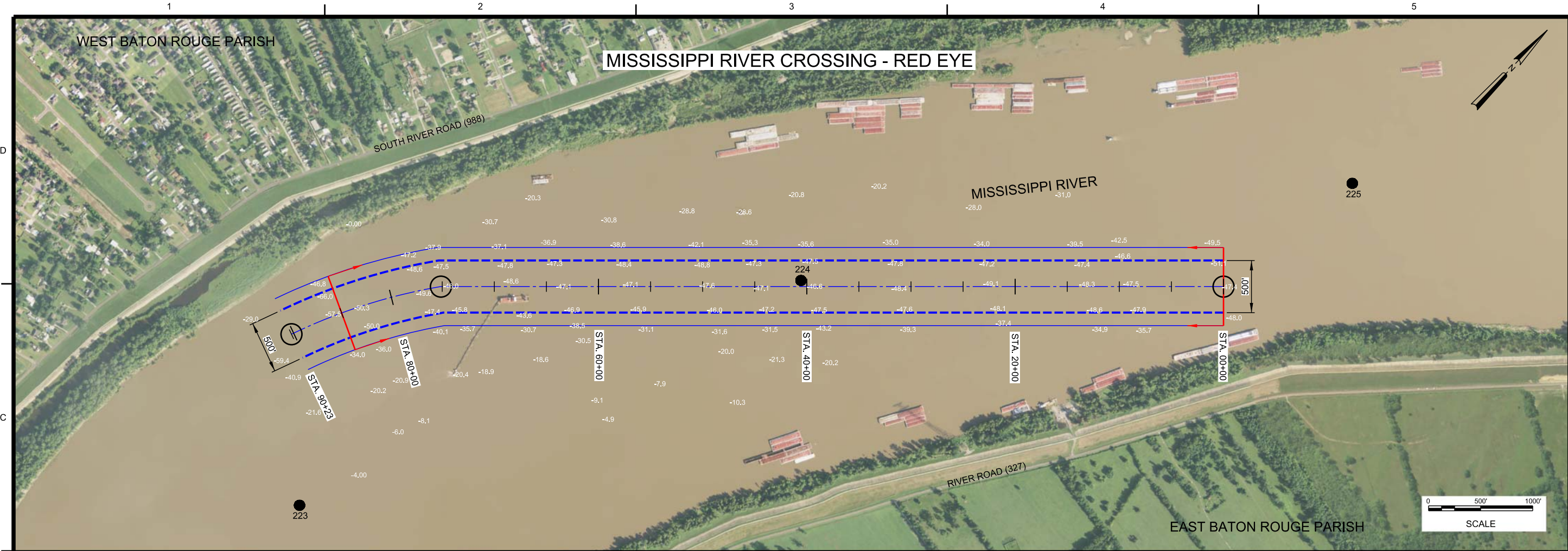
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	SUBMITTED BY: KEITH O'CAIN	FILE NUMBER: 14-357-2016
	PLOT SCALES	FILE NAME:
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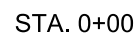
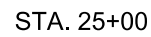
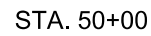
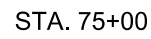
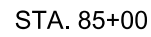
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-01B



- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-45.60' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-48.60' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

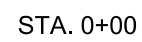
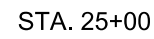
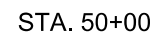
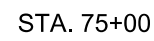
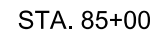
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NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
	PRG		
	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAM		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		6/26/2016	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY, MISSISSIPPI RIVER CROSSINGS

SHEET
IDENTIFICATION
C-02A

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-47.60' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-50.60' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

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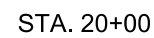
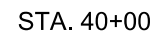
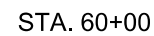
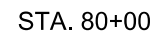
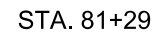
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	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAM		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
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DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

50' PROJECT DEPTH

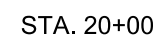
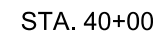
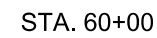
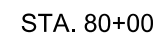
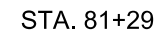
SHEET
IDENTIFICATION
C-02B

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-45.70' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-48.70' NAVD88)



SHEET
IDENTIFICATION
C-03A

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-47.70' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-50.70' NAVD88)

[illegible][illegible]

U.S. ARMY OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PLOT SCALE: 1"=400'		FILE NUMBER:
	46021 14 SEP 2016		
KEITH O'CAIN	SUBMITTED BY:		CONTRACT NO.:
	PENG B1		
PENG B1	PLOT DATE:		SOLUTION NO.:
	14 SEP 2016		
ANSI D		FILE NAME:	
ANSI D			

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

SHEET
IDENTIFICATION
C-03B

A

<p align="center">MISSISSIPPI RIVER CROSSING, SARDINE POINT, 48' PROJECT DEPTH, QUANTITIES</p> <p align="center">QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)</p>		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	22.90	211.70
25+00.00	710.50	6,790.10
30+00.00	848.10	14,430.80
35+00.00	1,790.20	24,428.20
40+00.00	3,066.50	44,969.00
45+00.00	551.20	33,496.70
50+00.00	487.50	9,617.20
55+00.00	340.70	7,668.20
60+00.00	423.90	7,079.20
65+00.00	1,148.30	14,557.40
70+00.00	1,277.90	22,465.40
75+00.00	2,795.10	37,713.60
80+00.00	2,146.30	45,753.60
81+29.02	2,124.60	10,204.10
	TOTAL:	279,385.20 CY

MISSISSIPPI RIVER CROSSING, SARDINE POINT, 50' PROJECT DEPTH, QUANTITIES		
QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	21.80	201.70
20+00.00	195.20	2,008.70
25+00.00	1,778.90	18,278.70
30+00.00	1,922.50	34,272.20
35+00.00	2,895.40	44,610.20
40+00.00	4,239.30	66,062.50
45+00.00	1,615.00	54,206.20
50+00.00	1,475.80	28,617.90
55+00.00	1,243.00	25,173.30
60+00.00	1,283.80	23,395.90
65+00.00	2,101.70	31,347.10
70+00.00	2,401.90	41,699.30
75+00.00	3,959.20	58,899.10
80+00.00	2,900.70	63,518.50
81+29.02	2,965.40	14,015.60
	TOTAL:	506,306.90 CY



**US Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

[illegible]

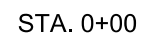
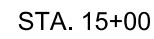
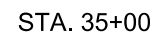
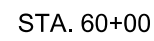
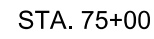
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	PARTIAL ONLY	
	PROG. NO.:	SOLICITATION NO.:
	REV. BY: PRG	
	SUBMITTED BY:	CONTRACT NO.:
	KEITH O'CAIN	
	PLOT SCALES:	FILE NUMBER:
	PLOT DATE: 12/01	
	SIZE:	FILE NAME:
		28 SEP 2016

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

SARDINE POINT,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET
IDENTIFICATION
C-03C

- - - - - EXISTING GRADE
 — PROPOSED AUTHORIZED GRADE (-46.00' NAVD88)
 — 3' ADVANCE MAINTENANCE (-49.00' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

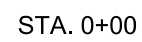
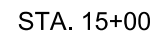
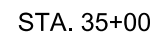
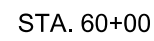
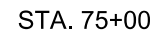
NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
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	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAM		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		4/26/2016	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-04A

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-48.00' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-51.00' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
	PRG		
	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAIN		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		4-28-2018	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-04B

D

C

B

A

MISSISSIPPI RIVER
CROSSING,
MEDORA,
48' PROJECT DEPTH,
QUANTITIES

QUANTITIES TO 3' ADVANCE
MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	1,039.80	0.00
5+00.00	2,116.10	29,221.40
10+00.00	4,225.40	58,717.10
15+00.00	2,366.60	61,036.20
20+00.00	1,724.50	37,880.50
25+00.00	327.00	18,995.70
30+00.00	1,894.10	20,565.80
35+00.00	9,855.20	108,790.10
40+00.00	8,641.70	171,267.80
45+00.00	5,727.80	133,051.10
50+00.00	3,693.70	87,236.20
55+00.00	3,333.90	65,070.00
60+00.00	2,748.70	56,319.80
65+00.00	1,221.10	36,757.00
70+00.00	265.90	13,768.70
75+00.00	45.80	2,886.50
80+00.00	62.50	1,002.80
85+00.00	71.50	1,241.00
90+00.00	0.00	662.20
95+00.00	79.3	734.1
100+00.00	0.1	734.9
101+13.09	0	0.2

MISSISSIPPI RIVER
CROSSING,
MEDORA,
50' PROJECT DEPTH,
QUANTITIES

QUANTITIES TO 3' ADVANCE
MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	1,471.80	0.00
5+00.00	2,854.70	40,060.70
10+00.00	5,418.80	76,606.60
15+00.00	3,236.90	80,145.40
20+00.00	2,367.40	51,891.90
25+00.00	696.60	28,370.30
30+00.00	3,021.00	34,422.00
35+00.00	11,225.30	131,910.50
40+00.00	9,944.40	196,016.30
45+00.00	6,953.30	156,460.40
50+00.00	4,893.80	109,695.60
55+00.00	4,522.30	87,186.30
60+00.00	3,870.80	77,713.90
65+00.00	1,941.00	53,812.80
70+00.00	642.50	23,921.00
75+00.00	193.60	7,741.30
80+00.00	265.70	4,252.60
85+00.00	166.70	4,003.50
90+00.00	0.90	1,551.50
95+00.00	454.4	4216.1
100+00.00	61.2	4773.9
101+13.09	50.1	232.9



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

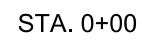
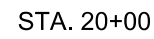
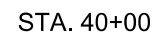
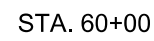
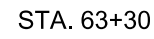
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		SOLICITATION NO.:	
DRAW BY:	CAD BY:	CONTRACT NO.:	
PKG	PKG		
SUBMITTED BY:		FILE NUMBER:	
PATRICK K GREY			
PLOT SCALES:		FILE NAME:	
1201			
26 SEP 2016			
SIZE:			
ASFD			

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

SHEET
IDENTIFICATION
C-04C

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-46.10' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-49.10' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

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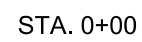
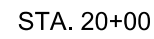
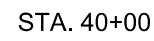
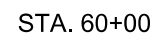
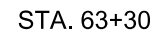
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	FIG. NO. PROJ. NO.	FIG. CONTRACT NO.
	SUBMITTED BY: KEITH O'CAIN	FILE NUMBER: 14-357-2016
	PLOT SCALES	FILE NAME:
	14-357-2016	ANSI

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-05A

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-48.10' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-51.10' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

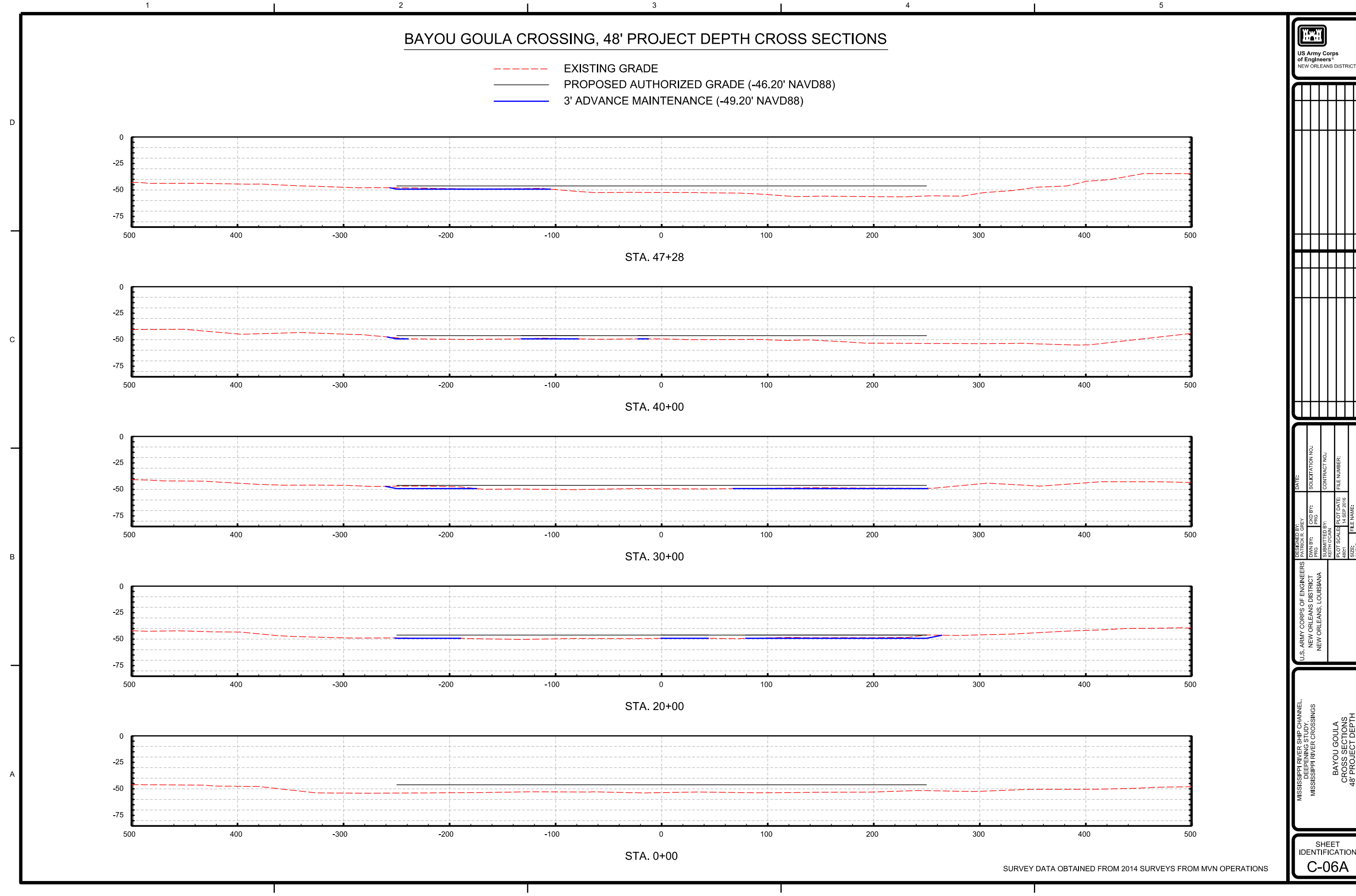
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	PROJ. BR.	CONTRACT NO.
	SUBMITTED BY: KEITH O'CAIN	FILE NUMBER:
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	ANSI	FILE NAME:
	ANSI	

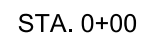
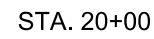
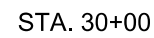
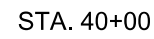
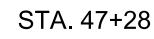
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-05B



--- EXISTING GRADE
 — PROPOSED AUTHORIZED GRADE (-48.20' NAVD88)
 — 3' ADVANCE MAINTENANCE (-51.20' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

[illegible]

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PAYMENT OF \$100,000.00 PRG NO: 10000000 CDD BY: 10000000 SUBMITTED BY: KEITH OCCAIN PLOT SCALER PLOT DATE: 14 SEP 2016 36521 ANSID	SOLICITATION NO.: CONTRACT NO.: FILE NUMBER: FILE NAME:
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DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSING

SHEET
IDENTIFICATION
C-06B

<p align="center">MISSISSIPPI RIVER CROSSING, BAYOU GOULA, 48' PROJECT DEPTH, QUANTITIES</p>		
<p align="center">QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)</p>		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	2.50	23.20
15+00.00	13.30	146.50
20+00.00	168.80	1,685.90
25+00.00	113.10	2,609.60
30+00.00	244.40	3,310.30
35+00.00	18.30	2,432.50
40+00.00	28.30	431.80
45+00.00	53.50	757.70
47+28.14	90.30	607.50
	TOTAL:	12,005.00 CY

<p align="center">MISSISSIPPI RIVER CROSSING, BAYOU GOULA, 50' PROJECT DEPTH, QUANTITIES</p>		
<p align="center">QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)</p>		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	73.60	681.10
10+00.00	507.80	5,382.90
15+00.00	646.90	10,691.60
20+00.00	1,136.50	16,512.80
25+00.00	958.20	19,395.30
30+00.00	1,189.80	19,889.10
35+00.00	882.70	19,189.40
40+00.00	703.90	14,690.20
45+00.00	473.80	10,904.20
47+28.14	427.90	3,809.30
	TOTAL:	121,145.90 CY

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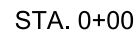
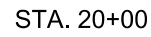
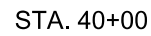
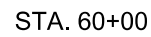
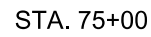
U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	DESIGNED BY: PATRICK D. GREY		DATE:	
	OWN BY: PRG	CAD BY: PRG	SOLICITATION NO.:	
	SUBMITTED BY: KEITH O'CAIN		CONTRACT NO.:	
	PLOT SCALED: 12x11		FILE NUMBER:	
	SIZE: ANSI D	FILE NAME:		

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

BAYOU GOULA,
48' AND 50' PROJECT DEPTH
DREDGING QUANTITIES

SHEET
IDENTIFICATION
C-06C

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-46.30' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-49.30' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

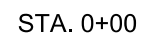
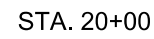
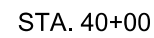
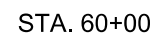
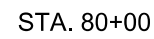
NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
	PRG		
	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAM		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		6/30/2016	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-07A

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-48.30' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-51.30' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
	PRG		
	SUBMITTED BY:	CONTRACT NO.:	
	KEITH OCAIN		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		2/28/2016	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-07B

<p align="center">MISSISSIPPI RIVER CROSSING, ALHAMBRA, 48' PROJECT DEPTH, QUANTITIES</p> <p align="center">QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)</p>		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	408.20	0.00
5+00.00	180.80	5,453.90
10+00.00	539.30	6,667.20
15+00.00	876.00	13,104.00
20+00.00	1,493.70	21,941.40
25+00.00	667.30	20,009.60
30+00.00	1,127.20	16,615.90
35+00.00	821.00	18,039.30
40+00.00	787.80	14,896.50
45+00.00	940.00	15,997.80
50+00.00	701.20	15,196.50
55+00.00	813.50	14,025.50
60+00.00	499.50	12,158.00
65+00.00	308.20	7,479.40
70+00.00	329.10	5,901.70
75+00.00	131.60	4,266.60
80+00.00	20.70	1,410.80
85+00.00	0.00	191.80
90+00.00	0.00	0.00
95+00.00	0.00	0.00
100+00.00	0.00	0.00
105+00.00	0.00	0.00
110+00.00	0.00	0.00
	TOTAL:	193,355.90 CY

MISSISSIPPI RIVER CROSSING, ALHAMBRA, 50' PROJECT DEPTH, QUANTITIES		
QUANTITIES TO 3' ADVANCE MAINTENANCE (AVERAGE END)		
STATION	AREA (SF)	VOLUME (CY)
0+00.00	986.50	0.00
5+00.00	666.30	15,303.70
10+00.00	1,437.20	19,476.30
15+00.00	1,995.00	31,779.40
20+00.00	2,744.50	43,884.20
25+00.00	1,731.30	41,443.00
30+00.00	2,198.30	36,385.80
35+00.00	1,913.00	38,067.90
40+00.00	1,860.60	34,941.00
45+00.00	2,038.10	36,098.80
50+00.00	1,774.90	35,305.30
55+00.00	1,878.90	33,831.30
60+00.00	1,509.70	31,376.00
65+00.00	1,280.00	25,830.70
70+00.00	1,306.80	23,951.90
75+00.00	1,101.50	22,299.40
80+00.00	498.30	14,812.90
85+00.00	188.60	6,359.80
90+00.00	111.00	2,773.50
95+00.00	30.80	1,312.30
100+00.00	0.00	284.80
105+00.00	0.00	0.00
110+00.00	0.00	0.00
	TOTAL:	495,518.00 CY



**US Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

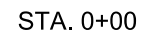
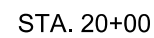
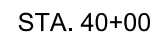
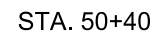
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DESIGNED BY: PATRICK R. GREY		DATE:	
DWM BY: PRG	CKD BY: PRG	SOLICITATION NO.:	
SUBMITTED BY:		CONTRACT NO.:	
PLOT SCALE:		FILE NUMBER:	
1201 26 SEP 2016		FILE NAME:	

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

SHEET
IDENTIFICATION
C-07C

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-46.40' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-49.40' NAVD88)

[illegible]

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PAYMENT SHEET NO.	SOLICITATION NO.
	FIG. NO. PROJ. NO.	FIG. CONTRACT NO.
	SUBMITTED BY: KEITH O'CAIN	FILE NUMBER: 14-357-2016
	PLOT SCALES	FILE NAME:
	14-357-2016	ANSI

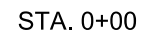
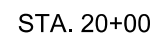
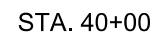
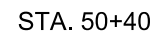
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-08A

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-48.40' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-51.40' NAVD88)

[illegible]

U.S. ARMY SYSTEMS ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PAYMENT METHOD		SOLICITATION NO.:	
	PRG PFG	PRD BY: PFG		
	SUBMITTED BY:		CONTRACT NO.:	
	KEITH D'CAIN			
	PLOT SCALER		FILE NUMBER:	
	14 SEP 2016			
	ANSI D		FILE NAME:	
	ANSI D			

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-08B

SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

D

C

B

A

MISSISSIPPI RIVER
CROSSING,
PHILADELPHIA,
48' PROJECT DEPTH,
QUANTITIES

QUANTITIES TO 3' ADVANCE
MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	0.00	0.00
5+00.00	0.00	0.00
10+00.00	0.00	0.00
15+00.00	0.00	0.00
20+00.00	0.00	0.00
25+00.00	0.00	0.00
30+00.00	0.00	0.00
35+00.00	0.00	0.00
40+00.00	0.00	0.00
45+00.00	0.00	0.00
50+00.00	0.00	0.00
50+40.40	0.00	0.00
	TOTAL:	0.00 CY

MISSISSIPPI RIVER
CROSSING,
PHILADELPHIA,
50' PROJECT DEPTH,
QUANTITIES

QUANTITIES TO 3' ADVANCE
MAINTENANCE (AVERAGE END)

STATION	AREA (SF)	VOLUME (CY)
0+00.00	151.90	0.00
5+00.00	164.20	2,927.00
10+00.00	75.80	2,222.50
15+00.00	1,762.90	17,025.30
20+00.00	2,429.10	38,814.40
25+00.00	2,267.00	43,482.30
30+00.00	3,445.00	52,889.60
35+00.00	3,643.00	65,630.00
40+00.00	3,652.30	67,548.60
45+00.00	2,443.40	56,441.00
50+00.00	3,661.60	56,527.60
50+40.40	4,033.40	5,757.10
	TOTAL:	409,265.40 CY



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

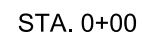
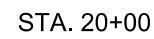
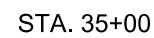
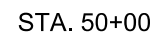
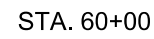
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U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA		DATE:	
		SOLICITATION NO.:	
DRAW BY:	CAD BY:	CONTRACT NO.:	
PKG	PKG		
SUBMITTED BY:		FILE NUMBER:	
PATRICK K GREY			
PLOT SCALES:		FILE NAME:	
1201			
26 SEP 2016			
SIZE:			
ASFD			

MISSISSIPPI RIVER SHIP CHANNEL,
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS,
CONSTRUCTION DREDGING

SHEET
IDENTIFICATION
C-08C

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-46.55' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-49.55' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

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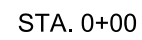
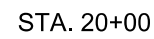
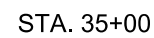
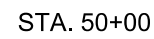
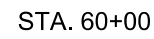
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	PRG	PRG BY:	PRG	
	PRG	PRG	CONTRACT NO.	
	SUBMITTED BY:		FILE NUMBER:	
	KEITH D'AMIN	PLOT DATE:		FILE NAME:
		14 SEP 2016		
		ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-09A

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-48.55' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-51.55' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

[illegible]

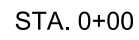
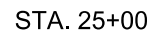
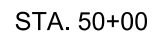
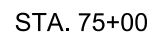
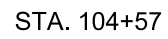
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	PRG	PRG BY:	PRG	
	PRG	PRG	CONTRACT NO.	
	SUBMITTED BY:		FILE NUMBER:	
	KEITH D'CAIN		PLOT DATE:	
			14 SEP 2016	
	ANSID		FILE NAME:	

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-09B

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-46.75' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-49.75' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

[illegible]

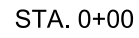
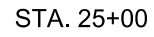
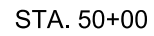
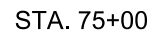
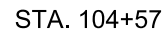
NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	OWN BY:	CVD BY:	SOLICITATION NO.:
	PRG		
	SUBMITTED BY:		CONTRACT NO.:
	KEITH OCAM		
	PLOT SCALER	PLOT DATE:	FILE NUMBER:
		4/26/2016	
	ISSUE:	FILE NAME:	
	ANSID		

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-10A

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-48.75' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-51.75' NAVD88)



**U.S. Army Corps
Engineers®**
NEW ORLEANS DISTRICT

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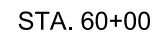
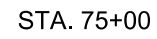
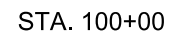
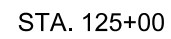
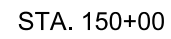
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NEW ORLEANS, LOUISIANA			
		DWN BY:	CRD BY:
		PRG	
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		SUBMITTED BY:	FILE NUMBER:
		KETH OGAN	
		PLOT SCALER PLOT DATE:	
		15.0000	11-20-90
		SPSID	FILE NAME:
		ANSLD	

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-10B

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-46.80' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-49.80' NAVD88)

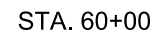
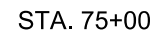
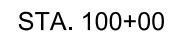
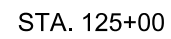
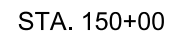
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NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	DWN BY: PRG	SIG BY: SGD	SOLICITATION NO.:
	SUBMITTED BY: KEITH OGDEN		CONTRACT NO.:
	PLOT SCALE:	PLOT DATE:	FILE NUMBER:
	5/24/2016	14 SEP 2016	
	ANSI D	FILE NAME:	

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

SHEET
IDENTIFICATION
C-11A

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-48.80' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-51.80' NAVD88)



**U.S. Army Corps
of Engineers®**
NEW ORLEANS DISTRICT

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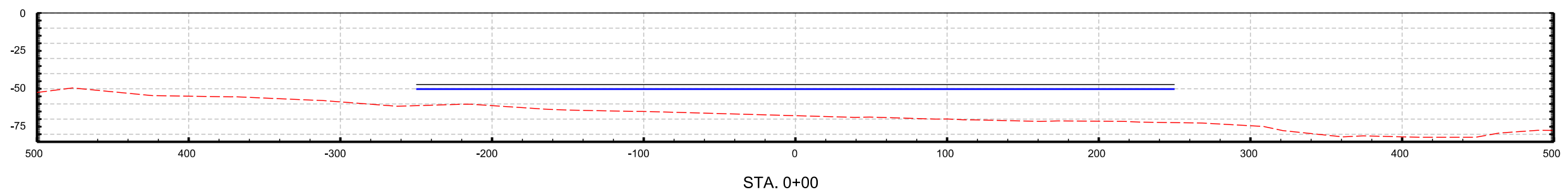
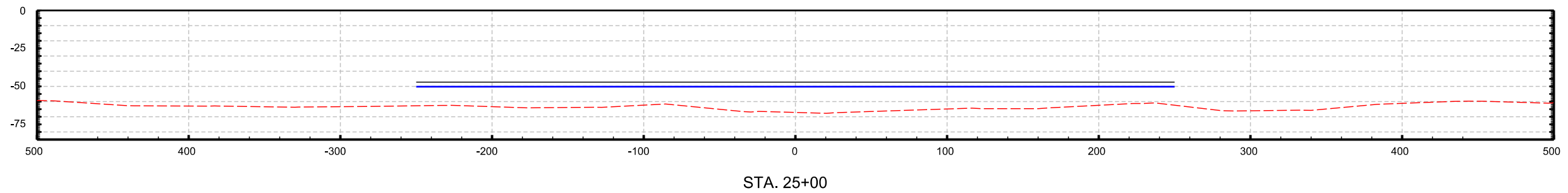
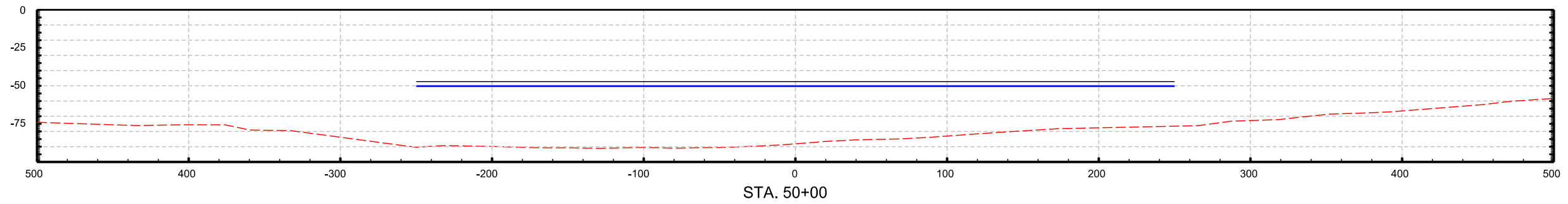
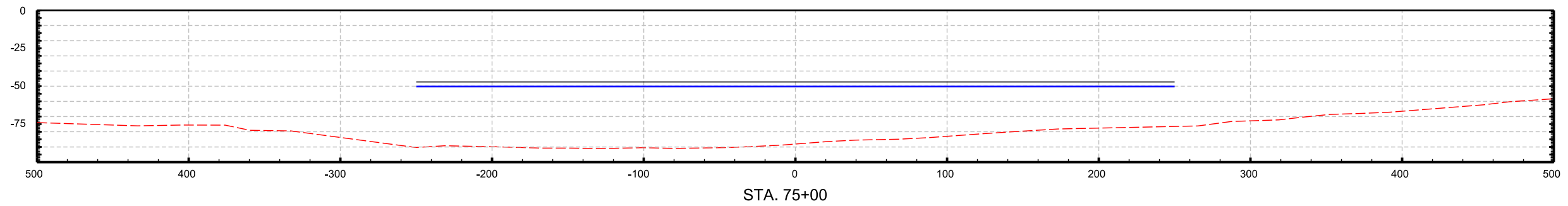
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	SUBMITTED BY:		CONTRACT NO.:	
	KEITH D'CAIN			
	PLOT SCALER		FILE NUMBER:	
	14 SEP 2016			
	ANSID		FILE NAME:	
	ANSID			

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

BELMONT
CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-11B

- - - - - EXISTING GRADE
 ——— PROPOSED AUTHORIZED GRADE (-47.20' NAVD88)
 ——— 3' ADVANCE MAINTENANCE (-50.20' NAVD88)



SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

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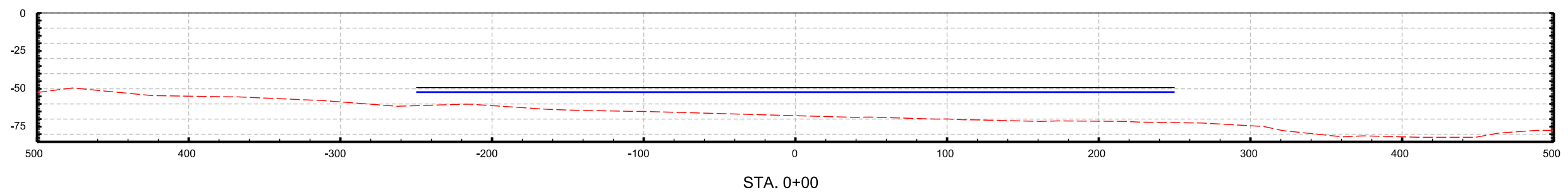
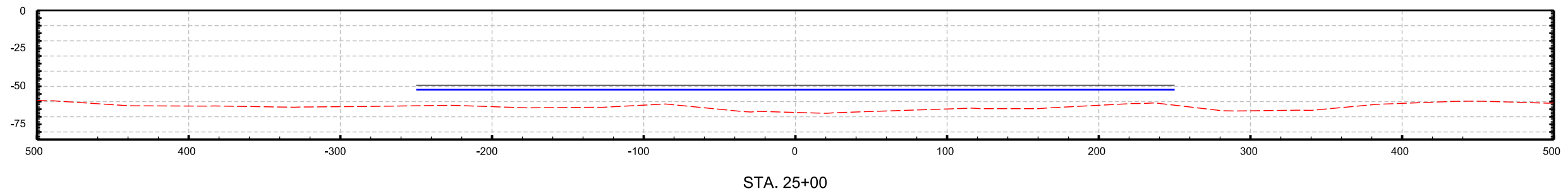
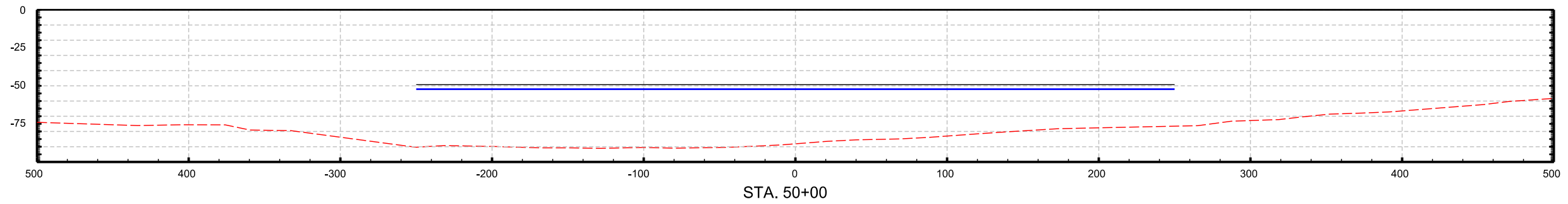
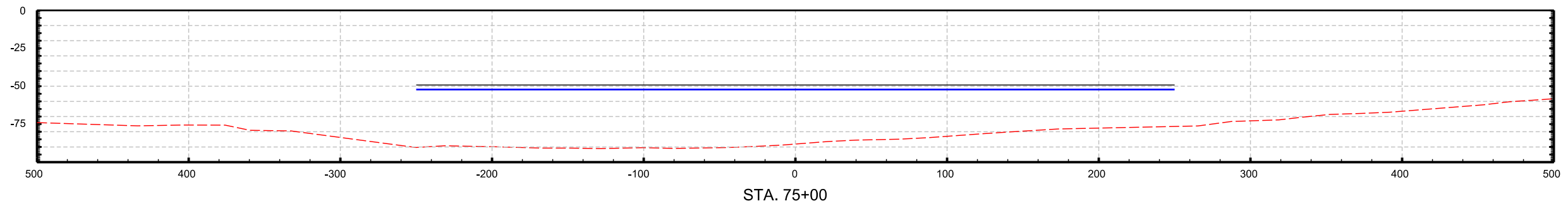
U.S. ARMY SYSTEMS ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PAYMENT METHOD		SOLICITATION NO.	
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	SUBMITTED BY:		CONTRACT NO.	
	KEITH D'CAIN			
	PLOT SCALER		FILE NUMBER:	
	14 SEP 2016			
	ANSID		FILE NAME:	
	ANSID			

DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
48' PROJECT DEPTH

SHEET
IDENTIFICATION
C-12A

- - - - - EXISTING GRADE
 ————— PROPOSED AUTHORIZED GRADE (-49.20' NAVD88)
 ————— 3' ADVANCE MAINTENANCE (-52.20' NAVD88)



SURVEY DATA OBTAINED FROM 2014 SURVEYS FROM MVN OPERATIONS

[illegible]

U.S. ARMY CORPS OF ENGINEERS NEW ORLEANS DISTRICT NEW ORLEANS, LOUISIANA	PATRICK T. GREY		SOLICITATION NO.:	
	DOWN BY:	CAD BY:	CONTRACT NO.:	
	DATE:	DATE:	FILE NUMBER:	
	SUBMITTED BY:		PLOT DATE:	
	KEITH O'CAIN		14 SEP 2016	
	PLOT SCALE:		FILE NAME:	
	SIZE:		PLOT:	

MISSISSIPPI RIVER CROSSINGS
DEEPENING STUDY,
MISSISSIPPI RIVER CROSSINGS

CROSS SECTIONS
50' PROJECT DEPTH

SHEET
IDENTIFICATION
C-12B



APPENDIX D

Economics



APPENDIX D – ECONOMICS

D-1.0 INTRODUCTION

The Mississippi River Ship Channel Deepening Study focuses on the stretch of the Mississippi River from the Gulf of Mexico to the Port of Baton Rouge and encompasses four major deep-water ports (the Port of Plaquemines, the Port of New Orleans, the Port of South LA, and the Port of Baton Rouge).¹

According to 2014 data provided by the Waterborne Commerce Statistics Center (WCSC), the 4 above-mentioned ports are all in the top 12 ranking of annual tonnage for U.S. ports. The Port of South LA is 1st with 267.4 million shorts tons followed by the Port of New Orleans (7th: 84.5 million), the Port of Baton Rouge (8th: 69.2 million), and the Port of Plaquemines (12th: 55.5 million).

To allow for navigation, 2 areas are typically dredged in the Mississippi River Ship Channel. Southwest Pass is the first area and is located in the lower Mississippi extending from river mile 10 Above Head of Passes (AHP) to river mile 22 Below Head of Passes (BHP). The second area consists of 12 crossings that begin at river mile 115 AHP and end at river mile 232.4 AHP. Three of these crossings, Fairview, Belmont, and Rich Bend, serve the Port of South LA while the remaining 9 crossings serve the Port of Baton Rouge (Figure D-1).

¹ Although St. Bernard Port lies within the area of study, it is not mentioned specifically in the report because of its relatively small size and because its data are included in the numbers reported for the Port of New Orleans.

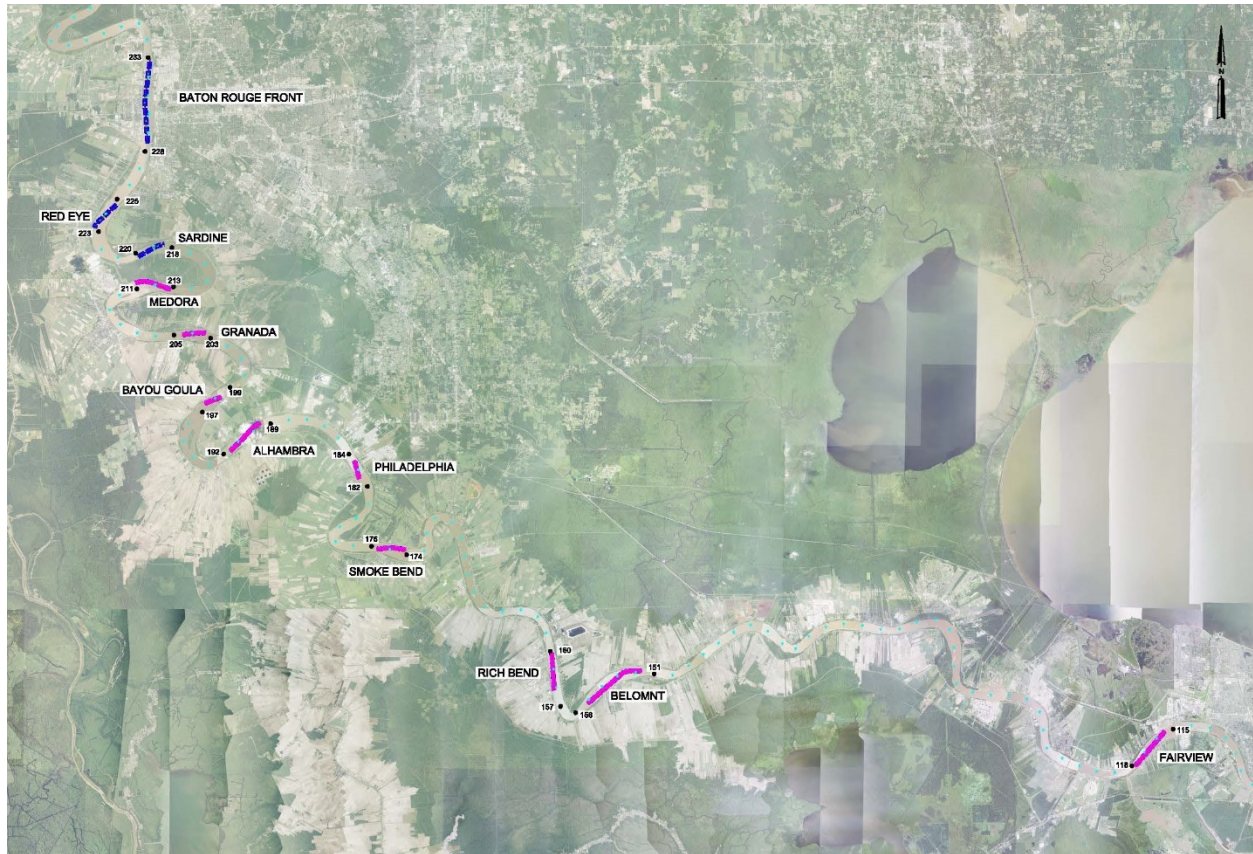


Figure D-1 Channel Crossings

Deepening the first area (from river mile 22 BHP to river mile 10 AHP) essentially connects 136 miles of the Mississippi River because of the naturally deep channel up to the Fairview Crossing at Mile 115 AHP. Deepening the second area would begin at Fairview Crossing and require dredging at several crossings to the Baton Rouge Harbor at mile 232.4 AHP.

Table D-1 lists the maintained project dimensions by reach, and Table D-2 lists the four major deep-water ports along this stretch of the Mississippi River that will be affected by the project. Figure D-2 shows this information geographically.



Table D-1 Authorized Project Dimensions by Reach

Project Dimensions	Reach by River Mile	Authorized Dimension
Baton Rouge	Mile 233.8 to Mile 232.4 AHP	40' by 500'
Baton Rouge to New Orleans	Mile 232.4 to Mile 104.5 AHP	45' by 500'
New Orleans to SWP Jetties	Mile 104.5 to Mile 18 BHP	45' by 750'
SWP Jetty to Bar Channel	Mile 18 BHP to Mile 22 BHP	48' by 600'

Note: Above Mile 233.8 is 9 ft. depth

Table D-2 Deep-Water Ports

Major Ports	Mile Marker
Baton Rouge	Mile 168.5 AHP to 253 AHP
South LA	Mile 114.9 AHP to 168.5 AHP
New Orleans	Mile 81.2 AHP to 114.9 AHP
Plaquemines	Mile 0 to 81.2 AHP



Figure D-2 Study Area Map

The 4 ports collectively make up the largest port cluster in the United States, effectively servicing a large portion of the country by connecting inland waterways, rail, and road while also serving as a gateway to foreign trade with Latin America, North Europe, and the Mediterranean.

Within a 500 mile radius alone, these ports can provide quick market access to a number of US metropolitan areas (Figure D-3).



Figure D-3 Metro Areas within 500 Miles

The strength of the 4 ports lies in their location, namely the intersection of the Mississippi River and the Gulf of Mexico. Access to the 14,500 miles of inland waterways through the Mississippi River and its tributaries provides convenient barge and vessel transportation throughout the Mississippi valley, and the Gulf Intracoastal Waterway, running approximately 1050 miles from Carrabelle, Florida, to Brownsville, Texas, provides direct access along the Gulf Coast. The vast majority of transported cargo is dry bulk for the Midwest through the use of the Mississippi River network and petroleum and petroleum products. Although oil is largely processed on site or transported by pipeline, a significant portion (along with chemical products) is shipped by barge. These 2 commodity groups comprise approximately two-thirds of the tonnage transported along the Mississippi River from Minneapolis, MN, to Mouth of Passes (Table D-3).



Table D-3 Mississippi River Minneapolis, MN to Mouth of Passes

2014 - Tonnages by Major Commodity Group		
Commodity Group	Tons	
	(1,000's)	Distribution
Food and Farm Products	167,313	31%
Petroleum and Petroleum Products	163,656	31%
Crude Materials	66,933	13%
Chemicals and Related Products	59,592	11%
Coal, Lignite & Coal Coke	42,501	8%
Primary Manufactured Goods	32,084	6%
Manufactured Equipment	1,569	< 1%
Total	533,648	100%

Source: WCSC

Rail plays an effective role as well. Customers of the Port of New Orleans benefit from direct access to a 133,000 mile rail network. In fact, the Port of New Orleans is the only seaport in the United States to be served by all 6 Class 1 railroads, effectively linking it to nearly every region in the country. The New Orleans Public Belt Railroad connects these railroads to the Port of New Orleans with 26 miles of track along the New Orleans riverfront and inner harbor. The Union Pacific railroad, one of 3 trunk line railroads servicing the Port of South LA, operates on the west bank of the Mississippi River and provides access to the western states. The other 2 railroads, Canadian National and Kansas City Southern, operate on the east bank and serve the mid-continental United States and Canada. Three Class 1 railroads (Union Pacific, Illinois Central/Canadian National Railway, and Kansas City Southern) serve the Port of Baton Rouge (Figure D-4).



Figure D-4 Railroad Network for 4 Ports

Additionally, convenient access to the Interstate Highway System provides advantageous transportation of goods for the 4 ports to locations throughout the country. I-10, stretching from the Atlantic Ocean to the Pacific Ocean, connects the east coast of the United States with the west coast. I-55 is a north-south route and connects the Great Lakes with the Gulf of Mexico. I-59 and I-49 are also easily accessible and provide further entrance to southern/midwestern markets.

As described above, the 4 Louisiana ports truly are in a unique position to act as a direct link between the states in the Mississippi valley as well as nearly any other part of the United States through its combination of waterway, rail, and highway access (Figure D-5).



Figure D-5 Freight Flows by Highway, Railroad, and Waterway

Source: U.S. Department of Transportation

D-2.0 EXISTING CONDITIONS

D-2.1 Socioeconomic

The socioeconomics of the community area along the Mississippi River are summarized in this section. The study area includes eleven contiguous parish communities that may be directly impacted by the deepening and expansion of the Ports in question.² The parameters used to describe the demographic and socioeconomic environment include recent trends in population, employment, and wage earnings by sectors. Other social characteristics such as race and age distribution, and poverty are examined.

² The eleven (11) parishes contiguous to the Mississippi River below Baton Rouge: West Baton Rouge, East Baton Rouge, Iberville, Ascension, St. James St. John the Baptist, St. Charles, Jefferson, St. Bernard, Orleans, and Plaquemines.



D-2.1.1 Population

Louisiana is ranked as the 25th largest state in the Union in terms of resident population as of July 1, 2015, with 4.7 million residents.³ Between the years of 1990 and 2015, Louisiana's population increased by 11 percent, from 4.2 million to 4.7 million persons, as shown below in Table D-4. Across the eleven parishes a 6 percent growth was observed from 1.55 million to 1.64 million persons. This is significantly lower than the observed national growth of 29% over the same historical period. Six of the parishes within the immediate economic region of the study area have seen a growth in population from 1990, while 5 parishes have seen a decrease in population. The Ascension Parish experienced the highest increase in population from 1990 to 2015 (+75%), while the St. Bernard Parish experienced the greatest decrease in population (-32%) over the same time period.

Table D-4 Population Trends for Selected Louisiana Parishes - 1990 to 2015

Parish	Population				Percentage Change			
	1990 ⁴	2000 ⁵	2010	2015 ⁶	1990 to 2000	2000 to 2010	2010 to 2015	1990 to 2015
Ascension	68,214	76,627	107,215	119,455	12%	40%	11%	75%
East Baton Rouge	285,167	412,852	440,171	446,753	45%	7%	1%	57%
Iberville	31,049	33,320	33,387	33,095	7%	0%	-1%	7%
Jefferson	448,306	455,466	432,552	436,275	2%	-5%	1%	-3%
Orleans	496,938	484,674	343,829	389,617	-2%	-29%	13%	-22%
Plaquemines	25,575	26,757	23,042	23,495	5%	-14%	2%	-8%
St. Bernard	66,631	67,229	35,897	45,408	1%	-47%	26%	-32%
St. Charles	42,437	48,072	52,780	52,812	13%	10%	0%	24%
St. James	25,575	21,216	22,102	21,567	-17%	4%	-2%	-16%
St. John the Baptist	39,996	43,044	45,924	43,626	8%	7%	-5%	9%
West Baton Rouge	19,419	21,601	23,788	25,490	11%	10%	7%	31%
Louisiana	4,219,973	4,468,976	4,533,372	4,670,724	6%	1%	3%	11%
United States	248,709,873	281,421,906	308,745,538	321,418,820	13%	10%	4%	29%

³ Bureau of the Census, American Community Survey

⁴ Bureau of the Census, <http://www.census.gov/population/www/censusdata/cencounts/files/la190090.txt>

⁵ Bureau of the Census, <http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t>

⁶ Bureau of the Census, American Community Survey, Quick Facts



D-2.1.2 Employment

Louisiana employment in 2014 totaled two million as show in Table D-5. Of the major industry sectors within the State, the health care and social assistance sector employs the most persons at 283,000. This industry is followed by retail trade (234,000), educational services (184,000), construction (161,000), manufacturing (160,000) and accommodation and food services (156,000). The parishes in the study region yield fairly similar proportions of workers per sector (all within 5 percent) compared to what was observed at the state level. The one industry exception was manufacturing in St. James Parish and West Baton Rouge Parish. Respectively, twenty three percent and sixteen percent of workers participated in the manufacturing industry compared to eight percent at the state level.

D-2.1.3 Earnings by Sector

Median earnings across all sectors averaged \$36.7 thousand in the state in 2014 (Table D-6). Comparatively, in the study area Jefferson Parish was at the low end with \$28.8 thousand while Ascension Parish was at the high end with \$44.1 thousand. At both the state and parish level, the mining, utilities, manufacturing, transportation and warehouses and professional and technical services generally provided the highest median earnings while the sectors for accommodation and food services, arts entertainment and recreation, administrative and waste services, retail trade and agriculture, forestry, fishing, hunting observed the lowest median earnings.



Table D-5 Sector Employment for Selected Louisiana Parishes - 2014⁷

	NAICS Industry Sector	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque- mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
11	Agriculture, forestry, fishing, hunting	22,946	313	818	289	291	573	558	287	84	203	97	16
21	Mining	72,324	321	1,799	167	13	1,816	643	222	105	64	206	143
22	Utilities	22,071	265	1,779	346	122	1,313	158	166	586	144	294	230
23	Construction	161,201	5,844	15,686	1,427	757	9,117	773	2,217	2,309	730	1,993	951
31-33	Manufacturing	160,428	7,132	15,571	1,716	883	6,817	824	1,662	2,932	2,050	2,623	1,816
42	Wholesale Trade	52,342	2,009	5,049	189	137	2,966	311	485	1,097	200	518	146
44-45	Retail Trade	233,981	5,826	26,628	1,435	1,522	15,005	888	1,671	2,595	1,058	2,335	1,160
48-49	Transportation and Warehousing	83,192	2,423	6,691	569	564	6,785	684	1,043	1,369	427	1,179	408
51	Information	31,077	984	3,937	184	304	3,290	63	160	328	22	352	152
52	Finance and Insurance	70,100	2,277	8,508	572	200	4,782	234	563	775	292	587	257
53	Real Estate and Rental and Leasing	33,708	884	3,869	95	333	3,444	217	262	416	50	253	188
54	Professional and Technical Services	103,455	3,304	14,303	367	653	12,819	470	875	1,030	242	684	762
55	Management of companies and Enterprises	627	52	81	-	11	35	-	4	-	6	15	-
56	Administrative and Waste Services	68,100	1,878	7,567	514	323	6,698	284	901	910	430	840	297
61	Educational Services	184,232	4,295	25,211	864	815	20,055	669	1,007	2,488	672	1,364	949
62	Health Care and Social Assistance	283,388	7,342	29,228	1,541	1,599	23,602	920	2,000	3,207	1,079	2,724	1,696

⁷ Source: Bureau of the Census, 2010-2014 American Community Survey 5-Year Estimates
S2403: Industry by sex and median earnings in the past 12 months (in 2014 inflation-adjusted dollars) for the civilian employed population 16 years and over



	NAICS Industry Sector	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque- mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
71	Arts, Entertainment and Recreation	47,286	488	4,376	133	211	6,850	165	308	635	41	283	235
72	Accommodation and Food Service	155,969	3,407	18,900	838	816	21,788	551	1,209	1,536	544	1,819	668
81	Other Services (except Public Administration)	103,477	2,308	11,724	542	894	7,779	496	942	1,261	348	757	539
92	Public Administration	112,506	2,934	13,179	1,222	727	8,585	1,096	1,077	1,247	455	715	877
	Total, Private and Government	2,002,410	54,286	214,904	13,010	11,175	164,119	10,004	17,061	24,910	9,057	19,638	11,490



Table D-6 Median Annual Wage Earnings for Selected Louisiana Parishes - 2014⁸

	NAICS Industry Sector	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
11	Agriculture, forestry, fishing, hunting	\$26,806	\$23,884	\$21,467	\$32,686	\$40,195	\$25,492	\$31,083	\$22,476	\$28,431	\$25,398	\$21,908	-
21	Mining	\$63,866	\$69,395	\$53,135	\$61,157	-	\$74,375	\$64,292	\$60,435	\$52,148	\$120,640	\$46,250	\$61,169
22	Utilities	\$49,023	\$80,417	\$51,365	\$41,929	\$50,300	\$39,219	\$54,242	\$50,833	\$71,852	\$40,556	\$103,438	\$46,075
23	Construction	\$36,035	\$46,552	\$34,739	\$33,775	\$27,708	\$31,848	\$39,464	\$31,787	\$40,719	\$46,746	\$36,755	\$32,625
31-33	Manufacturing	\$47,593	\$71,350	\$54,240	\$54,554	\$43,713	\$40,394	\$72,292	\$46,176	\$61,037	\$72,100	\$53,578	\$62,045
42	Wholesale Trade	\$41,910	\$62,750	\$44,337	\$39,485	\$25,481	\$44,491	\$45,583	\$39,612	\$53,113	\$49,091	\$39,554	\$45,694
44-45	Retail Trade	\$20,121	\$20,352	\$20,135	\$22,022	\$21,980	\$19,956	\$25,341	\$24,067	\$23,042	\$17,048	\$19,221	\$19,081
48-49	Transportation and Warehousing	\$44,026	\$55,934	\$40,733	\$53,542	\$31,207	\$37,221	\$50,385	\$34,676	\$43,363	\$46,921	\$56,349	\$60,285
51	Information	\$37,316	\$43,387	\$33,230	\$35,758	\$5,556	\$41,404	\$81,875	\$41,944	\$46,029	-	\$33,750	\$26,959
52	Finance and Insurance	\$38,311	\$47,375	\$42,985	\$26,587	\$42,888	\$45,804	\$45,536	\$36,445	\$38,633	\$35,938	\$34,913	\$41,344
53	Real Estate and Rental and Leasing	\$32,949	\$40,156	\$30,426	\$33,750	\$14,261	\$33,036	\$58,750	\$41,250	\$32,500	\$65,750	\$32,083	\$19,310
54	Professional and Technical Services	\$48,440	\$51,640	\$51,144	\$44,107	\$40,651	\$54,101	\$38,869	\$46,840	\$46,886	\$60,469	\$48,523	\$49,098
55	Management of companies and Enterprises	\$61,563	-	\$118,365	-	-	\$128,309	-	-	-	-	-	-
56	Administrative and Waste Services	\$22,117	\$23,750	\$24,461	\$34,375	\$13,862	\$22,305	\$30,469	\$21,645	\$22,692	\$18,750	\$21,017	\$21,908
61	Educational Services	\$35,985	\$41,016	\$35,427	\$34,593	\$25,978	\$40,423	\$42,384	\$33,094	\$34,367	\$37,772	\$27,225	\$30,295
62	Health Care and Social Assistance	\$30,091	\$35,972	\$31,567	\$22,188	\$31,738	\$32,271	\$31,885	\$33,256	\$35,735	\$26,658	\$35,647	\$30,185

⁸ Source: Bureau of the Census, 2010-2014 American Community Survey 5-Year Estimates
S2403: Industry by sex and median earnings in the past 12 months (in 2014 inflation-adjusted dollars) for the civilian employed population 16 years and over



	NAICS Industry Sector	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
71	Arts, Entertainment and Recreation	\$20,750	\$30,323	\$14,599	\$11,080	\$19,570	\$23,275	\$22,202	\$24,403	\$17,281	\$20,662	\$19,201	\$20,677
72	Accommodation and Food Service	\$13,538	\$10,750	\$12,493	\$12,416	\$11,451	\$18,716	\$13,114	\$15,599	\$9,626	\$16,121	\$13,243	\$9,600
81	Other Services (except Public Administration)	\$21,614	\$33,006	\$21,889	\$23,321	\$18,750	\$21,664	\$26,250	\$25,451	\$21,814	\$15,086	\$31,875	\$17,260
99	Public Administration	\$41,960	\$48,982	\$46,722	\$36,696	\$53,098	\$49,069	\$41,280	\$47,675	\$47,083	\$42,188	\$50,436	\$44,583
	Average, Private and Government	\$36,701	\$44,052	\$39,173	\$34,422	\$28,799	\$41,169	\$42,910	\$35,667	\$38,229	\$42,105	\$38,156	\$35,455



D-2.1.4 Median Household Income for Selected Parishes

Median household incomes for selected parishes in 2014 are shown in Table D-7. The average median household income across all parishes was \$50.9 thousand, which is greater than the State median of \$45k but less than the National median of \$53.5 thousand. Ascension Parish has the highest median household income of \$70.2 thousand which is 56 percent greater than the state median, 31 percent greater than the national median, and 20 percent greater than the next closest parish, St. Charles. Ascension Parish's comparatively high income status can be traced to the utilities, manufacturing and wholesale trade sectors and the respectively high earnings of these employees, as well as a slightly higher number of persons per household and a lower unemployment rate compared to most of the other parishes in the study area. Median household income for all the parishes excluding Orleans and St. Bernard are higher than the state median. Ascension, Plaquemines and St. Charles are the only parishes that have a higher median household income than the national median.

Table D-7 Median Household Income for Selected Louisiana Parishes - 2014

Geography	Median Household Income	% of State Median Household Income	% of National Median Household Income
Ascension	\$70,207	156%	131%
East Baton Rouge	\$48,535	108%	91%
Iberville	\$45,692	102%	85%
Jefferson	\$47,871	106%	90%
Orleans	\$36,964	82%	69%
Plaquemines	\$54,835	122%	103%
St. Bernard	\$44,706	99%	84%
St. Charles	\$57,785	128%	108%
St. James	\$53,259	118%	100%
St. John the Baptist	\$50,716	113%	95%
West Baton Rouge	\$49,202	109%	92%
Louisiana	\$44,991	-	84%
United States	\$53,482	119%	-

Source: Bureau of the Census, Small Area Income and Poverty Estimates Program

As shown in Table D-8, the unemployment rate ranges 5 percent (Ascension) to 8.3 percent (St. James). The average rate of 6.4 percent across the parishes is slightly higher than the rate of 6.3 percent for the state, and one full percent higher than the national rate of 5.3 percent. Louisiana was ranked 45th out of the 50 states in 2015.



Table D-8 Unemployment Rate for Selected Louisiana Parishes - 2015 Annual Average

Geography	Unemployment Rate
Ascension	5.0%
East Baton Rouge	6.8%
Iberville	7.1%
Jefferson	5.7%
Orleans	6.5%
Plaquemines	5.5%
St. Bernard	6.6%
St. Charles	5.7%
St. James	8.3%
St. John the Baptist	7.3%
West Baton Rouge	5.6%
Louisiana	6.3%
United States	5.30%

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics (LAUS)

Parish Data, <http://www.bls.gov/lau/laucnty15.xlsx>; State Data, <http://www.bls.gov/lau/lastrk15.htm>

D-2.1.5 Social Characteristics

This section describes social characteristics of the parishes in the study region. The social characteristics that are assessed in this section include race, age, education, income, poverty, and unemployment.

D-2.1.6 Race

As shown in Table D-9 and D-10, in 2014 the State and most of the parishes in the study region have similar percentage of total minority populations compared to the national level. However, both the State and the parishes have significantly higher percentages of the Black or African American persons, and significantly lower percentages of Asian and Hispanic or Latino persons. On average across the parishes there are 37 percent Black or African American compared to 32 percent at the State and 12 percent at the National level. Both the Orleans Parish and the St. John the Baptist Parish have majority Black or African American populations, at 59 percent and 54 percent respectively. For Asian populations, the average across the parishes is 1.7 percent compared 1.6 percent at the State and 4.9 percent at the national level. For Hispanic or Latino populations, the average across the parishes is 5.4 percent compared to 4.6 percent at the State and 16.9 percent at the National level.



Table D-9 Racial Composition (Number) of Selected Louisiana Parishes - 2014

Race	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque-mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
White	197,159,492	2,748,538	78,806	204,838	15,970	238,538	113,105	15,772	27,143	34,603	10,423	17,295	14,032
Black or African American	38,460,598	1,468,208	25,012	200,711	16,206	112,733	217,983	4,934	8,270	13,755	10,906	23,900	9,066
American Indian & Alaska Native	2,082,768	25,498	203	576	43	1,643	536	301	193	107	12	24	77
Asian	15,536,209	74,878	1,242	13,654	21	17,624	10,737	778	806	512	71	267	129
Native Hawaiian & Other Pacific Islander	493,155	1,604	-	103	-	154	105	-	-	11	-	99	-
Some other race	611,881	7,158	221	600	16	1,246	1,074	22	11	78	-	77	107
Two or more races	6,692,885	64,641	1,295	6,318	346	5,255	5,020	409	808	690	55	647	308
Hispanic or Latino	53,070,096	210,524	5,529	16,798	773	57,335	19,911	1,329	3,883	2,860	315	2,261	628
Total	314,107,084	4,601,049	112,308	443,598	33,375	434,528	368,471	23,545	41,114	52,616	21,782	44,570	24,347

Table D-10

Race	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaque-mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
White	62.8%	59.7%	70.2%	46.2%	47.9%	54.9%	30.7%	67.0%	66.0%	65.8%	47.9%	38.8%	57.6%
Black or African American	12.2%	31.9%	22.3%	45.2%	48.6%	25.9%	59.2%	21.0%	20.1%	26.1%	50.1%	53.6%	37.2%
American Indian and Alaska Native	0.7%	0.6%	0.2%	0.1%	0.1%	0.4%	0.1%	1.3%	0.5%	0.2%	0.1%	0.1%	0.3%
Asian	4.9%	1.6%	1.1%	3.1%	0.1%	4.1%	2.9%	3.3%	2.0%	1.0%	0.3%	0.6%	0.5%
Native Hawaiian and Other Pacific Islander	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%



Race	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson	Orleans	Plaquemines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
Some other race	0.2%	0.2%	0.2%	0.1%	0.0%	0.3%	0.3%	0.1%	0.0%	0.1%	0.0%	0.2%	0.4%
Two or more races	2.1%	1.4%	1.2%	1.4%	1.0%	1.2%	1.4%	1.7%	2.0%	1.3%	0.3%	1.5%	1.3%
Hispanic or Latino	16.9%	4.6%	4.9%	3.8%	2.3%	13.2%	5.4%	5.6%	9.4%	5.4%	1.4%	5.1%	2.6%

Source: Bureau of the Census, DPO5: ACS DEMOGRAPHIC AND HOUSING ESTIMATES; 2010-2014 American community survey 5-Year Estimate



D-2.1.7 Age Distribution

The age characteristics of the study area and the parishes are shown in Table D-11 and D-12. The average median age across all the parishes in the study region of 36.2 years is nearly identical to the State median of 36.3 years. These values are slightly lower than the National median of 37.7 years. The lower median age averaged across all the parishes and at the State level compared to the National number can be contributed to the greater percentage of persons under the age of 18.

Table D- 11 Age Characteristics (Number) of Selected Louisiana Parishes - 2014

Race	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson
Under 18	73,583,618	1,113,493	32,277	101,880	7,246	95,369
18-64	199,030,227	2,903,289	72,818	288,827	21,560	274,667
65 and above	46,243,211	632,894	11,934	55,335	4,521	65,680
Median Age	37.7	36.3	34.9	33.3	38.1	38.9
Total Population	318,857,056	4,649,676	117,029	446,042	33,327	435,716

Race	Orleans	Plaquemines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
Under 18	78,503	6,250	11,928	13,409	5,145	11,024	6,038
18-64	259,304	14,337	28,110	33,241	13,232	27,202	16,030
65 and above	46,513	2,860	4,371	6,095	3,261	5,519	3,017
Median Age	35.5	36.1	33.1	37.3	38.8	37.0	35.6
Total Population	384,320	23,447	44,409	52,745	21,638	43,745	25,085

Source: Bureau of the Census, PEPAGESEX: Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2014 - 2014 Population Estimates



Table D-12 Age Characteristics (Percent) of Selected Louisiana Parishes - 2014

Race	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson
Under 18	23.1%	23.9%	27.6%	22.8%	21.7%	21.9%
18-64	62.4%	62.5%	62.2%	64.8%	64.7%	63.0%
65 and above	14.5%	13.6%	10.2%	12.4%	13.6%	15.1%

Race	Orleans	Plaque-mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
Under 18	20.4%	26.7%	26.9%	25.4%	23.8%	25.2%	24.1%
18-64	67.5%	61.1%	63.3%	63.0%	61.1%	62.2%	63.9%
65 and above	12.1%	12.2%	9.8%	11.6%	15.1%	12.6%	12.0%

Source: Bureau of the Census, PEPAGESEX: Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2014 - 2014 Population Estimates

D-2.1.8 Income and Poverty

Income and poverty data for the eleven parishes, the State and the Nation in 2014 are summarized in Table D-13. On average across the parishes in the study region the median household income (\$50.9 thousand), per capita income (\$25.4 thousand) and poverty rate (18.1 percent) falls between the State and National statistics, with the trend for the Nation to posts higher income and a smaller percentage of persons in poverty. The Orleans Parish has the highest level of persons below the poverty level at nearly 28 percent and the lowest median household income at \$37 thousand, which could be contributed to the lower number of persons per household relative to the other parishes.

Table D-13 Income and Poverty Data for Selected Louisiana Parishes - 2014

Income and Poverty	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson
Persons per Household	2.63	2.6	2.83	2.57	2.62	2.57
Median Household Income	\$53,482	\$44,991	\$70,207	\$48,535	\$45,692	\$47,871
Per Capital Income	\$28,555	\$24,775	\$28,834	\$27,558	\$21,576	\$27,067
Persons Below Poverty Level	14.8%	19.8%	13.7%	18.4%	19.9%	15.8%



Income and Poverty	Orleans	Plaque-mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
Persons per Household	2.37	2.65	2.9	2.83	2.72	2.84	2.63
Median Household Income	\$36,964	\$54,835	\$44,706	\$57,785	\$53,259	\$50,716	\$49,202
Per Capital Income	\$27,255	\$26,672	\$21,079	\$26,623	\$24,757	\$22,785	\$25,296
Persons Below Poverty Level	27.9%	16%	17.9%	12.1%	16.1%	20.8%	20.5%

Source: Bureau of the Census, S1703 Selected Characteristics of People at Specified Levels of Poverty in the Past 12 months, 2010-2014 American Community Survey 5-Year Estimates

D-2.1.9 Education

The educational attainment levels for the eleven parishes, the State and the Nation in 2014 are presented in Table D-14. On average across the parishes in the study region, 83.7 percent of persons age 25 years and older had completed high school, while 20.5 percent had a bachelor's degree. These values are higher than State's high school graduate rate at 82.8 percent, but lower than the State's rate of 22.1 percent with a bachelor's degree. The National statistics for both high school and college graduates are greater than those at the State and parish level at 86.3 percent and 29.3 percent, respectively. The Iberville Parish had the lowest percentage of persons with either or high school or bachelor's degree, at 76.7 percent and 12.7 percent respectively. East Baton Rouge had the highest percentage of high school graduates at 88.8 percent and the Orleans Parish had the highest rate of college graduates at 34.4%.

Table D-14 Educational Attainment (Percent) for Persons 25 Years of Age or Older - 2014

Education	United States	Louisiana	Ascension	East Baton Rouge	Iberville	Jefferson
High School Graduate or Higher	86.3%	82.8%	88.7%	88.8%	76.7%	84%
Bachelor's Degree or Higher	29.3%	22.1%	25.8%	34.1%	12.7%	23.8%

Education	Orleans	Plaque-mines	St. Bernard	St. Charles	St. James	St. John the Baptist	West Baton Rouge
High School Graduate or Higher	84.8%	79.7%	81.9%	86.6%	83.8%	81%	84.3%
Bachelor's Degree or Higher	34.4%	15.4%	12.5%	20.1%	13.4%	15.2%	18%

Source: Bureau of the Census. 2010-2014 American Community Survey 5-Year Estimates



D-2.2 Facilities and Infrastructure

The following is a discussion of port facilities for the Port of New Orleans, Port of South Louisiana, Port of Baton Rouge, Port of St. Bernard, and Port of Plaquemines that includes, but is not limited to port facility location, facility capacity and facility berths. Description and discussion of port facilities are combined in some cases due to the volume of facilities, especially if the cargo handled is similar or other similarities warrants the ability to combine.

D-2.2.1 Port of New Orleans

The Port of New Orleans hosts both cruise and cargo terminals and facilities, an industrial park, and a number of other service providers. Located on Louisiana's Lower Mississippi River, the Port has connections to six Class One railroads and the interstate highway system. The main project depth of the Mississippi River is 47 feet while the Inner Harbor Navigation Canal has a depth of 30 ft. Primary inbound cargoes include steel, rubber, plywood, coffee, non-ferrous metals, and project cargo. Forest products, steel, foodstuff, chemicals, frozen poultry represent the primary outbound cargoes.

On top of the Port's cargo handling capacity, there is an industrial park of more than 1,000 acres under short and long-term leases that support a wide range of heavy and light industrial services as well as commercial services. Heavy and light industrial uses include: shipbuilding and repair; Truck and container depots; Steel distribution; Warehouse and distribution; Basic materials handling; Refrigerated warehousing; Truck and container depots; Cement handling; Manufacturing and Packaging.

Other services include: Bunkers/Fuel; Chandlery; Cold Storage; Crane Maintenance and Repair; Dry Dock; Environmental/Waste Services; Marine Equipment and Supplies; Oil Spill Response; Shipyard/Ship Repair; Towing & Tug Services; Warehousing - Bonded; SILO-CAF: bulk coffee storage & blending facility; bagging & drumming; container & chassis repair; heavy lift pilots; ship cleaning & fumigation; inland cruising.

D-2.2.1.1 Cruise Terminals

Julia Street Cruise Ship Terminal

Operated by the Port of New Orleans, Cruise & Tourism Division, this terminal located at river mile 95.3 has one berth that is 1,250 feet long and a project depth of 35 feet. There is an air-conditioned gangway, covered drive-in, drop-off and pick-up areas and a secured passenger parking lot. Additional features include a 23,000 square foot embarkation deck and 23,000 square feet of luggage laydown area.

Erato Street Cruise Terminal and Parking Garage



Operated by the Port of New Orleans, this terminal located at river mile 95.6 has one berth that is 1,250 feet long and a project depth of 30 feet. Special features include a 60,000 square foot embarkation deck a raised, passenger gangway and 28,000 square feet of luggage laydown area, a 1,000 vehicle-parking garage and an air-conditioned articulated passenger gangway.

D-2.2.1.2 Uptown River Cargo Terminals and Facilities

Henry Clay Avenue Wharf

Operated by New Orleans Cold Storage, this terminal located at river mile 101.1 has two berths of 1,441 feet in length and a project depth of 38 feet. Primary cargoes are refrigerated goods. Facilities include a 95,020 square foot refrigerated warehouse that includes a blast freezing system. Both highway and railroad services are available.

Nashville Avenue Wharf “A”

Operated by Ports America, this terminal located at river mile 100.8 has four berths that total 2,159 feet in length and a project depth of 35 feet. Primary cargoes include palletized, containerized and breakbulk. Facilities include a 756,000 square foot shed with close proximity to 2,673,924 square feet of open storage as well as a 62-foot apron. Both highway and railroad services are available.

Nashville Avenue Wharf “B”

Operated by Ports America, this terminal located at river mile 100.1 has three berths that total 1,785 feet in length and a project depth of 40 feet. Facilities include a 141,000 square foot shed with close proximity to 2,673,924 square feet of open storage and access to four multipurpose cranes with 40/70-ton capacity. There are also 50-foot gauge cranes and a 100-foot wide front apron. Both highway and railroad services are available.

Nashville Avenue Wharf “C”

Operated by Ports America, this terminal located at river mile 99.8 has three berths that total 1,658 feet in length and a project depth of 40 to 45 feet. Facilities include a 179,500 square foot shed with close proximity to 2,673,924 square feet of open storage as well as access to four multipurpose cranes with 40/70-ton capacity and a 100-foot wide front apron. Both highway and railroad services are available.

Napoleon Avenue Container Terminal Operators

Operated by Ports America, Inc. and New Orleans Terminal, LLC; this terminal located at river mile 99.5 has a berth with a length of 2,000 feet and a project depth of 45 feet. Primary cargoes



are containers. The terminal has six gantry cranes and a 640,000 annual TEU capacity and 1,000 psf live load. Both highway and railroad services are available.

Milan Street Wharf

Operated by New Orleans Terminal LLC, this wharf located at river mile 99.1 has two berths, one 772 feet in length and the other 1,263 feet in length with a project depth of 35 feet. Container freight is the primary cargo. Facilities and services include a 107,081 square feet of shed area, 232 foot wide front apron, 65,000 square feet of paved open area and 269,352 square feet of open wharf area. Both highway and railroad services are available.

Louisiana Avenue Wharf

Operated by Coastal Cargo Co., this wharf at river mile 98.3 has two berths with a total length of 1,590 feet and a project depth of 35 feet. Primary cargoes include palletized, containerized & breakbulk. Additional facilities include 178,360 square feet of covered area and 1,581,291 square feet of paved back-up area. Both highway and railroad services are available.

Harmony Street Wharf

Operated by Coastal Cargo Co., this wharf located at river mile 98.1 has two berths with a total length of 1,231 feet and a project depth of 35 feet. Steel is the primary cargo. Facilities include a 125,653 square foot shed a 49 foot wide front apron and 114,380 square feet of open area. Both highway and railroad services are available.

Seventh Street Wharf

Operated by Coastal Cargo Co., this wharf located at river mile 97.8 has two berths with a total length of 1,196 feet and a project depth of 35 feet. Primary cargoes include steel, palletized, and breakbulk. Facilities include 119,280 square foot shed a 50 foot wide front apron and 134,911 square feet of open area. Both highway and railroad services are available.

First Street Wharf

Operated by Empire Stevedoring, this wharf located at river mile 97.3 has two berths with a total length of 1,275 feet and a project depth of 35 feet. Primary cargoes include palletized, containerized and breakbulk. Facilities include 140,655 square foot shed a 50 foot wide front apron and 99,440 square feet of open area. Both highway and railroad services are available.

D-2.2.1.3 Downtown River Cargo Terminals and Facilities

Poland Avenue Wharf



This unassigned wharf located at river mile 93.1 has two berths with a total length of 932 feet and a project depth of 35 feet. Conventional and general containerized are the primary cargoes. Facilities include 84,328 square foot shed a 35 foot wide front apron and 96,257 square feet of open area. Both highway and railroad services are available.

Alabo Street Wharf

Operated by Seaonus, this wharf located at river mile 92.0 has two berths with a total length of 1,732 feet and a project depth of 38 feet. Conventional and breakbulk are the primary cargoes. Facilities include 126,178 square feet of covered storage, 81 foot wide front apron, 182,821 square feet of open area and 207,849 square feet of marshalling area. Both highway and railroad services are available.

Perry Street Wharf

This unassigned wharf located at river mile 95.9 has two berths with a total length of 1,009 feet and a project depth of 50 feet. Facilities include 160,000 square foot shed a 40 foot wide front apron and 33,368 square feet of open area. The wharf is currently being used as a Railroad services are available.

Governor Nicholls Street Wharf

Operated by TCI, this wharf located at river mile 94.6 has two berths with a total length of 1,210 feet and a project depth of 35 feet. Conventional and general containerized are the primary cargoes. Facilities include 156,617 square foot shed, 30 foot wide front apron and 37,694 square feet of open area. Both highway and railroad services are available.

D-2.2.1.4 Inner Harbor Cargo Terminals and Facilities

France Road Container Terminal

This unassigned wharf located at the industrial canal has one 830 foot berth and a project depth of 30 feet. Facilities include a 67,019 square foot shed, 2.6 million square feet of marshalling area and a 147 foot wide wharf. Both highway and railroad services are available.

Jourdan Road Terminal

Operated by New Orleans Cold Storage, this wharf located at the inner harbor has two berths with a total length of 1,400 feet and a project depth of 29 feet. Facilities and services include 160,000 square foot refrigerated warehouse with a 55 million pound capacity and a blast freezing system. Railroad



D-2.2.2 Port of Baton Rouge

The Port jurisdiction includes the parishes of Ascension, East Baton Rouge, Iberville and West Baton Rouge. It stretches 85 miles of the Mississippi River and hosts both deep-draft and shallow-draft terminals with access to both rail and highway infrastructure. Main project depth at the Port is 45 feet. Primary inbound cargoes include grain, petroleum, molasses, rail, steel coils, pipe, steel products, chemicals, and building and construction materials. Grain, molasses, chemicals, liquid bulk chemicals, coal, petroleum coke, petroleum products, pipe, sugar and containerized cargo encompass the primary outbound cargoes. The Port also provides a range of other services and warehouse facilities and hosts a number of large chemical companies like BAF, ExxonMobil and the Dow Chemical Company. The Port has Foreign Trade Zone services available.

D-2.2.2.1 Cargo Terminals and Facilities

The Port of Baton Rouge has two general cargo docks and a 5 berths that total 3,000 feet in length. The depth of the main project is 45 feet. Rail services are available at both of the cargo docks and there is a 525,000 square foot transit shed. Two cranes are available for use with up to 150 ton capacity. All of the cargo terminals and facilities are owned by the Port.

Inland Rivers Marine Terminal (IRMT)

This domestic barge terminal located on the Gulf Intracoastal Waterway has one berth of 250 feet in length and has a depth of 12 feet (similar to the Gulf Intracoastal Waterway). Primary cargoes include, short sea shipping containers, bulk products, agricultural products, bagged goods, steel coils, polypropylene and polyethylene pellets, newsprint, and project cargo. There is a 10-acre private container marshalling yard and a 4-acre public container marshaling terminal onsite. Rail service is available at this terminal. Value added services at IRMT include packaging by Katoen Natie and heavy lift and project cargo facilities operated by Mammoet.

Baton Rouge Barge Terminal

Two bulk terminals operate at this 985 foot long berth with a depth of 12 feet. Kinder Morgan operates one bulk terminal that services domestic, bulk products aggregate, coke and woodchip cargoes. Kanorado Corporation operates the other bulk terminal that supports coal handling. Rail service is available at this terminal.

Petroleum Fuel & Terminal

The Petroleum Fuel & Terminal Company operates this berth with a length of 864 feet and a project depth of 45 feet. Storage capacity for petroleum products can exceed 17 million gallons or 1,215,000 barrels. Rail services are available.



Public Grain Elevator

The Louis Dreyfus Commodities Port Allen Export Grain Elevator has an 800 foot long berth with a 4 foot project depth. Primary cargoes include soybeans, soft red wheat, oats, corn and other grain products. The facility supports storage for up to 9.5 million bushels and has the capacity to facilitate five to seven million tons on an annual basis. Rail services are available.

Export Biomass Facility

Baton Rouge Transit, LLC (subsidiary of Drax Biomass International, Inc.) operates this 80,000 ton storage and loading facility for the export of wood pellets. The ship loader can transport and load pellets at a rate of 1,200 MTPH, and travel on rail at a rate of 50 feet a minute. This allows the loading of Panamax vessels averaging 65,000 short tons capacity in 3 days. Rail and truck access is available.

Bulk Flour Mill

The flour mill is operated by Ardent Mills, Inc., and ships to domestic & international markets.

Mid-Stream Buoys

This dry bulk public terminal has one berth with a length of 990 feet and a project depth of 45 feet. It is located opposite of the Port's main cargo terminal. The pile anchor system at the midstream buoys support cargo-to-barge transfer all year at low and high water levels and can accommodate Panamax size vessels and allow for 1,000 feet of clearance between the buoys. There is an unlimited turning basin and barge fleet services are available.

Molasses Terminal

The molasses terminal has one berth with a length of 800 feet and a project depth of 45 feet. Westway Terminal Company operates this cargo terminal that supports liquid bulk, molasses, and high-fructose corn syrup, specialty chemicals including acids, caustics and glycol-based products. Storage capacity of this terminal exceeds 22 million gallons. Rail services are available.

Sugar Distribution & Warehouse Complex

Louisiana Sugar Cane Cooperative operates this 80,000 square foot warehouse that has an underground hopper system to convey to general cargo dock for loading.

D-2.2.3 Port of South Louisiana

The Port of South Louisiana is the largest tonnage port in the Western Hemisphere, handling over 250 million tons annually by vessel, barge, rail and truck across 54 miles of the Mississippi River.



The main project depth is 45 feet. Primary inbound cargoes include crude oil, chemicals, fertilizers, petrochemicals, steel products, concrete/stone products, ores/phosphate rock, wood/wood chips, coal/lignite/ coke and edible oils. Animal feed, wheat, soybeans, coal/lignite/coke, maize, milo, petrochemicals, rice, chemicals, fertilizers, edible oils and crude oil makeup the primary outbound cargoes.

D-2.2.3.1 Cargo Terminals and Facilities

Globalplex Intermodal Terminal (Port Terminal #8)

The Globalplex Intermodal Terminal has a project depth of 50 feet and is located at river mile 138. The Globalplex terminal has a 135,000 square feet general cargo dock, 25,000 square foot bulk handling dock and a 45,500 square foot finger pier that can support Panamax vessels. There is 300,000 square feet of covered storage facilities and 200 acres available for open storage. Rail services are accessible, and Foreign Trade Zone services are available.

ADM/GROWMARK/RESERVE (Port Terminal #1):

At river mile 139.2 there is a reserve grain elevator berth and a project depth of 50 feet. At river mile 150.5 there is the St. Elmo berth with a length of 984 feet. Rail services are accessible at both berths.

ADM/Growmark/Destrehan (Port Terminal #3)

At river mile 120.6 there is a berth with a length of 800 feet and a project depth of 40 feet. At river mile 144.9 is the Canadian National Kinder Morgan Marine Gramercy that hosts a barge dock berth with the length of 850 feet and a depth of 15 feet. Rail services are accessible at both berths.

ADM/Growmark/AMA

At river mile 117 there is a berth with a length of 585 feet and a project depth of 50 feet. Rail services are available.

Mosaic Chemical Co.

At river mile 160.3 there is one ship dock with a length of 625 feet and two barge docks each 300 feet in length. At mile 167 another berth with a length of 880 feet. At both locations project depth is 40 feet and rail services are available.

Arcelor Mittal

At river mile 132.5 there is a berth with a length of 300 feet with dolphin and a project depth of 40 feet. Rail services are available.



Bunge Corp.

At river mile 120 there is a berth of 470 feet and a project depth of 45 feet. Rail services are available.

Cargill Terre Haute

At river mile 139.4 there are two berths, one 735 feet in length and the other 892 feet in length. Project depth is 48 feet. Rail services are available.

Colonial Sugars Inc.

At river mile 147 there are two berths with a length of 363 feet. Project depth is 42 feet. Rail services are available.

Noranda Aluminum

At river mile 145.3 there are three berths, one with 150 feet in length, the second at 875 feet in length with dolphins and the third at 118 feet in length with plats. Project depth is 60 feet. Rail services are available.

Valero Asphat

At river mile 167.9 there is one berth with a length of 500 feet. Project depth is 30 feet.

St. James Stevedoring

At river mile 166 there are two berths with a total length of 1,800 feet midstream.

Weber Marine Inc.

Midstream operation at river mile 167 with accessible rail services.

ZEN/NOH Grain Corp.

At river mile 163.7 there is one berth with a length of 1,189 feet. Project depth is 50 feet. Rail service is available.

Occidental Chemical Corp. (Port Terminal #4)

At river mile 161.4 there is one berth with a length of 740 feet. Project depth is 40 feet. Rail service is available.

Occidental Chemical Corp. (Port Terminal #5)



At river mile 128.8 there is one berth with a length of 410 feet with dolphins. Project depth is 50 feet. Rail service is available.

Capline Terminal

At river mile 159.9 there are four berths. Two berths are 1,100 feet in length, another berth is 800 feet in length and there is one floating barge. Project depth is 40 feet.

American Styrenics: Berths

At river mile 166.5 there is one berth with a length of 200 feet for barges.

E.I. Dupont De Nemours

At river mile 135.7 there are two berths, one 825 feet in length and the other 400 feet in length. Project depth is 40 feet.

Ergon/St. James Inc.

At river mile 160.7 there are two berths with a length of 1,225 feet. Project depth is 40 feet. Berths: 2.

International Matex Tank Terminals

At river mile 118 there are 11 berths with lengths up to 900 feet. Project depth is 45 feet. Rail service is available.

NuStar

At river mile 159.8 there are three berths, two at 760 feet in length and another at 320 feet in length. Project depth is 35 feet.

Marathon Oil Co.

At river mile 140 there are 5 berths each at a length of 1,000 feet. Project depth is 45 feet. Rail service is available.

Monsanto Co.

At river mile 120 there are 3 berths with a length of 1,202. Project depth is 25/30 feet. Rail service is available.

Petroleum Fuel & Terminal Co.



At river mile 144.6 there are three berths. Two of the berths are 50 feet by 300 feet and the third berth is 940 feet for barges and ships. Project depth is 50 feet.

Motiva Enterprises:

At river mile 126 there are three berths, two at 750 feet in length and the third is 900 feet in length. Project depth is 45/90 feet. At river mile 168.1 there are two berths with a length of 1,710 feet. Project depth is 40 feet. Rail service is available at both locations.

Valero Refining

At river mile 125 there are two berths, one 423 feet in length and the other 480 feet in length. Project depth is 25 feet. Rail service is available.

DOW Chemical Co. — St. Charles Operations

At river mile 127.3 there is one berth with a length of 725 feet. Project depth is 30 feet. Rail service is available.

U.S. Department of Energy Strategic Petroleum Reserve:

At river mile 158.7 there are two berths each with a length of 940 feet. Project depth is 57 feet.

D-2.2.4 Port of St. Bernard

The Port of St. Bernard, a landlord port, provides a strategic location for expanding logistics and manufacturing operations. Located at the convergence of two major maritime corridors (the Mississippi River and the U.S. Gulf Intracoastal Waterway), the port is located on the east bank of the Mississippi River between mile markers 81.5 and 91.5, and includes a 216-acre marine terminal located in Arabi, Louisiana. Primary inbound cargoes include ferro alloys, fertilizers (potash), zinc concentrates, limenite sand, coke, fluorspar, bauxite, limestone, steel and plywood. Outbound cargoes include ferro alloys, fertilizers (potash), zinc concentrates, limenite sand, petroleum, coal, coke, fluorspar, bauxite and limestone.

D-2.2.4.1 Cargo Terminals and Facilities

The Port of Chalmette has two industrial terminals consisting three general cargo docks, marine mooring dolphins and two mid-stream mooring facilities. The depth of the slip is 36 feet and river mooring re 45+ feet.

The Arabi Terminal



The Arabi Terminal is a 40,000 sq. foot transit shed with 4 acres of hard surface laydown. A 40,000 sq. ft. dry bulk storage and transfer facility along with the installation of 2 state-of-the-art truck weigh scales, roadway and security enhancements were completed in 2007. There are two docks. Dock #1 has three berths, with a length of 1,300 feet and a minimum depth of 36 feet. Dock #2 has three berths, with a length of 1,500 feet and a minimum depth of 36 feet. Rail service is available. The Marine Terminal is protected by the Mississippi River Levee System and consists of hard surface laydown surface, dockside rail service and warehousing.

The Chalmette Terminal

The Chalmette Terminal is located one mile downriver from the Arabi Terminal (mile 89.5 AHP). Chalmette Terminal encompasses 216 acres of land with 300,000 square feet of building space, 100 acres of open land partially available for office space leasing. Recently, several buildings have been redesigned and rehabilitated for leasing to major clients. The site is fully equipped with all necessary utilities including electricity, gas, water, and sewerage. Almost any requirement for water and power can be met. High pressure natural gas crosses the site. Rail service is available.

Mooring Dolphins

Upriver from the Arabi Terminal Slip entrance. Capable of handling vessels up to 750 feet. Maintained depth is 44 plus feet alongside a steel and concrete in street platform.

Chalmette Mid-Stream Mooring Facility

The Chalmette Mid-Stream Mooring Facility is a deep draft buoy system at mile marker 89.5 on the Mississippi River. This facility handles bulk and breakbulk commodities.

Meraux Mid-Stream Mooring Facility

The Meraux Mid-Stream Mooring Facility is two deep draft buoy system at mile marker 86.5 on the Mississippi River. This facility handles bulk and breakbulk commodities.

Other Port Area Services

Other port area services include 60 acres undeveloped on the Mississippi River; 1,000 acres undeveloped on the Mississippi River Gulf Outlet (MRGO). Bunkers/Fuel; Truck Crane; Waste and Environmental Services; Oil Spill Response; Launch Bot Service; Towing/Tug Services; Bagging operation; Heavy-lift; dry bulk storage, 24/7 Security.

D-2.2.5 Port of Plaquemines



Located at the mouth of the Mississippi River, the Port of Plaquemines provides water access to 33 states – allowing businesses to benefit from barge, rail and interstate highway access across much of the United States. Plaquemines Port is positioned to serve the expanding global markets for oil & gas, grain, coal, chemicals and more. In addition, the port offers 14 major anchorages and thousands of acres of properties available for development of container ports, bulk & break bulk operations, docks and much more.

D-2.2.5.1 Cargo Terminals and Facilities

The Port of Plaquemines Chalmette has twenty public and private port terminals and facilities. Inbound cargo includes coke, carbon black feed stock, crude, fuel oil, IC 4, gasoline, heating oil, naphtha, natural gas, cobalt, petroleum products, and phosphate. Outbound cargo includes cola, grain-corn, soybean and wheat. The main channel depth is a 47 feet draft stretching from the Gulf of Mexico to mile 81.7 above the Head of Passes.

Bass Enterprises Production Co.

Private; Cargo Crude oil; Berths 2 - (1) Loading Dock, Point a la Hache; Length 200 ft.; Depth 25-30 ft.; (2)

Cox Bay

Length 500 ft.; Depth 12-15 ft.

Chevron Pipe Line Co. (Cal-Ky Div.)

Private; Cargo Landing for crew-boat, receipt of supplies such as diesel, lubricating oil & water for station consumption; Length 60 ft.; Depth 10 ft.; One 2-ton electric mast & boom derrick/20 ft.

Chevron Pipe Line Co. (Empire Barge Wharf)

Private; Cargo Crude Oil; Length 500 ft.; Depth 25 ft.; Two 6" swivel-jointed pipeline loading arms.

Chevron Oak Point

Cargo Crude and petroleum products; Berths 1; Length 250 ft.; Depth 40 ft.; Rail service; Product handled over wharf, organic chemical compounds used in the blending of lubricating oils for transportation & industrial related equipment; Loading/unloading facilities for tank cars, tank trucks, container trucks, drums; Product storage 8 to 10 million gallons. 44 ft. x 110 ft. structure



with 5-8 ft. marine loading arms. Handles barges from 180 ft. to 250 ft. long. Can handle 5 separate materials at one time.

Conoco, Inc.

Private; Cargo Oil and gas drilling & production materials and equipment; Slip #1 on Tiger Pass; Length 900 ft.; Depth 10-18 ft.; Highway and trucking access; 20 ft. by 40 ft. storage warehouse.

Freeport Sulphur Company

Vacant Cargo Sulphur; Berths 2; Length 600 ft.; Depth 40 ft.

Halliburton Services

Private; Cargo Drilling mud, chemicals, portable water; Length 400 ft. in Tiger Pass and 400 ft. inside slip; 40-ton crane alongside Halliburton-McDermott Slip side.

CHS, Inc.

Cargo Grain; Berths 1; Length 540 ft. to 982 ft.; Depth 50 ft.; Rail Service; Storage of 6.1 million bushels.

International Marine Terminal

Berths 2 for ships, 1 for gulf barge; Storage 750,000 sq. ft. open ground storage.

Marathon Oil Co.

Private; Cargo Coordination and supply point for off-shore drilling and production areas; Length 500 ft. along Canal #2; Depth 17-24 ft.; 15-ton hydraulic crane.

Marathon Petroleum Co. (Venice Terminal)

Private; Cargo Crude oil by tanker; Length 1,000 ft.; Depth 40 ft.; Three 12" swivel-jointed pipeline loading arms.

Shell Offshore, Inc.

Private; Cargo Oilfield supplies and equipment for offshore drilling and production operations; Length 1,000 ft.; Depth 9 ft.- 15 ft.; Heliport area of 3.97 acres with 5 landing pads, 8 helicopter capacity.

Stolthaven Braithwaite Terminal



Cargo Breakbulk; Truck Racks 6; Rail Racks 4, Docks Ships (2), Length 576 ft. Depth 40 ft. each; Barge (1), 300 ft. Depth 14 ft.; Storage Tanks 80; Capacity 1,626,000 barrels.

United Bulk Terminal

Cargo coal, phosphate; Berths 3;

Length 3,000 ft. of continuous dock; Depth 55-80 ft.; Annual throughput capacity of more than 25 million tons, first major terminal on the river, operating 24 hrs. per day, 7 days per week, 360 days per year; Fleetings available for 450 river barges. Full-service terminal for cargo transfer, ground storage, blending, sizing, crushing and sampling of coal and coke. Provides discharge of ocean vessels & transfer to river barges; and direct transfer for bulk commodities from barge to ships.

Texaco Pipeline Co. (Pilottown crew boat dock)

Private; Landing for crew, supplies & equipment; Length 80 ft.; Depth 8 ft.; Two 2-ton hand operated traveling hoists/15 ft. reach; one on wharf extending to building at rear, one on upper pier.

Phillips 66, Alliance Refinery

Cargo Petroleum products, crude, etc.; Berths 2; Length 1,205 ft.; Depth 40+ft.; Rail Service; Berth from 280 ft. to 1,205 ft. Can accommodate one tanker and one L.P.G.; 51 storage tanks with total capacity of 6.8 million barrels; 11 pressure spheres with total capacity of 400,000 barrels.

Rescue/Patrol/Fire Boats

M/V AUTHORITY I located Mile 75.6

RDB: M/V AUTHORITY II is located at Mile 10.5 RDB. M/V AUTHORITY III is located at Mile 75.6. Communications: VHF Channels 12, 16, 22, 67; all other port services provided by private industry.

Anchorage

12 Mile: 79.0-80.8 RDB; Augusta: 72.0-71.4 RDB; Wills Point: 67.5-66.4 LDB; Davant: 54.5-53.5 LDB; Port Sulphur: 39.7-37.5 LDB; Boothville: 18.4-12.2 RDB; Belle Chasse: 75.2-73.1 RDB; Cedar Grove 71.2-70.6 RDB; Alliance: 65.8-63.2 RDB; Magnolia: 47.5-45.8 RDB; Ostrica: 24.4-23.5 RDB; Pilottown: 6.7-1.5 RDB.

Coal Facilities Dockside (Midstream)



72.7 RDB; Fleeting Area 73.0-71.5 RDB; International Marine Terminal (Landside) 57.0 RDB; International Marine Terminal (Fleeting Area) 58.0-56.0 RDB; United Bulk Terminal (Landside) 55.2 LDB; Electro-Coal Transfer (Fleeting Area) 56.0-55.2 LDB; 55.0-52.5 LDB.

D-2.3 Historical Commerce

The Port of Plaquemines, the Port of New Orleans, the Port of South LA, and the Port of Baton Rouge are all in the top 15 ranking of 2014 annual tonnage for U.S. ports. Based on WCSC data, these 4 ports handled a total of 464.2 million tons⁹ of commerce in 2014, including 209.5 million tons of foreign commerce and 254.7 million tons of domestic commerce. Except for slight bumps in 2008, 2009, and 2013, total tonnage has trended upward from 374.6 million tons in 2005 to 464.2 million tons in 2014 (Figure D-6). Figures D-7 through D-10 show historic total tonnage individually for the ports of Plaquemines, New Orleans, South LA, and Baton Rouge.

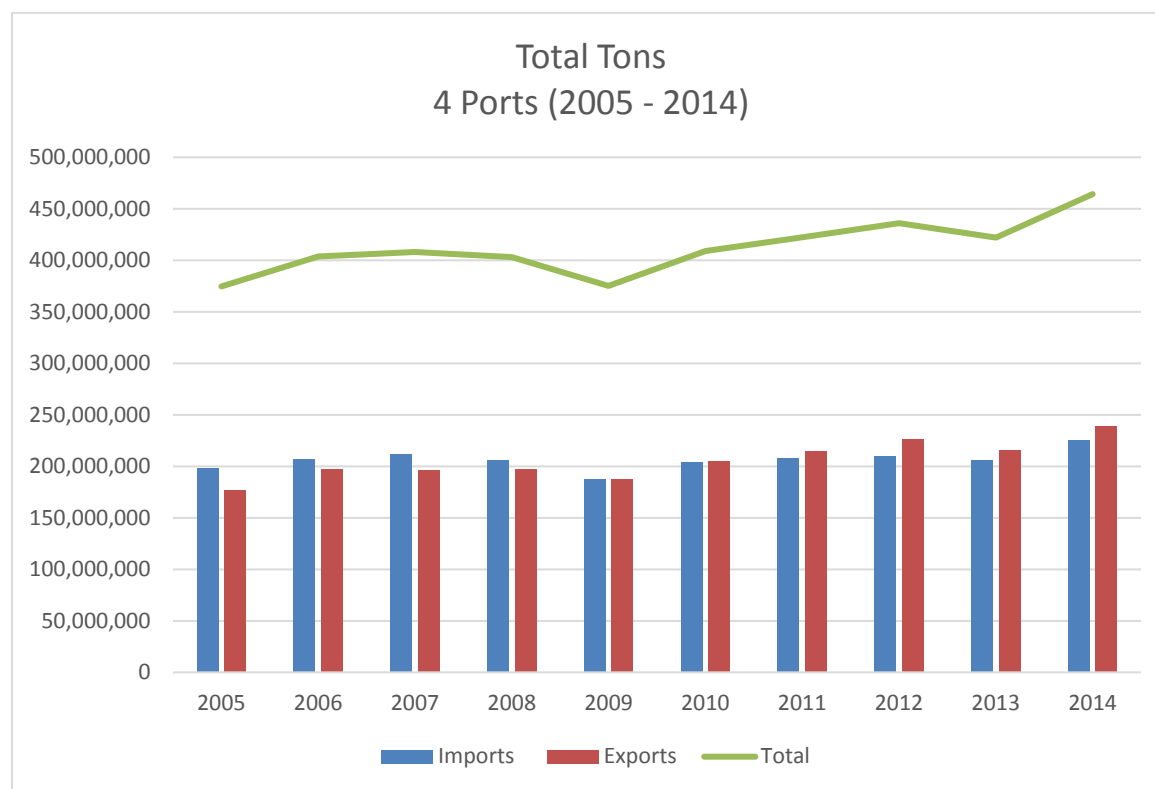


Figure D-6 Total Tons 4 Ports

Source: WCSC

⁹ All references to commodity shipments in “tons” refer to “short tons” of 2,000 pounds.

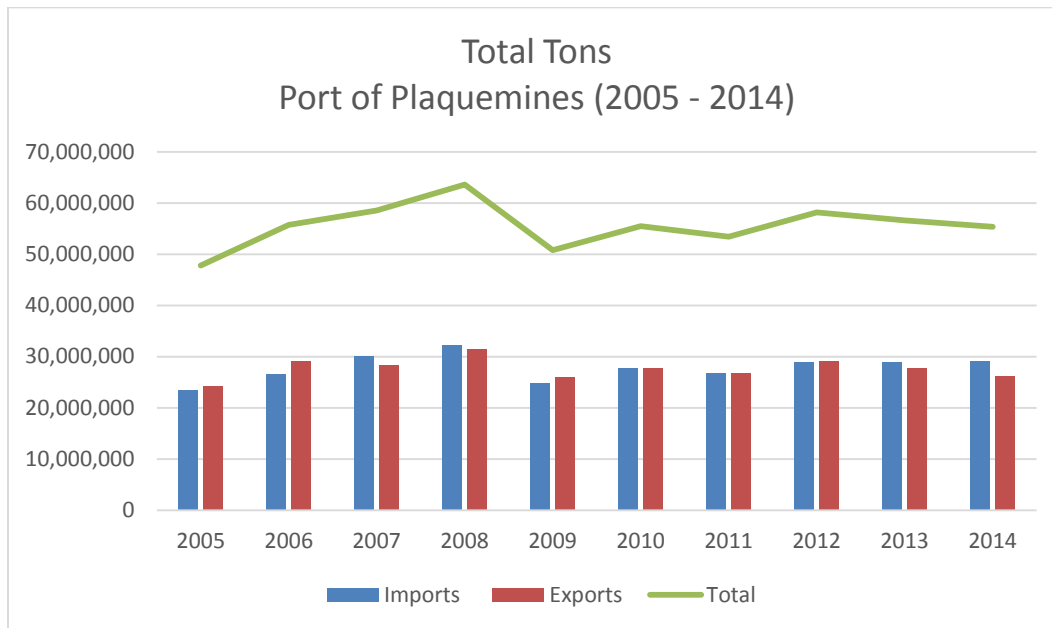


Figure D-7 Total Tons Plaquemines

Source: WCSC

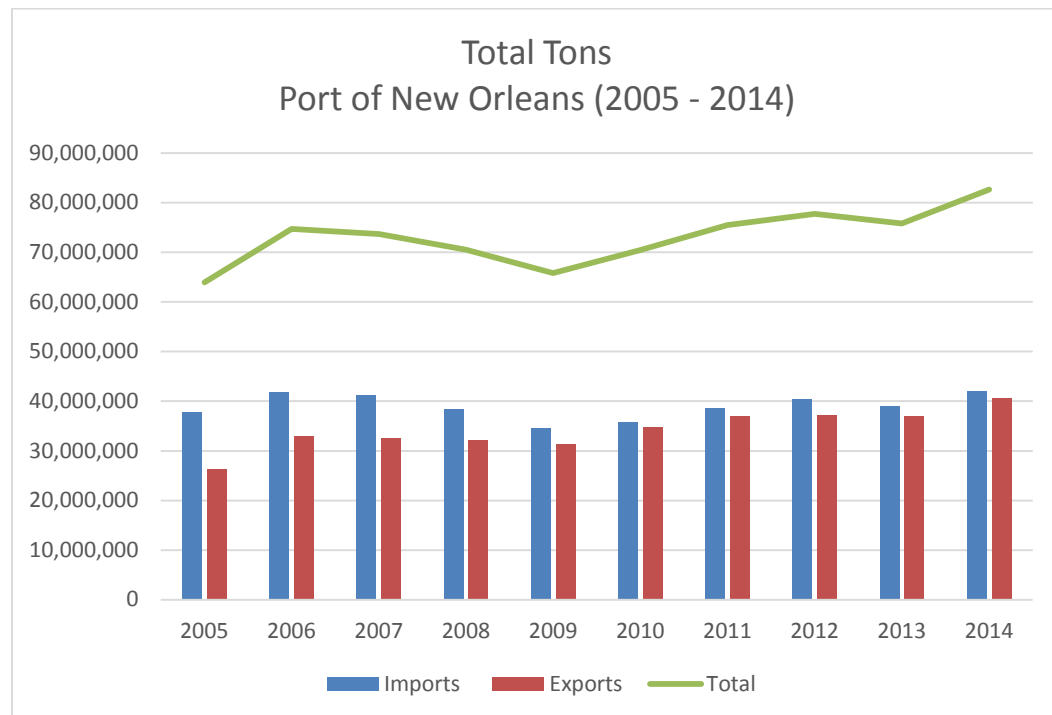


Figure D-8 Total Tons Plaquemines

Source: WCSC

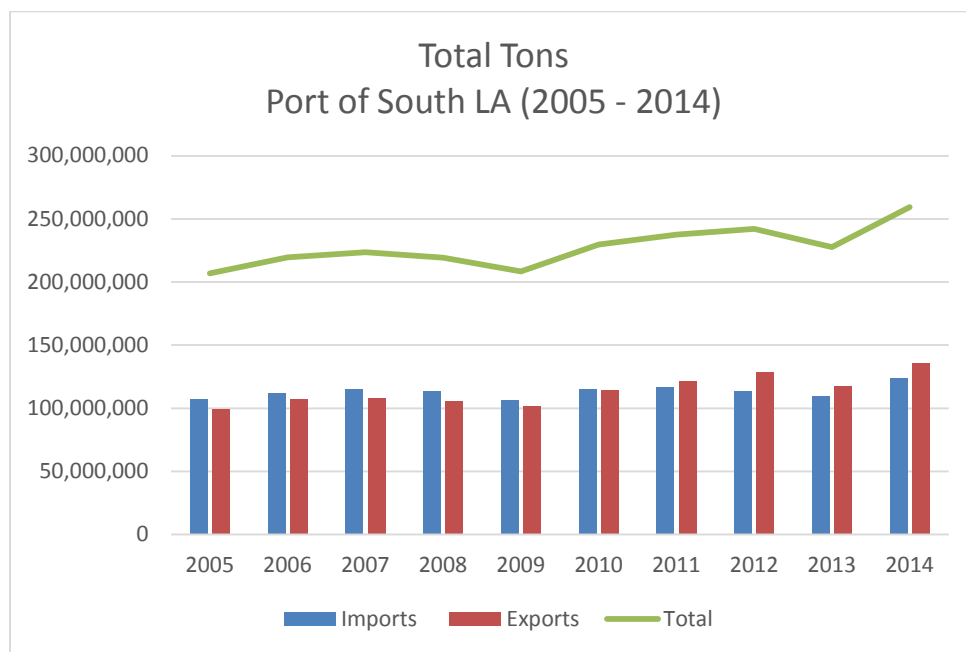


Figure D-9 Total Tons South LA

Source: WCSC

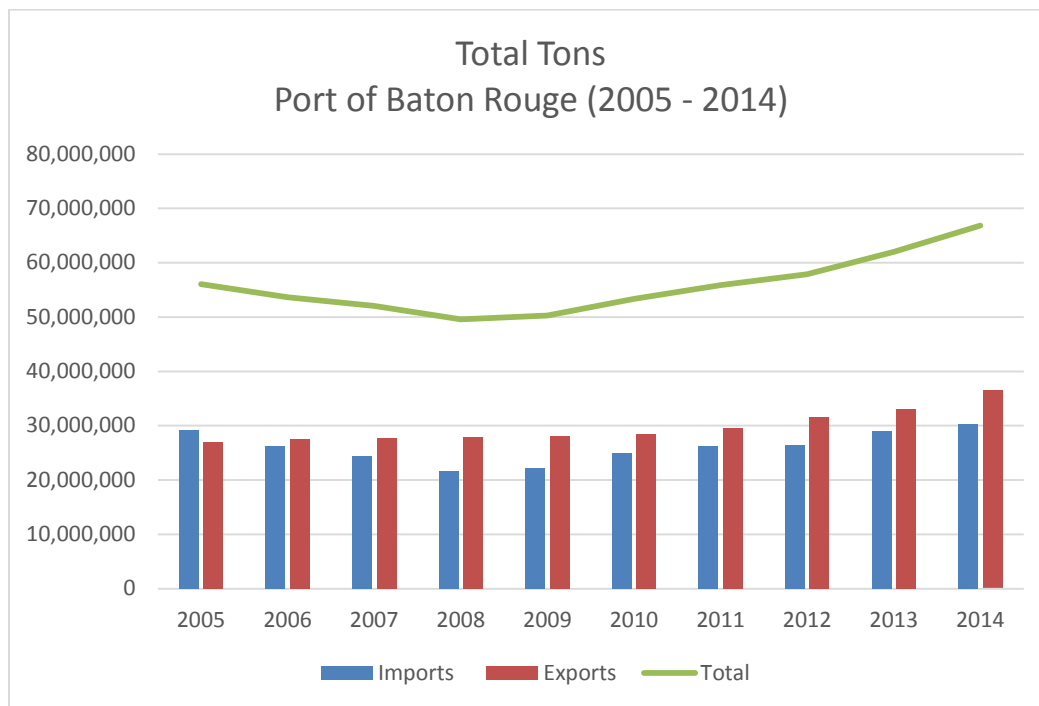


Figure D-10 Total Tons Baton Rouge

Source: WCSC

As mentioned previously, food and farm products and petroleum and petroleum products dominate the commodity mix in terms of total tonnage passing through the 4 ports. A total of 1.38 billion



tons of food and farm products moved through the ports from 2005 – 2014 followed by 1.37 billion tons of petroleum and petroleum products. The next highest commodity group is chemicals and related products at 455 million tons; manufactured equipment and machinery round out the bottom at 11 million tons. For the most part, commodities seem to be trending upward or holding steady except for coal which began to decrease rather sharply in 2012, likely due to the significant transformation from coal to natural gas and renewables for electricity generation in the US (Figure D-11).

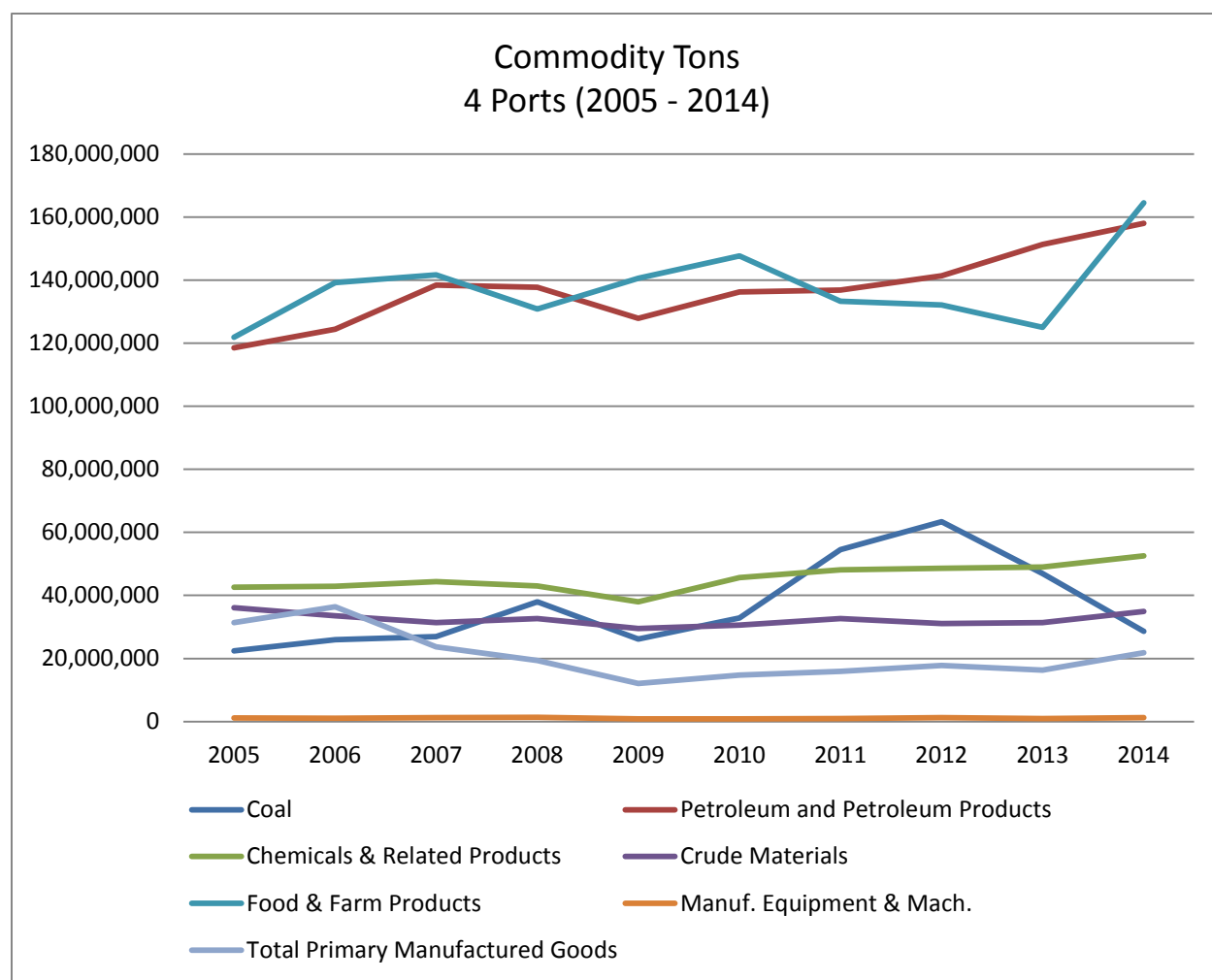


Figure D-11 Commodity Tons 4 Ports

Source: WCSC

In terms of commodity distribution, food and farm products make up the highest percentage at 34%; petroleum and petroleum products are just slightly less at 33% (closely resembling the commodity percentages moved from Minneapolis, MN, to Mouth of Passes as shown in Table 1). The remaining commodity group breakouts are chemical and related products at 11%, coal at 9%,



crude materials at 8%, primary manufactured goods at 5%, and manufactured equipment and machinery at <1% (Figure D-12).

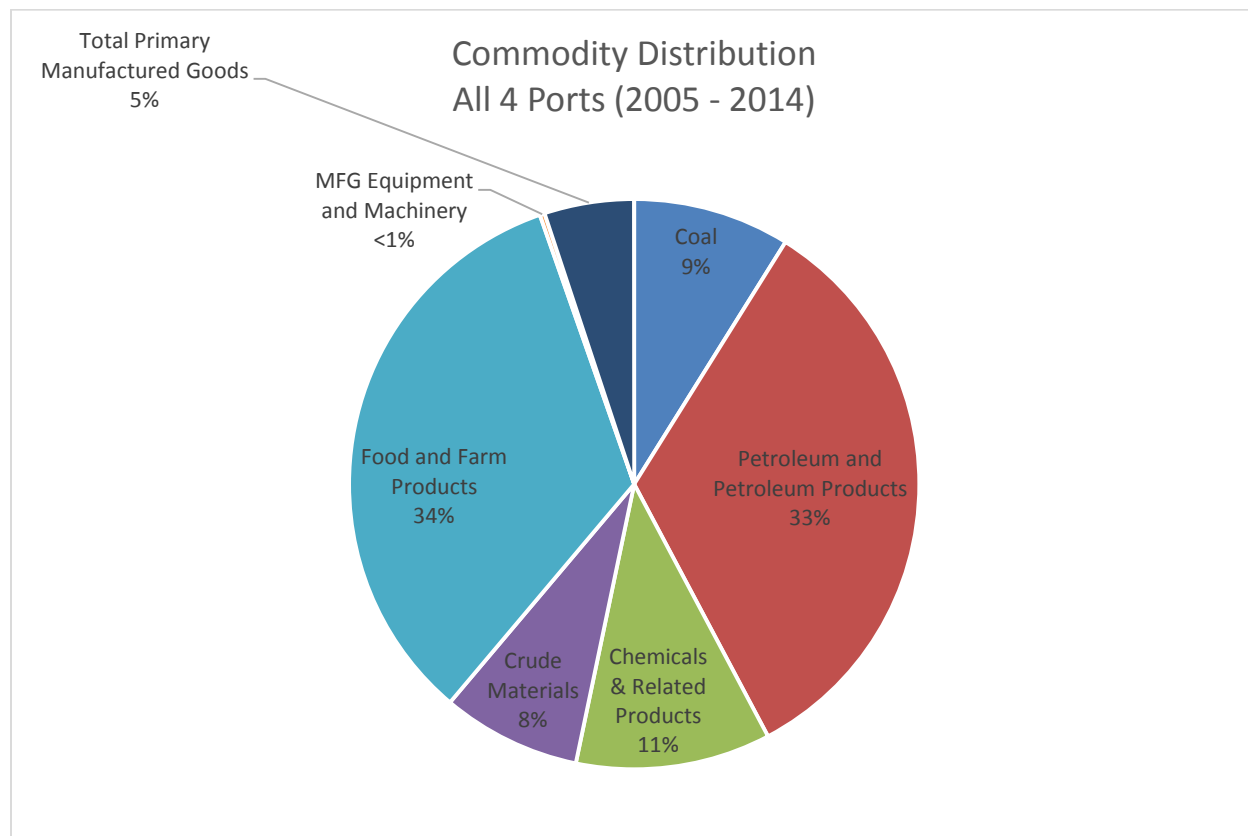


Figure D-12 Commodity Distribution 4 Ports

Source: WCSC

Foreign tonnage has consistently lagged behind domestic tonnage for the past 10 years for both the ports of Plaquemines and Baton Rouge. Over this time period foreign tonnage for Plaquemines has comprised an average of 38% of the total tonnage with food and farm products being the largest. Baton Rouge foreign tonnage has also constituted an average of 38% of the port's total tonnage with petroleum and petroleum products being the most numerous commodity. For the Port of New Orleans, the percent of foreign tonnage during this 10-year time period has averaged 49%, or nearly half of all port tonnage. In the years 2005, 2006, 2007, 2008, and 2011, foreign tonnage actually surpassed domestic tonnage at an average of 51% of total tonnage. Food and farm products followed closely by petroleum and petroleum products is the dominant foreign commodity. Foreign tonnage at the Port of South LA likewise makes up nearly half of all port tonnage over this time period at, namely, 49%. In the years 2008, 2010, and 2011, however, foreign tonnage surpassed domestic tonnage by nearly 1%. Food and farm products topped all foreign commodities for the port of South LA. Overall, foreign tonnage comprises about 46% of all tonnage passing through the 4 ports when taking an average of the years 2005 – 2014 (Figure



D-13). Fueled largely by the high volume of the Port of South LA, food and farm products and petroleum and petroleum products have consistently been the drivers of most foreign commodity movements for the 4 ports.

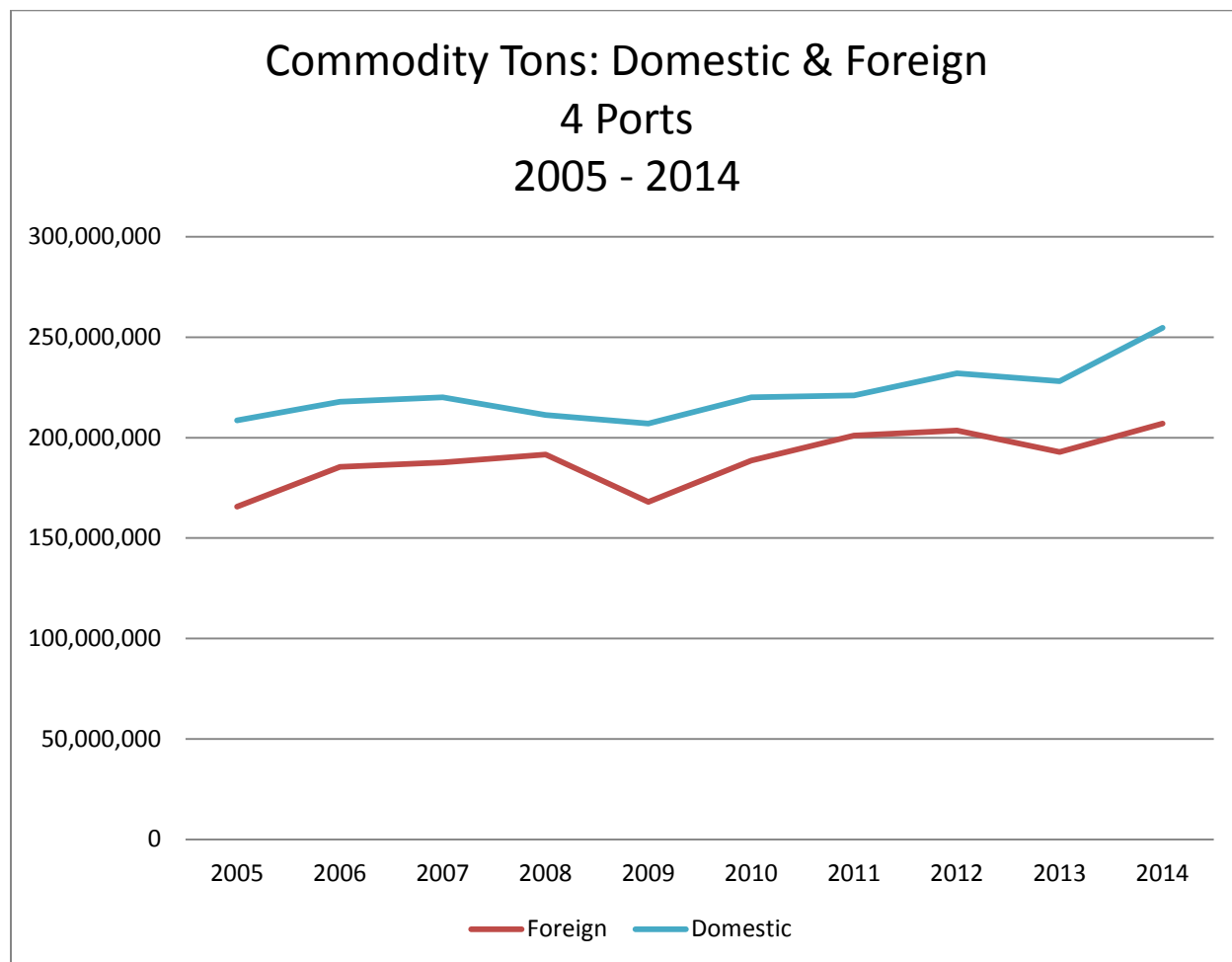


Figure D-13 Commodity Tons: Domestic & Foreign 4 Ports

Source: WCSC

Cargo information is used to provide the basis for commodity flows and projections. This study tried to identify (through both interviews with the ports and historic data) which commodities would benefit from a deepening of the channel. For the Port of Plaquemines, these commodities were determined to be foreign exports of coal, food and farm products, and petroleum and petroleum products; together they accounted for 29% of all Plaquemines port tonnage from 2005 – 2014. For the Port of New Orleans, foreign movements of food and farm products (both exports and imports), petroleum and petroleum products (both exports and imports), chemicals (both exports and imports), crude materials (exports), and primary manufactured goods (imports) were broken out; together they accounted for 41% of all New Orleans port tonnage from 2005 – 2014. The benefiting commodities for the Port of South LA were determined to be foreign movements



of coal (exports), food and farm products (exports), petroleum and petroleum products (both exports and imports), chemicals (both exports and imports), crude materials (imports), and primary manufactured goods (imports); together they accounted for 48% of all South LA port tonnage from 2005 – 2014. Finally, the commodities for the port of Baton Rouge believed to benefit the most from a deepening of the channel are foreign movements of food and farm products (exports), petroleum and petroleum products (both exports and imports), chemicals (both exports and imports), coal (exports), crude materials (imports), and primary manufactured goods (imports); together they accounted for 34% of all Baton Rouge port tonnage from 2005 – 2014. Table D-15 identifies these commodities by port.

Table D-15 Foreign Commodities Benefitting from a Deeper Channel

	Plaquemines		New Orleans		South LA		Baton Rouge	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Coal	X				X		X	
Food Products	X		X	X	X		X	
Petroleum Products	X		X	X	X	X	X	X
Chemicals			X	X	X	X	X	X
Crude Materials			X			X		X
Primary MFG Goods				X		X		X

D-2.4 Fleet Characteristics

Data for fleet characteristics was obtained from the Waterborne Commerce Statistics Center, Crescent River Port Pilots' Association and Associated Branch Pilots. A variety of different vessel types called on the Ports of the Mississippi River including tankers, containerships, bulk carriers and general cargo vessels. Based on data contained in the Waterborne Commerce of the United States, there were approximately 10,900 foreign vessel transits on the Lower Mississippi River between Port of Plaquemines and Baton Rouge in 2014. This is a 3% increase in the number of transits from 2010. Of the 2014 total, 8% of transits were vessels with draft of 20 feet or less, 39% of transits drafted 21-29 feet, 45% of transits drafted 30-40 feet and 8% of vessel transits drafted 41-48 feet.

Figure D-14 shows the distribution of vessel types calling the Lower Mississippi River Ship channel. The distribution of vessel transits by sailing draft for the period of 2010-2014 is presented in Figure D-15. There was a total of 10,843 vessel transits drafting greater than 14 feet in 2014. The total number of transits from vessels drafting greater than 14 feet has varied over the period 2010 to 2014 from a high of 10,922 transits in 2012 to a low of 10,353 transits in 2010. In 2014, there were a total of 381 vessel transits that drafted 45 feet or more, a 5% increase from 2010. The data suggests vessels fully utilize the existing channel depth on the Lower Mississippi River.

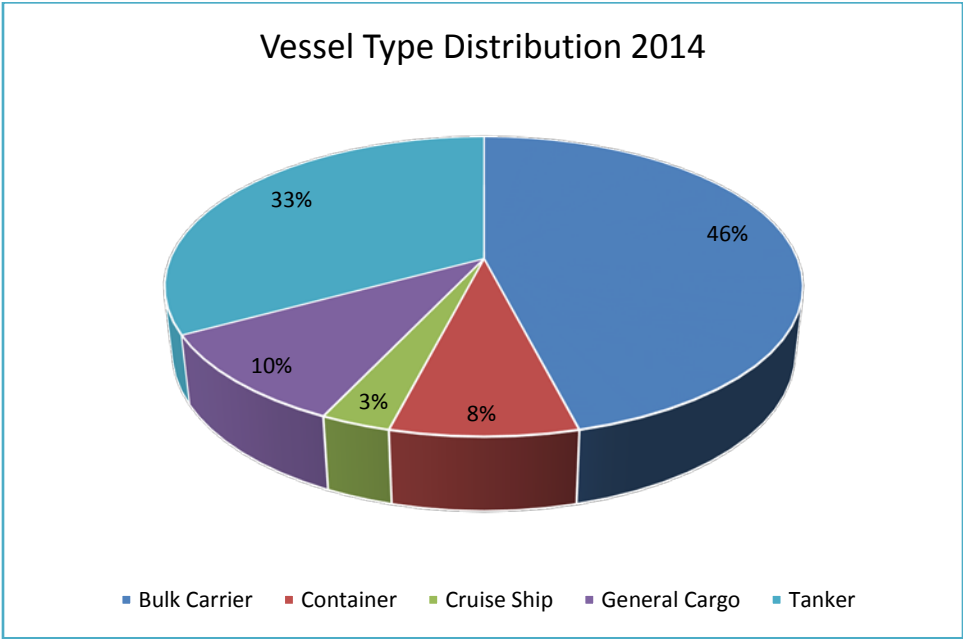


Figure D-14 Vessel Type Distribution

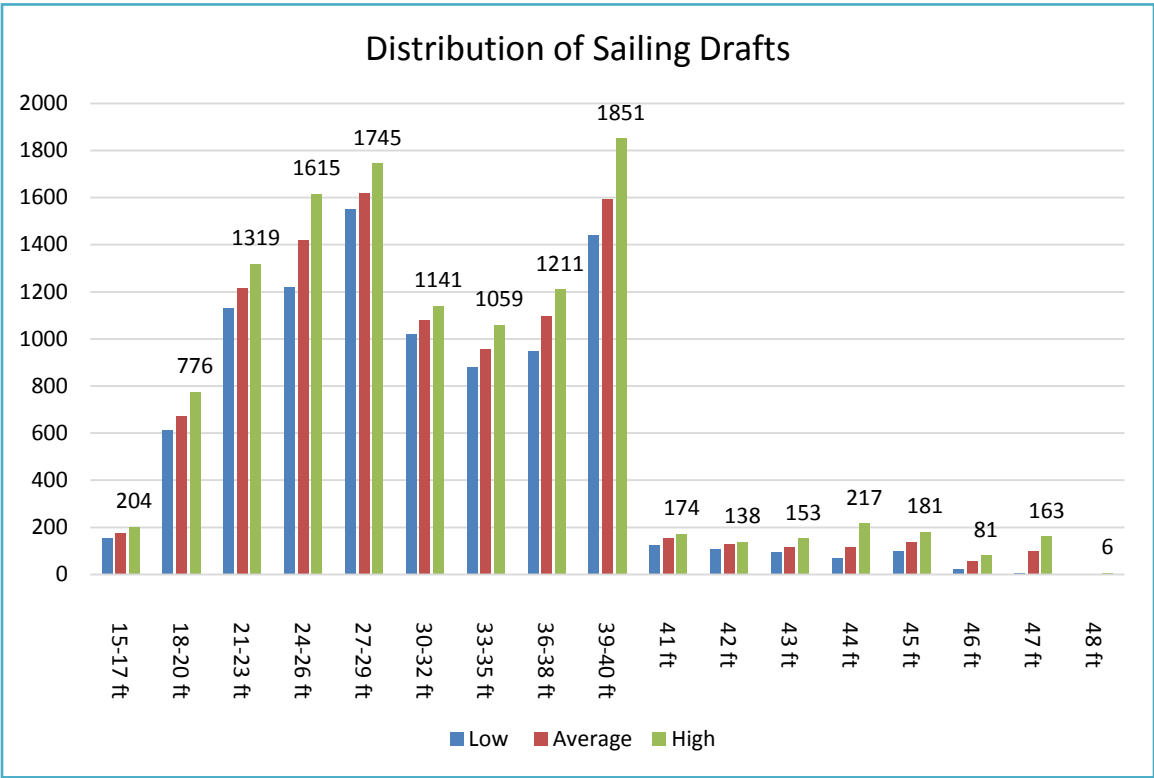


Figure D-15 Distribution of Sailing Drafts

An analysis of the existing fleet data for vessels calling the Ports on the Lower Mississippi River revealed five typical vessel types: (1) containerships, (2) bulk carriers, (3) general cargo, (4)



tankers, and (5) cruise ships. Based on the existing fleet, the vessel classes were further categorized into representative sub-classes based on vessel size as measured by deadweight tonnage (DWT). Table D-16 shows the breakdown of the sub classes. Vessel classes that have a broad range of DWTs did not have many foreign vessel calls relative to other categories.

Table D-16

Vessel Type	Description	DWT	
		Min	Max
Bulk Carrier	Handysize	5,000	35,000
	Handymax	35,001	60,000
	Panamax	60,001	80,000
	Capesize	80,001	200,000
Products Tanker	Medium	34,000	60,000
	Panamax	60,001	80,000
	Aframax	80,001	120,000
	Suezmax	120,001	200,000
Chemical Tanker	Tanker	4,500	50,000
Containership	Subpanamax	8,000	42,000
	Panamax	42,001	60,000
	Post Panamax Generation 1	60,001	90,000
	Post Panamax Generation 2	90,001	110,000
General Cargo	General Cargo	3,000	55,000
LPG Tanker	LPG Tanker	2,000	45,000
Cruise	Cruise	6,000	12,000

Bulk Carriers made up 46% of the deep draft vessel calls on the lower Mississippi River in 2014. According to the Pilot logs, the largest cargo vessel to call the channel is a bulk carrier of 168,968 deadweight tons (DWT), tankers were the next largest category. Figure D-15 shows the distribution of sailing drafts for years 2010 through 2014. The numbers shown above the bars is the number of transits that was the highest for the draft range for a given year in the five year period. The distribution shows minimum, average and maximum number of transits taken from the five year period.

D-2.5 Shipping Operations



The measure of underkeel clearance (UKC) for economic studies is applied according to planning guidance. According to this guidance, UKC is evaluated based on actual operator and pilot practice within a harbor and subject to present conditions, with adjustment as appropriate or practical for with-project conditions. Generally, practices for UKC are determined through review of written pilotage rules and guidelines, interviews with pilots and vessel operators and analysis of actual past and present practices based on relevant data for vessel movements. Typically, UKC is measured relative to immersed vessel draft in the static condition. Evaluation of when the vessel is moved or initiates transit relative to immersed draft, tide state and commensurate water depth allows reasonable evaluation of clearance throughout the time of vessel transit.

The Pilots indicated that there are no hard and fast rules for UKC. The data shows the bulkers are using the authorized depth and tankers typically have a rule of 10% of draft of two to three feet. The Pilots make the necessary arrangements for meeting, passing and overtaking vessels.

D-2.6 Trade Routes

Trade routes were divided into 13 groups according to historic traffic patterns (Figure D-16). Because some countries may be assigned to more than 1 route group due to their bordering more than 1 body of water, it was necessary to identify all the relevant foreign ports for each country. Data from WCSC for the year 2013 was used to identify foreign ports of origin and destination for each vessel trip that took place within the 4 Louisiana ports.

Figure D-16 Trade Routes

- Australia-New Zealand
- Caribbean-South America (North)
- Central America (West Coast)
- Far East
- Mediterranean-North Africa
- Middle East
- North America East Coast
- North America West Coast
- North Atlantic-Europe-Baltic States
- South America (East)
- South America (West)
- US Gulf of Mexico
- West Africa

Once these foreign ports were identified, the website <http://www.sea-distances.org/> was used to calculate the distance between the foreign port and the 4 Louisiana ports (for simplification purposes, New Orleans was used to represent all 4 Louisiana ports) in nautical miles. An average was then taken to represent the most likely distance a vessel would travel along each trade route; minimum and maximum distances were also calculated. This data would be used to develop vessel call lists for each port for without-project and with-project conditions.



Although there is no specific tracking of how much tonnage comes through the Panama Canal en route to/from the 4 ports, it is possible to study WCSC data and estimate this tonnage by looking at which vessels likely used which trade routes. In 2013 it is estimated that between 36 – 54 million foreign tons passed through the Panama Canal when traveling to or from the 4 ports. Of this amount, it is estimated that between 3 – 5 million tons were transported on vessels drafting 45 feet or more. This translates to about 9% of all foreign tons passing thru the Panama Canal on their way to or from the 4 ports. Finally, these 3 – 5 million tons roughly account for 2% of all foreign tons and almost 1% of all domestic and foreign tons handled by the 4 ports of Plaquemines, New Orleans, South LA, and Baton Rouge.

D-3.0 FUTURE CONDITIONS

D-3.1 Commodity Forecasts

An essential step when evaluating navigation improvements is to analyze the types and volumes of cargo moving through the ports. Trends in cargo history can offer insights into a port's long-term trade forecasts and thus the estimated cargo volume upon which future vessel calls are based. Under future without and future with project conditions, the same volume of cargo is assumed to move through the Port of Plaquemines, the Port of New Orleans, the Port of South LA, and the Port of Baton Rouge. However, a deepening project will allow shippers to load their vessels more efficiently or take advantage of larger vessels. This efficiency translates to transportation cost savings and is the main driver of NED benefits.

To minimize the impact of potential anomalies in trade volumes on long-term forecast, 5 years of data were employed to establish the baseline for the commodity forecast. Historic data from 2009 to 2013 (2013 was the latest year available from WCSC when the forecasts were developed) were used to develop a baseline, allowing the forecast to capture both economic prosperity and downturn which occurred over that timeframe.

The difficulty in determining commodity forecasts for a study such as this lies in the 50-year period of analysis that is required by USACE regulations. There are very few industry forecasts that project more than 10 or 20 years. With a study base year of 2025, the task becomes even more difficult. The *Annual Energy Outlook 2015 (AEO2015)*, prepared by the U.S. Energy Information Administration (EIA), is the source of information used to project growth for the commodities of coal, petroleum and petroleum products, and chemicals. Its forecasts extend to the year 2040. Because long-term projections are uncertain at best and because there is risk in extending forecasts beyond their intended scope, the growth rates for this study are kept constant until year 2050 (25 years after the base year), after which no growth is assumed until the end of the study's scope in 2075. *USDA Agricultural Projections to 2025* by the United States Department of Agriculture and *Fertilizer Outlook 2015-2019* by the International Fertilizer Industry Association (IFA) were likewise used to make commodity projections for food and farm products and chemicals,



respectively. Finally, the study *A Container Trade Forecast for the Port of New Orleans 2015 – 2065* by R.K. Johns & Associates (July 22, 2015) was used for the purpose of projecting crude materials and primary manufactured goods. Despite its title emphasizing container trade, the report also makes projections for breakbulk and other cargo. Annual growth rates from the base year are shown in Table D-17; tonnage projections for the 4 major ports are shown in Figures D-17 through D-23.

Table D-17 Growth Rate (annual)

	Baton Rouge		South LA		New Orleans		Plaquemines	
	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
Food & Farm ¹	0.5%	-	1.0%	-	1.1%	-0.4%	1.3%	-
Petroleum ²	0.3%	0.4%	0.8%	0.4%	0.6%	0.3%	0.7%	-
Chemicals ²	1.1%	0.9%	1.0%	1.4%	0.9%	1.4% ³	-	-
Coal ²	0.7%	-	0.7%	-	-	-	0.7%	-
Crude Materials ⁴	-	2.5%	-	2.5%	0.0%	-	-	-
Primary MFG Goods ⁴	-	5.0%	-	5.0%	-	5.0%	-	-

Note: Growth rates for the same commodity category can vary by port due to the varying compositional makeup of those commodities within each port. No growth rates are shown for Plaquemines Imports because these commodities were determined not to be significantly impacted by a deeper channel.

¹ Source is USDA Agricultural Projections to 2025 Feb 2016.

² Source is Annual Energy Outlook 2015 with Projections to 2040.

³ Source is International Fertilizer Industry Association's (IFA) Fertilizer Outlook 2015-2019.

⁴ Source is "A Container Trade Forecast for the Port of New Orleans 2015 - 2065" by R. K. Johns & Associates Inc., 2015 final report

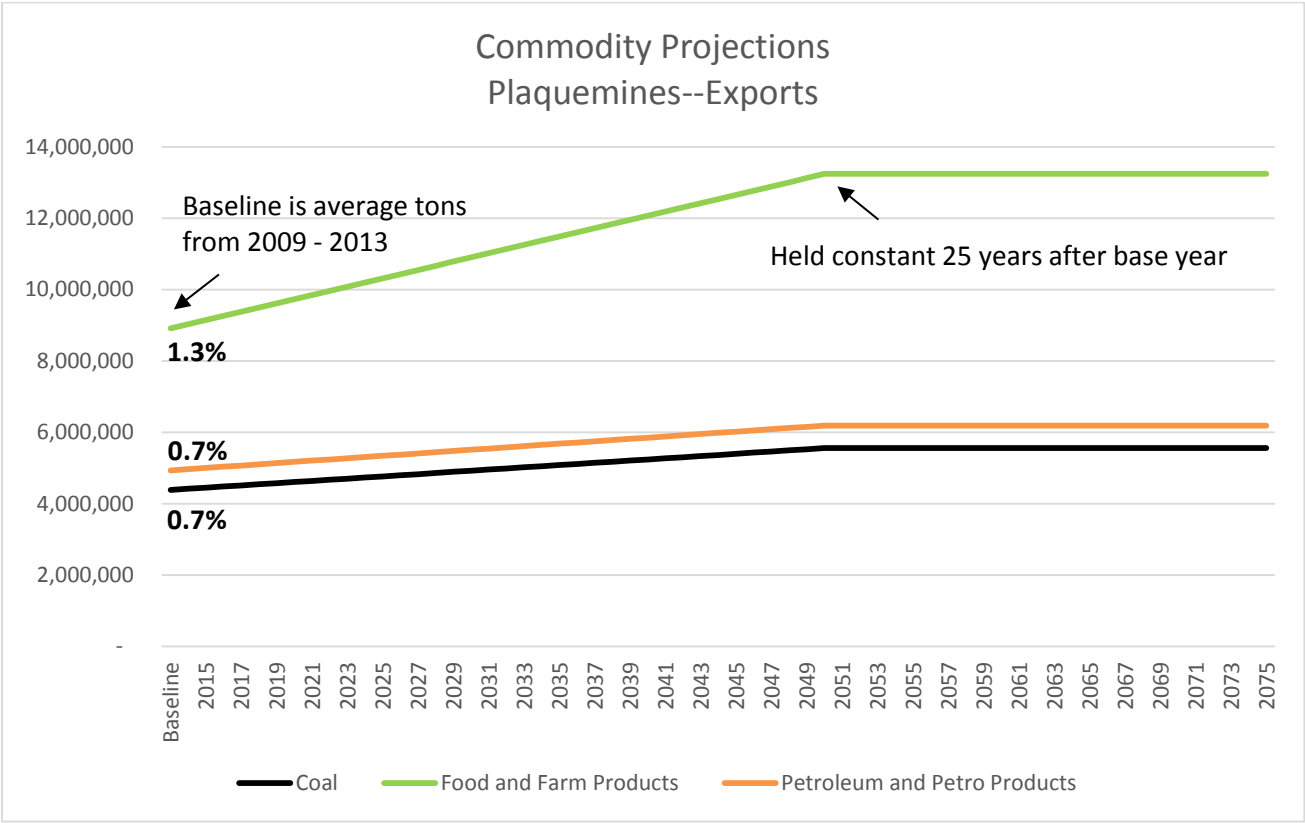


Figure D-17 Commodity Projections Plaquemines

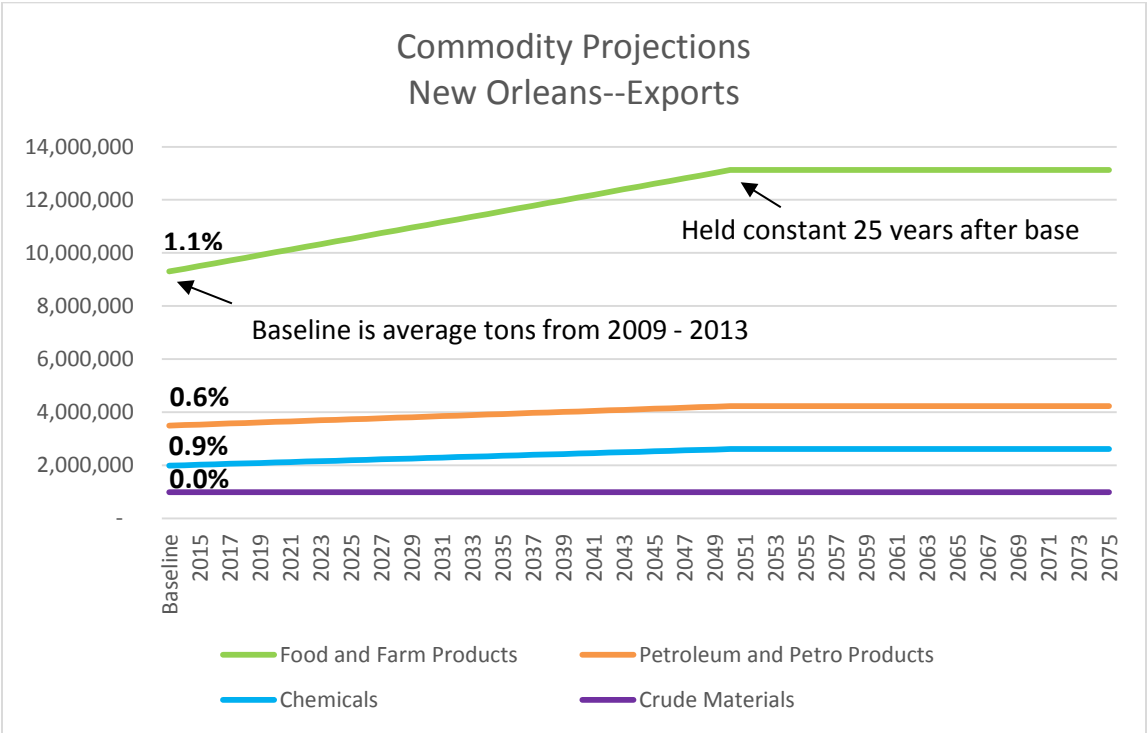


Figure D-18 Commodity Projections New Orleans Exports

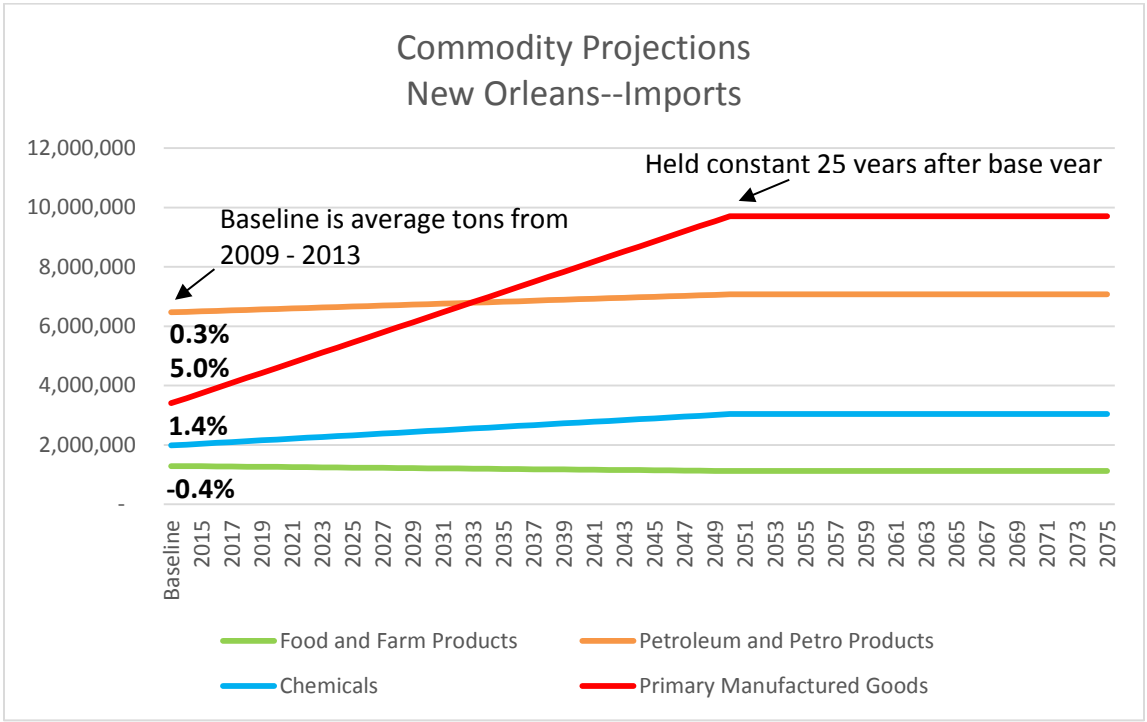


Figure D-19 Commodity Projections New Orleans Imports

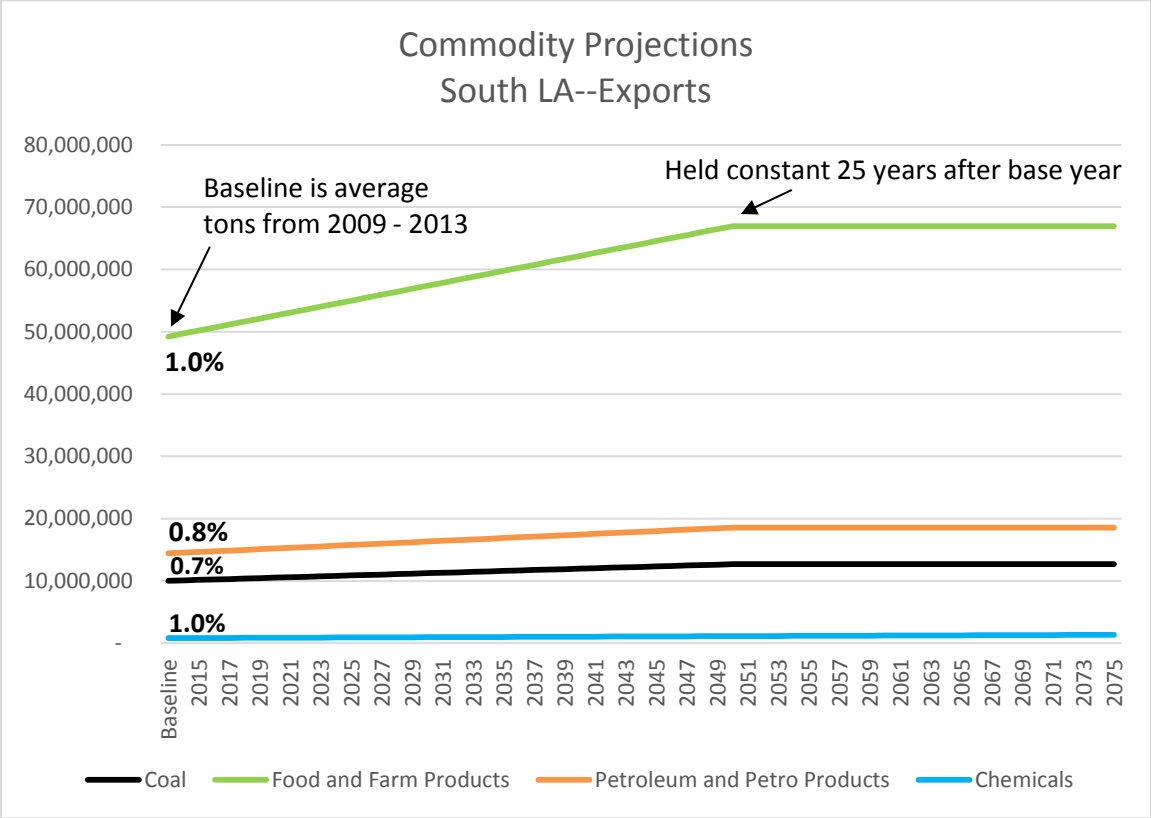


Figure D-20 Commodity Projections South LA Exports

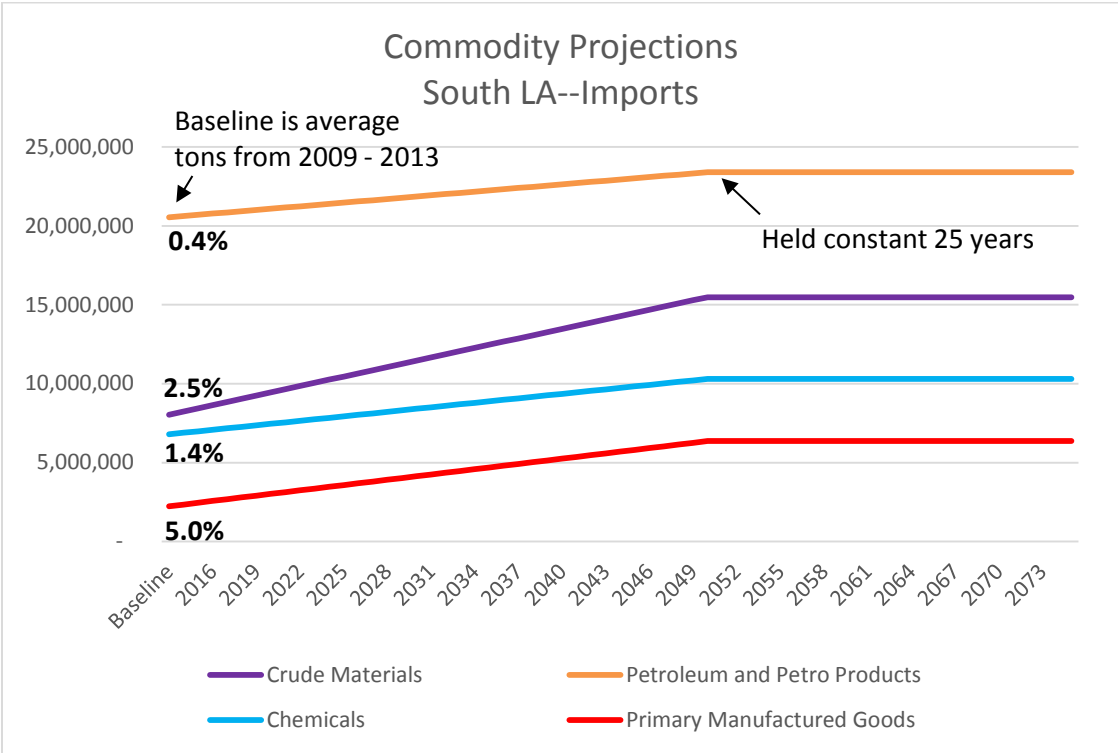


Figure D-21 Commodity Projections South LA Imports

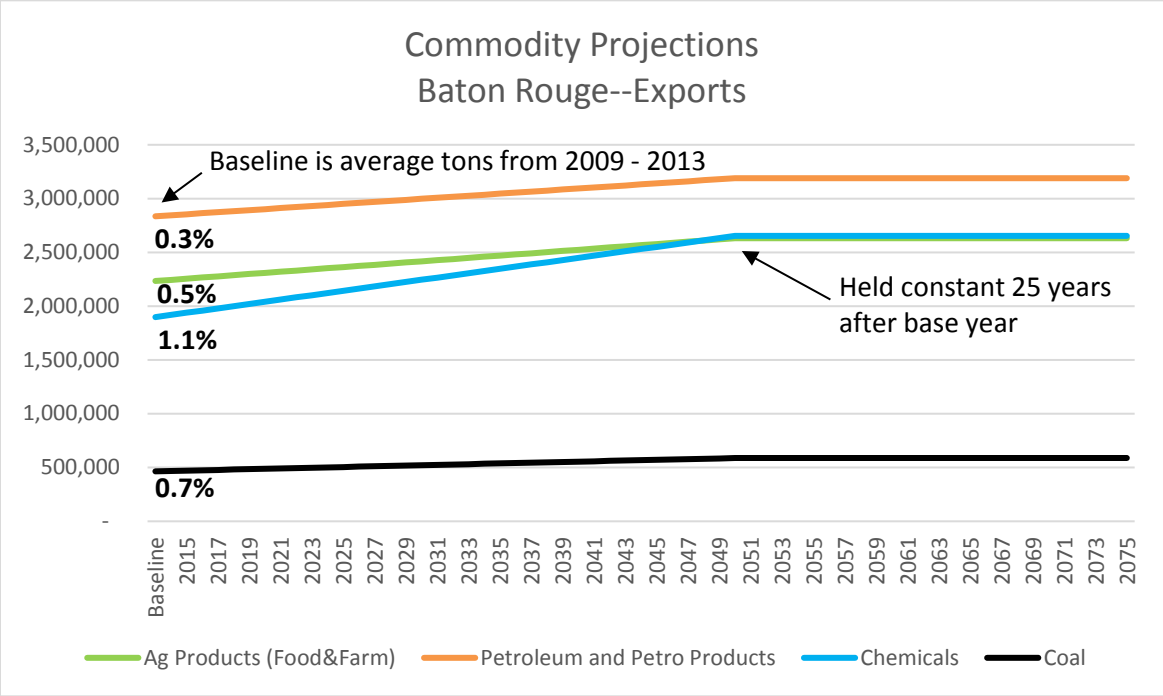


Figure D-22 Commodity Projections Baton Rouge Exports

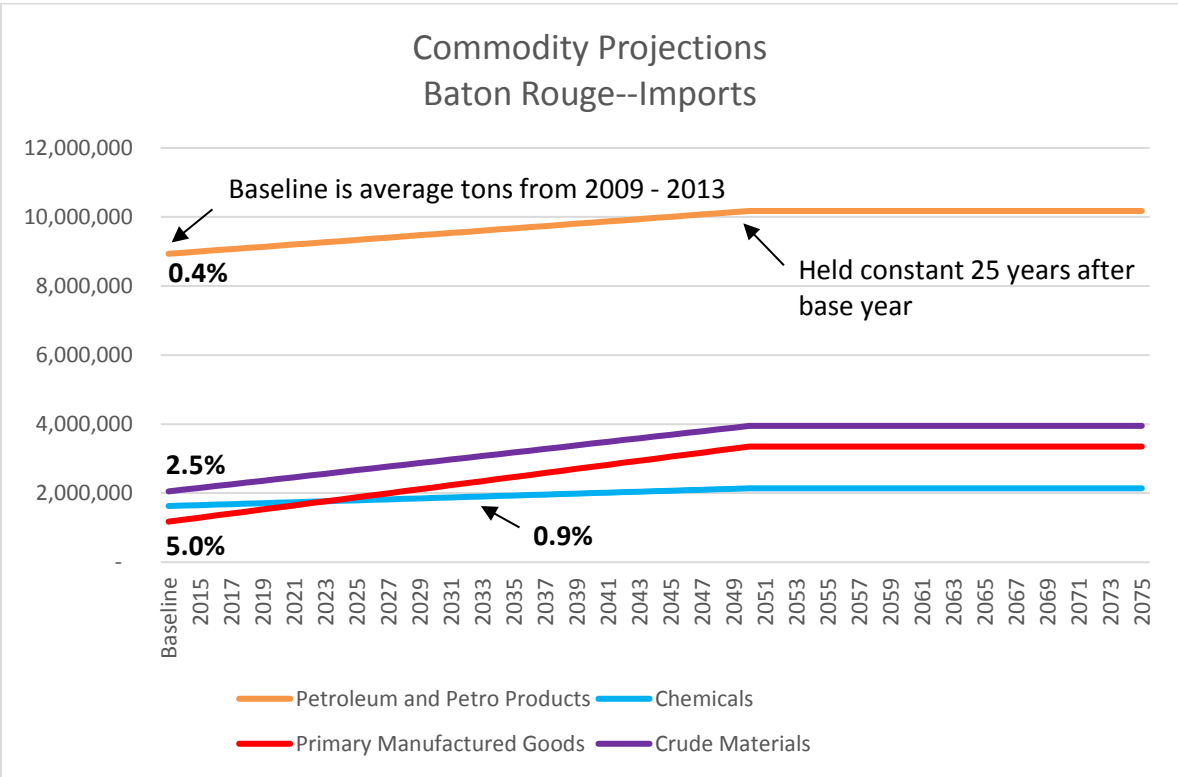


Figure D-23 Commodity Projections Baton Rouge Imports

D-3.2 Vessel Fleet



Based upon data from WCSC for the year 2014, there were a total of 414,961 vessel transits for the 4 ports of Plaquemines (136,977), New Orleans (61,527), South LA (131,831), and Baton Rouge (84,626). From this total, 328,417 transits (79%) were vessels with drafts of less than 10 feet. On the other end of the spectrum, a total of 668 (0.2%) vessel transits occurred when the draft of the vessel was 42 feet or greater. When looking specifically at 45 feet or greater, this number drops to 206 (0.05%) vessel transits. Breaking it down by port for transits of vessels drafting greater than 45 feet, Plaquemines had a total of 44 transits, New Orleans 17 transits, South LA 137 transits, and Baton Rouge 8 transits.

The vast majority of these transits with a draft greater than 45 feet are from bulk carriers transporting grain. Of the 206 transits in 2014 with a draft greater than 45 feet, 190 were from bulk carriers (92%). Oil tankers and chemical tankers followed at 6% and 1%, respectively.

Numbers are similar when looking at data for years 2012 and 2013. In 2012 a total of 347,050 transits (78%) occurred in which the vessel drafted less than 10 feet; the year 2013 saw 345,237 such transits (87%). For vessels drafting 42 feet or greater, 718 vessel transits (0.2%) occurred in 2012 compared to 632 (0.2%) in 2013. For vessels drafting 45 feet or greater, the 4 ports saw a total of 171 transits (0.04%) in 2012 and 200 such transits (0.05%) in 2013.

Again, bulk carriers dominated the list of vessels types that drafted greater than 45 feet. In 2012 bulk carriers made up 91% of this number followed by oil tankers and general cargo vessels at 8% and 1%, respectively. Bulk carriers in 2013 made up 89% of vessels drafting greater than 45 feet; oil tankers and chemical tankers rounded out the rest at 8% and 2%, respectively (Table D-18).

Table D-18 Number of Vessels Drafting > 45'

Port	2014	2013	2012
Plaquemines			
Bulk Carrier	43	40	28
Oil Tanker	-	-	-
Chemical Tanker	1	1	-
General Cargo	-	-	2
New Orleans			
Bulk Carrier	12	26	12
Oil Tanker	5	11	6
Chemical Tanker	-	1	-
General Cargo	-	-	-
South LA			



Bulk Carrier	129	106	110
Oil Tanker	7	7	5
Chemical Tanker	1	1	-
General Cargo	-	1	-
<hr/>			
Baton Rouge			
Bulk Carrier	6	6	6
Oil Tanker	1	-	2
Chemical Tanker	1	-	-
General Cargo	-	-	-
<hr/>			
Total	206	200	171

Source: WCSC

As the data indicates, vessels drafting greater than the authorized depth of the channel are already calling on the ports of Plaquemines, New Orleans, South LA, and Baton Rouge (probably due to a combination of high water events and over-dredging). The vast majority of these vessels are bulk carriers and, to a lesser extent, oil tankers. Considering the commodity makeup of cargo that is handled by the ports, this isn't too surprising. Data from WCSC showing excess capacity for these vessels as well as conversations with the ports also point to bulk carriers and oil tankers as vessels that will be able to utilize the extra depth of a deeper channel.

Vessels that could utilize extra depth are likely already calling on the 4 ports and are having to light-load to safely traverse the channel. With a greater depth, these vessels will be able to more fully utilize their capacity by loading more cargo which will, in effect, generate efficiencies in cost savings. Thus, a future fleet mostly comprised of larger and deeper-drafting vessels is not expected; rather, ships' abilities to load closer to their capacities are anticipated to reduce light-loading inefficiencies. Approximately 0.5% of the vessels calling have design drafts 50 feet or greater.

D-4.0 TRANSPORTATION COST SAVINGS BENEFIT ANALYSIS

D-4.1 Methodology

The purpose of this analysis is to describe the benefits associated with the deepening of the Mississippi River Ship Channel. Project benefits were estimated by calculating the reduction in transportation cost for each project depth using the HarborSym Modeling Suite of Tools (HMST) which is a certified model developed by IWR. The HMST reflects USACE guidance on transportation cost savings analysis. HarborSym model runs were completed to determine the origin to destination transportation costs to estimate deepening benefits.



Channel improvement modifications result in reduced transportation cost by allowing a more efficient use of vessels. The primary effect from channel deepening that can induce changes in vessel utilization is an increase in a vessel's loading capacity. Channel restrictions can limit a vessel's capacity by limiting its ability to load to its design draft. Deepening the channel can reduce this constraint and the vessel's capacity can increase towards its design capacity if commodities are available to transit, vessel loading practices allow and the weight of the commodity on the vessel will lower it deeper in the water. This increase in vessel capacity utilization can result in fewer trips being required to transport forecasted cargo.

HarborSym was set up with the basic required variables. To estimate origin to destination cost savings benefits, the Bulk Loading Tool (BLT), a module within the HMST was used to generate a vessel call list based on the commodity forecast for the MRSC for a given year. The resulting vessel traffic was simulated using HarborSym, producing average annual vessel origin to destination transportation costs. The transportation costs savings benefits were then calculated from the existing 45 and 48 foot depth and for each additional project depth. The Tentatively Selected Plan (TSP) was identified by considering the highest net benefits based on the transportation model.

D-4.1.1 HarborSym Model

The Institute for Water Resources (IWR) developed HarborSym as a planning level, general-purpose model to analyze the transportation costs of various waterway modifications within a harbor. HarborSym is a Monte Carlo simulation model of vessel movements at a port for use in economic analyses. HarborSym concentrates on specific vessel movements and transit rules on the waterway, fleet and loading changes as well as incorporating calculations for both within harbor costs and costs associated with the ocean voyage.

HarborSym represents a port as a tree-structured network of reaches, dock, anchorages and turning areas. Vessel movements are simulated along the reaches, moving from the entrance to one of more docks and then exiting the port. The driving parameter for the HarborSym model is a vessel call at the port.

HarborSym is an event driven model. Vessel calls are processed individually and the interactions with other vessels are taken into account. For each iteration, the vessel calls that fall within the simulation period are accumulated and placed in a queue based on arrival time. When a vessel arrives at the port, the route to all of the docks in the vessel call is determined. This route is comprised of discrete legs (contiguous sets of reaches, from the entry to the dock, from a dock to another dock and from the final dock to the exit). The vessel attempts to move along the initial leg of the route. Potential conflicts with other vessels that have previously entered the system are evaluated according to the user-defined set of rules for each reach within the current leg, based on information maintained by the simulations to the current and projected future state of each reach.



If a rule activation occurs, such as no passing allowed in a given reach, the arriving vessel must either delay entry or proceed as far as possible to an available anchorage, waiting there until it can attempt to continue the journey. Vessels move from reach to reach, eventually arriving at the dock that is the terminus of the leg.

After the cargo exchange calculations are completed and the time the vessel spends at the dock has been determined, the vessel attempts to exit the dock, starting a new leg of the vessel call; rules for moving to the next destination (another dock or an exit of the harbor) are checked in a similar manner to the rule checking on arrival, before it is determined that the vessel can proceed on the next leg. As with the entry into the system, the vessel may need to delay departure and retry at a later time to avoid rule violations and the waiting time at the dock is recorded.

Each vessel call has a calculated associated cost, based on time spent in the harbor and ocean voyage and cost per hour. Also for each vessel call, the total quantity of commodity transferred to the port (both import and export) is known, in terms of commodity category, quantity, tonnage and value. The basic problem is to allocate the total cost of the call to the various commodity transfers that are made. Each vessel call may have multiple dock visits and multiple commodity transfers at each visit, but each commodity transfer record refers to a single commodity and specifies the import and export tonnage. Also, at the commodity level, the “tons per unit” for the commodity is known, so that each commodity transfer can be associated with an export and import tonnage. As noted above, the process is greatly simplified if all commodity transfers within a call are for categories that are measured in the same unit, but that need not be the case.

When a vessel leaves the system, the total tonnage, export and import transferred by the call are available, as is the total cost of the call. Each commodity transfer for a call is associated with a single vessel class and unit of measure. Multiplying the tons or value in the transfer by the appropriate per ton cost, the cost totals by class and unit for the iteration can be incremented. In this fashion, the total cost of each vessel call is allocated proportionately to the units of measure that are carried by the call, both on a tonnage and value basis. Note that this approach does not require that each class or call carry only a commensurate unit of measure.

The model calculates import and export tons, import and export value, and import and export allocated cost. This information allows for the calculation of total tons and total cost, allowing for the derivation of the desired metrics at the class and total level. The model can thus deliver a high level of detail on individual vessel, class, and commodity level totals and costs.

D-4.2 Methodology for Preparing Future Vessel Call Lists

Historic calls from 2013 were used to determine the breakdown of commodity tonnage by dock for each of the 4 ports. After forecasts were applied to the calculated baseline (average of years



2009 – 2013) to project tonnage for the years 2025, 2035, and 2045, the same commodity percentages found in 2013 were applied to assign projected tonnage to those same docks.

For the Port of Plaquemines, as an example, the appropriate docks were determined to be CHS, International Marine Terminal, and Teco Bulk Terminal. Coal, food and farm products, and petroleum products are handled at CHS and Teco, while food and farm products and petroleum products are handled at International Marine Terminal (In the case of Plaquemines, the focus was only on exports as it was determined from historic tonnage of foreign imports that these commodities did not number enough to trigger a significant benefit for the port from a deeper channel). Using historic call data from 2013 as described above, forecasted commodity tonnages for the years 2025, 2035, and 2045 were distributed by dock according to these percentages in the amounts shown in Table D-19. The projected tonnages reflect both without-project and with-project future conditions.

Table D-19 Port of Plaquemines Commodity Distribution by Dock¹

Dock	Commodity	% of Total Commodity	Commodity Tonnage		
			2025	2035	2045
CHS, Inc.	Coal	5%	243,493	259,670	275,846
	Food and Farm	50%	5,188,411	5,776,997	6,365,583
	Petroleum Products	74%	3,938,536	4,188,310	4,438,084
Int. Marine Terminal	Food and Farm	14%	1,471,416	1,638,337	1,805,258
	Petroleum Products	16%	846,900	900,608	954,317
Teco Bulk Terminal	Coal	95%	4,522,398	4,822,846	5,123,292
	Food and Farm	35%	3,654,920	4,069,543	4,484,166
	Petroleum Products	10%	557,192	592,528	627,864

¹Exports only.

Likewise, historic calls from 2013 were used to determine the types of vessel classes calling on each dock, the number of each vessel class calling on that dock, and the total commodity tonnage moved by each vessel class per dock. Average tons per vessel were then calculated for each vessel class by dock. Using the average tons per vessel numbers with the new commodity tonnages for the years 2025, 2035, and 2045, it was possible to determine how many vessels by class were needed to move the forecasted tonnage for each dock (Table D-20).



Table D-20 Port of Plaquemines Number of Vessels Projected by Dock

Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
CHS, Inc.	Coal	BC ¹ Handymax	57,870	4	4	5
		BC Handymax	30,298	102	114	126
		BC Handysize	15,972	128	142	156
	Food and Farm	BC Panamax	20,591	2	3	3
		BC Handymax	45,333	73	78	83
		BC Handysize	25,820	17	18	19
	Petroleum Products	BC Panamax	47,515	4	4	4
		BC Handymax	32,307	46	51	56
		BC Handysize	15,972	128	142	156
Int. Marine Terminal	Food and Farm	BC Handymax	32,307	46	51	56
		BC Handysize	15,972	128	142	156
		BC Panamax	20,591	2	3	3
Teco Bulk Terminal	Coal	BC Handymax	50,063	17	18	19
		BC Handysize	25,820	17	18	19
		BC Panamax	47,515	4	4	4
	Food and Farm	BC Handymax	32,307	46	51	56
		BC Handysize	15,972	128	142	156
		BC Panamax	20,591	2	3	3
	Petroleum Products	BC Handymax	45,333	73	78	83
		BC Handysize	25,820	17	18	19
		BC Panamax	47,515	4	4	4

¹ Bulk Carrier

The same process was used for the ports of New Orleans, South LA, and Baton Rouge to determine the number of vessels needed to satisfy the forecasted tonnage. Additionally, due to their large number, docks for these 3 ports were consolidated into generic groupings named “Bulk/General Cargo” and “Tankers” to signify which vessel types accessed these docks (Tables D-21 through D-26).



Table D-21 Port of New Orleans Commodity Distribution by Dock

Dock	Commodity	% of Total	Commodity Tonnage		
		Commodity	2025	2035	2045
Exports					
Bulk/General Cargo	Chemical Products	8%	169,058	182,098	195,138
	Crude Materials	100%	987,505	987,505	987,505
	Food and Farm	99%	10,419,961	11,441,466	12,462,971
	Petroleum Products	29%	1,065,209	1,121,688	1,178,168
Tankers	Chemical Products	92%	2,018,596	2,174,295	2,329,995
	Food and Farm	1%	119,398	131,103	142,808
	Petroleum Products	71%	2,665,884	2,807,235	2,948,585
Imports					
Bulk/General Cargo	Chemical Products	83%	1,937,853	2,175,189	2,412,525
	Food and Farm	30%	370,418	357,029	343,640
	Manufactured Goods	100%	5,449,107	7,151,953	8,854,799
	Petroleum Products	5%	344,044	352,470	360,896
Tankers	Chemical Products	17%	389,341	437,025	484,709
	Food and Farm	70%	867,895	836,524	805,153
	Petroleum Products	95%	6,319,291	6,474,055	6,628,819



Table D-22 Port of New Orleans Number of Vessels Projected by Dock

Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
Exports						
Bulk/General Cargo	Chemical Products	General Cargo	3,806	44	48	51
	Crude Materials	BC Capesize	99,761	3	3	3
		BC Handysize	24,270	3	3	3
		General Cargo	11,276	54	54	54
	Food and Farm	BC Capesize	59,084	31	35	38
		BC Handymax	34,862	90	98	107
		BC Handysize	23,747	92	101	110
		BC Panamax	58,451	44	48	52
		General Cargo	11,127	62	68	74
	Petroleum Products	BC Capesize	15,608	1	1	1
		BC Handymax	40,676	12	12	13
		BC Handysize	29,746	7	7	8
		BC Panamax	35,012	5	5	5
		General Cargo	8,898	21	22	24
	Tankers	Chemical Products	Chemical Tanker	12,518	148	159
PT ¹ Medium			44,595	4	4	4
Food and Farm		Chemical Tanker	6,269	19	21	23
Petroleum Products		Aframax	42,949	11	11	12
		Chemical Tanker	37,601	39	41	43
		PT Medium	35,193	8	9	9
		PT Panamax	43,478	8	9	9



Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
		Suezmax	76,973	1	1	1
Imports						
Bulk/General Cargo	Chemical Products	BC Capesize	46,047	5	6	7
		BC Handymax	24,849	36	41	45
		BC Handysize	12,485	15	17	18
		BC Panamax	32,937	16	18	20
		General Cargo	3,301	20	23	25
	Food and Farm	BC Capesize	66,115	1	1	1
		BC Handymax	14,415	3	3	3
		BC Handysize	19,566	2	2	2
		BC Panamax	66,143	2	2	2
		General Cargo	6,496	7	7	6
	Manufactured Goods	BC Capesize	26,709	2	3	3
		BC Handymax	14,942	214	281	348
		BC Handysize	11,398	78	103	127
		BC Panamax	28,031	16	21	26
		General Cargo	5,710	150	197	243
	Petroleum Products	BC Handymax	11,512	8	9	9
		BC Handysize	18,231	8	9	9
		BC Panamax	36,377	2	2	2
		General Cargo	4,324	7	7	7
Tankers	Chemical Products	Chemical Tanker	6,009	65	73	81
		PT Panamax	340	1	2	2



Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
	Food and Farm	Chemical Tanker	13,144	66	64	61
	Petroleum Products	Aframax	87,984	56	57	59
		Chemical Tanker	14,695	20	21	21
		PT Medium	14,685	2	2	2
		PT Panamax	44,737	20	21	21
		Suezmax	86,093	2	2	2

¹Products Tanker



Table D-23 Port of South LA Commodity Distribution by Dock

Dock	Commodity	% of Total	Commodity Tonnage		
		Commodity	2025	2035	2045
Exports					
Bulk/General Cargo	Chemical Products	7%	63,119	68,874	74,628
	Coal	100%	10,890,424	11,613,935	12,337,446
	Food and Farm	99%	54,353,446	59,086,749	63,820,052
	Petroleum Products	3%	551,131	590,266	629,400
Tankers	Chemical Products	93%	875,141	954,927	1,034,713
	Food and Farm	1%	635,330	690,656	745,983
	Petroleum Products	97%	15,222,925	16,303,883	17,384,839
Imports					
Bulk/General Cargo	Chemical Products	45%	3,559,707	3,984,723	4,409,738
	Crude Materials	100%	10,455,757	12,466,479	14,477,202
	Manufactured Equip.	35%	1,266,777	1,662,645	2,058,513
	Petroleum Products	1%	256,124	265,336	274,548
Tankers	Chemical Products	55%	4,375,890	4,898,355	5,420,819
	Manufactured Equip.	65%	2,310,415	3,032,419	3,754,424
	Petroleum Products	99%	21,215,100	21,978,165	22,741,232



Table 24 Port of South LA Number of Vessels Projected by Dock

		Vessel	Avg. Tons	# of Vessels Projected		
Dock	Commodity	Class	per Vessel	2025	2035	2045
Exports						
Bulk/General Cargo	Chemical Products	BC Handymax	41,227	1	1	1
		BC Handysize	20,874	1	1	1
		General Cargo	17,950	1	1	1
	Coal	BC Capesize	90,106	77	82	87
		BC Handymax	54,183	12	12	13
		BC Handysize	23,211	1	2	2
		BC Panamax	73,395	40	43	46
		General Cargo	34,917	10	11	11
		Food and Farm	BC Capesize	70,245	122	133
	BC Handymax		47,605	446	485	524
	BC Handysize		29,357	192	209	225
	BC Panamax		64,579	268	292	315
	General Cargo		23,148	68	73	79
	Petroleum Products	BC Capesize	28,881	1	1	1
		BC Handymax	44,218	4	5	5
		BC Handysize	28,826	6	6	6
		BC Panamax	12,270	9	9	10
		General Cargo	10,432	6	7	7
Tankers	Chemical Products	Chemical Tanker	17,800	44	48	52
		PT Medium	25,451	3	3	3
		PT Panamax	26,734	1	1	1



		Vessel	Avg. Tons	# of Vessels Projected			
Dock	Commodity	Class	per Vessel	2025	2035	2045	
Imports	Food and Farm	Chemical Tanker	13,482	46	50	54	
		PT Medium	19,112	1	1	1	
	Petroleum Products	Aframax	34,779	111	119	127	
		Chemical Tanker	35,369	73	78	83	
		PT Medium	37,574	94	101	107	
		PT Panamax	41,000	107	114	122	
		Suezmax	33,877	26	28	30	
	Bulk/General Cargo	Chemical Products	BC Capesize	68,905	7	8	9
			BC Handymax	41,348	39	43	48
			BC Handysize	28,018	23	26	28
			BC Panamax	56,244	13	15	16
			General Cargo	19,017	4	5	5
		Crude Materials	BC Capesize	77,401	35	42	48
			BC Handymax	49,695	54	64	74
			BC Handysize	24,007	15	17	20
BC Panamax			64,659	69	82	96	
General Cargo			19,272	14	16	19	
Manufactured Equip.		BC Capesize	72,753	1	1	1	
		BC Handymax	36,765	9	12	15	
		BC Handysize	24,007	2	2	3	
		BC Panamax	62,339	13	18	22	
		General Cargo	6,474	5	7	8	



Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
Tankers	Petroleum Products	Aframax	49,520	3	3	3
		BC Handymax	59,472	1	1	1
		BC Handysize	20,186	1	1	1
		General Cargo	13,612	1	1	1
	Chemical Products	Aframax	83,586	1	1	1
		Chemical Tanker	21,347	163	182	202
		PT Medium	21,274	37	41	45
		PT Panamax	22,117	3	4	4
	Manufactured Equip.	Aframax	67,572	13	18	22
		Chemical Tanker	22,121	19	25	31
		PT Medium	6,783	3	4	5
		PT Panamax	49,546	13	18	22
		Suezmax	117,095	3	3	4
	Petroleum Products	Aframax	52,587	189	196	203
		Chemical Tanker	21,085	16	17	17
		PT Medium	21,905	83	86	89
		PT Panamax	38,966	165	171	177
		Suezmax	59,384	45	47	49

Table D-25 Port of Baton Rouge Commodity Distribution by Dock

Dock	Commodity	% of Total Commodity	Commodity Tonnage		
			2025	2035	2045
Exports					
Bulk/General Cargo	Chemical Products	8%	178,676	195,694	212,713



Dock	Commodity	% of Total Commodity	Commodity Tonnage		
			2025	2035	2045
Tankers	Coal	100%	504,663	538,190	571,719
	Food and Farm	84%	1,987,171	2,077,417	2,167,663
	Chemical Products	92%	1,964,395	2,151,496	2,338,598
	Food and Farm	16%	375,955	393,029	410,103
	Petroleum Products	100%	2,950,258	3,045,940	3,141,620
Imports					
Bulk/General Cargo	Chemical Products	4%	80,226	86,414	92,602
	Crude Materials	100%	3,282,981	4,308,913	5,334,844
	Manufactured Equip.	100%	1,881,230	2,469,115	3,056,999
	Petroleum Products	1%	85,432	88,498	91,563
Tankers	Chemical Products	96%	1,714,589	1,846,841	1,979,093
	Petroleum Products	99%	9,250,964	9,582,873	9,914,780



Table D-26 Port of Baton Rouge Number of Vessels Projected by Dock

		Vessel	Avg. Tons	# of Vessels Projected			
Dock	Commodity	Class	per Vessel	2025	2035	2045	
Exports							
Bulk/General Cargo	Chemical Products	BC Handymax	27,278	3	4	4	
		BC Handysize	15,372	4	5	5	
		General Cargo	8,057	3	4	4	
	Coal	BC Handymax	35,937	5	5	5	
		BC Handysize	16,832	10	11	11	
		General Cargo	7,992	21	22	24	
	Food and Farm	BC Handymax	44,596	27	28	29	
		BC Handysize	18,293	24	25	26	
		BC Panamax	60,000	3	3	3	
		General Cargo	7,927	24	25	26	
	Tankers	Chemical Products	Chemical Tanker	11,758	157	172	187
			PT Medium	20,439	5	6	6
PT Panamax			10,900	1	1	1	
Food and Farm		Chemical Tanker	18,139	21	22	23	
Petroleum Products		Aframax	19,818	29	30	31	
		Chemical Tanker	25,289	53	55	57	
		PT Medium	33,251	16	16	17	
		PT Panamax	18,264	28	29	29	
Imports							
Bulk/General Cargo		Chemical Products	BC Handysize	17,949	4	4	5
	General Cargo		6,043	1	1	2	



Dock	Commodity	Vessel Class	Avg. Tons per Vessel	# of Vessels Projected		
				2025	2035	2045
Tankers	Crude Materials	BC Capesize	64,216	9	11	14
		BC Handymax	39,558	10	13	16
		BC Handysize	18,314	24	32	39
		BC Panamax	58,831	24	32	39
		General Cargo	33,640	14	19	23
	Manufactured Equip.	BC Capesize	63,193	8	11	14
		BC Handymax	50,019	6	8	10
		BC Panamax	52,007	20	26	32
	Petroleum Products	BC Handysize	16,510	1	1	1
		BC Panamax	52,417	1	1	1
	Chemical Products	Chemical Tanker	15,149	98	105	113
		PT Medium	12,436	19	20	22
	Petroleum Products	Aframax	61,267	86	89	92
		Chemical Tanker	19,761	51	53	54
		PT Medium	17,826	4	4	4
		PT Panamax	49,428	59	62	64

The Bulk Loading Tool then used this data to generate vessel call lists representing traffic for each of the 4 ports for the years 2025, 2035, and 2045. These generated vessel call lists were input back into HarborSym, and HarborSym was run to calculate the average total vessel cost for each vessel class. With this information it was possible to calculate the total annual cost for all vessels operating in each port.

Once the total annual cost was calculated for each port for the years 2025, 2035, and 2045, new vessel call lists had to be generated by the Bulk Loading Tool to take into account the extra depth being added to the channel (48 feet and 50 feet). With extra depth, vessels that previously light-



loaded are now able to load closer to their capacity and thus operate more efficiently. In the Bulk Loading Tool the user assigns a value to each vessel class indicating what percent of its capacity is being utilized. For these new vessel call lists, vessel classes that were identified as potentially being able to load more efficiently were given a higher operating capacity number correlating to the extra depth of the project (vessels traveling to the ports of Plaquemines and New Orleans were given an extra 1.5 feet for the 50-foot channel, whereas vessels traveling to the ports of South LA and Baton Rouge were given an extra 3 feet for the 48-foot channel and 5 feet for the 50-foot channel).

HarborSym runs using these new vessel call lists calculated the average total vessel cost for each vessel class which, in turn, was used to calculate the total annual cost for all vessels operating in each port. The difference in total annual transportation costs between the with- and without-project conditions are the net NED benefits of the project.

D-4.3 Transportation Cost Savings Benefit Analysis

For the Port of Plaquemines, the 2025 with-project condition of a 50-foot channel saw the annual number of vessel trips drop from a total of 457 to 454, resulting in a transportation cost savings benefit of \$2,038,384. For the year 2035, the annual number of vessels was reduced from a total of 512 to 509, giving a transportation cost savings benefit of \$2,165,227. Finally, vessels in the year 2045 were projected to number 551 compared to 556 in the without-project condition, yielding a transportation cost savings benefit of \$5,623,534. Reduction in the amount of light-loading due to a deeper channel creates a more efficient use of vessels that translates into the above transportation cost savings benefits. These same efficiencies which generate transportation cost savings are found for the ports of New Orleans, South LA, and Plaquemines.

The Port of New Orleans saw its vessel trip total drop from 1,347 to 1,339 in 2025, from 1,545 to 1,537 in 2035, and from 1,738 to 1,729 in 2045. Transportation cost savings equaled \$5,421,383 in 2025, \$6,811,205 in 2035, and \$8,010,740 in 2045 (Table D-27).

Table D-27 Port of Plaquemines and New Orleans Transportation Cost Savings

Port	Existing Conditions (48.5 feet)		With-Project (50 feet)		Savings
	Number of Vessels	Total Annual Cost	Number of Vessels	Total Annual Cost	
Plaquemines					
2025	457	\$430,976,335	454	\$428,937,951	\$2,038,384



2035	512	\$475,466,167	509	\$473,300,940	\$2,165,227
2045	556	\$517,943,449	551	\$512,319,915	\$5,623,534
New Orleans					
2025	1,347	\$1,067,907,827	1,339	\$1,062,486,444	\$5,421,383
2035	1,545	\$1,216,406,028	1,537	\$1,209,594,822	\$6,811,205
2045	1,738	\$1,358,439,392	1,729	\$1,350,428,653	\$8,010,740

For the Port of South LA, the 2025 with-project condition of a 48-foot channel saw the annual number of vessels drop from a total of 2,503 to 2,414, resulting in a transportation cost savings benefit of \$73,912,430. For the year 2035, the annual number of vessels was reduced from a total of 2,726 to 2,633, giving a transportation cost savings benefit of \$77,911,656. Finally, vessels in the year 2045 were projected to number 2,946 compared to 2,843 in the without-project condition, yielding a transportation cost savings benefit of \$90,433,443. For the 50-foot channel scenario, vessel counts fell to 2,389, 2,607, and 2,815 in the years 2025, 2035, and 2045; transportation cost savings equaled \$21,974,494, \$22,947,795, and \$22,939,693 respectively.

The Port of Baton Rouge saw its vessel count drop from 622 to 595 in 2025, from 668 to 635 in 2035, and from 713 to 680 in 2045. Transportation cost savings equaled \$18,198,871 in 2025, \$22,188,670 in 2035, and \$23,334,682 in 2045. For the 50-foot channel scenario, vessel counts fell to 583, 625, and 669 in the years 2025, 2035, and 2045; transportation cost savings equaled \$8,120,003, \$7,822,764, and \$7,993,380 respectively (Table D-28).

Table D-28 Port of South LA and Baton Rouge Transportation Cost Savings

Port	Existing Conditions (45 feet)		With-Project (48 feet)			With-Project (50 feet)		
	Number of Vessels	Total Annual Cost	Number of Vessels	Total Annual Cost	Savings	Number of Vessels	Total Annual Cost	Savings
South LA								
2025	2,503	\$2,324,906,986	2,414	\$2,250,994,556	\$73,912,430	2,389	\$2,229,020,062	\$21,974,494
2035	2,726	\$2,531,330,462	2,633	\$2,453,418,806	\$77,911,656	2,607	\$2,430,471,012	\$22,947,795
2045	2,946	\$2,735,824,969	2,843	\$2,645,391,526	\$90,433,443	2,815	\$2,622,451,834	\$22,939,693
Baton Rouge								
2025	622	\$588,062,485	595	\$569,863,614	\$18,198,871	583	\$561,743,611	\$8,120,003
2035	668	\$636,611,344	635	\$614,422,674	\$22,188,670	625	\$606,599,909	\$7,822,764
2045	713	\$681,115,724	680	\$657,781,043	\$23,334,682	669	\$649,787,663	\$7,993,380



Benefit streams for the 50-year period of analysis and the calculation of average annual benefits are shown for the 48-ft channel and 50-foot channel in tables D-29 and D-30, respectively. Benefits reflect 2016 price levels and were annualized at the current FY17 Federal discount rate of 2.875 percent.

Table D-29 Average Annual Benefits – 48-ft Alternative

Year	Year	Navigation Benefits	Present Value of Costs
2020	-4		
2021	-3		\$0
2022	-2		\$0
2023	-1		\$0
2024	0		\$0
2025	1	\$92,111,301	\$89,537,109
2026	2	\$92,910,203	\$87,789,730
2027	3	\$93,709,106	\$86,070,089
2028	4	\$94,508,008	\$84,377,998
2029	5	\$95,306,911	\$82,713,263
2030	6	\$96,105,814	\$81,075,674
2031	7	\$96,904,716	\$79,465,016
2032	8	\$97,703,619	\$77,881,062
2033	9	\$98,502,521	\$76,323,576
2034	10	\$99,301,424	\$74,792,318
2035	11	\$100,100,326	\$73,287,037
2036	12	\$101,467,106	\$72,211,621
2037	13	\$102,833,886	\$71,139,076
2038	14	\$104,200,666	\$70,070,081
2039	15	\$105,567,446	\$69,005,275
2040	16	\$106,934,225	\$67,945,259



Table D-29 (Continued) Average Annual Benefits – 48-ft Alternative

2041	17	\$108,301,005	\$66,890,596
2042	18	\$109,667,785	\$65,841,817
2043	19	\$111,034,565	\$64,799,414
2044	20	\$112,401,345	\$63,763,852
2045	21	\$113,768,125	\$62,735,561
2046	22	\$113,768,125	\$60,982,319
2047	23	\$113,768,125	\$59,278,075
2048	24	\$113,768,125	\$57,621,458
2049	25	\$113,768,125	\$56,011,138
2050	26	\$113,768,125	\$54,445,820
2051	27	\$113,768,125	\$52,924,248
2052	28	\$113,768,125	\$51,445,199
2053	29	\$113,768,125	\$50,007,484
2054	30	\$113,768,125	\$48,609,948
2055	31	\$113,768,125	\$47,251,468
2056	32	\$113,768,125	\$45,930,953
2057	33	\$113,768,125	\$44,647,342
2058	34	\$113,768,125	\$43,399,603
2059	35	\$113,768,125	\$42,186,735
2060	36	\$113,768,125	\$41,007,762
2061	37	\$113,768,125	\$39,861,737
2062	38	\$113,768,125	\$38,747,739
2063	39	\$113,768,125	\$37,664,874
2064	40	\$113,768,125	\$36,612,271
2065	41	\$113,768,125	\$35,589,085
2066	42	\$113,768,125	\$34,594,493
2067	43	\$113,768,125	\$33,627,697
2068	44	\$113,768,125	\$32,687,919
2069	45	\$113,768,125	\$31,774,405
2070	46	\$113,768,125	\$30,886,421
2071	47	\$113,768,125	\$30,023,252
2072	48	\$113,768,125	\$29,184,206
2073	49	\$113,768,125	\$28,368,609
2074	50	\$113,768,125	\$27,575,804
TOTAL PRESENT VALUE ==>			\$2,790,663,487
AVERAGE ANNUAL BENEFIT			
==>			\$105,900,338

Federal	Fraction	Decimal
Discount Rate	2 7/8	2 7/8
0.037948	50 Yr. Amortization Factor	



Table D-30 Average Annual Benefits – 50-ft Alternative

Year	Year	Navigation Benefits	Present Value of Costs
2020	-4		
2021	-3		\$0
2022	-2		\$0
2023	-1		\$0
2024	0		\$0
2025	1	\$129,665,565	\$126,041,862
2026	2	\$130,683,740	\$123,481,489
2027	3	\$131,701,915	\$120,965,785
2028	4	\$132,720,091	\$118,494,250
2029	5	\$133,738,266	\$116,066,382
2030	6	\$134,756,441	\$113,681,669
2031	7	\$135,774,616	\$111,339,597
2032	8	\$136,792,791	\$109,039,644
2033	9	\$137,810,966	\$106,781,285
2034	10	\$138,829,142	\$104,563,992
2035	11	\$139,847,317	\$102,387,233
2036	12	\$141,696,132	\$100,841,621
2037	13	\$143,544,948	\$99,302,432
2038	14	\$145,393,763	\$97,770,515
2039	15	\$147,242,578	\$96,246,665
2040	16	\$149,091,394	\$94,731,629
2041	17	\$150,940,209	\$93,226,103
2042	18	\$152,789,025	\$91,730,739
2043	19	\$154,637,840	\$90,246,145
2044	20	\$156,486,656	\$88,772,887
2045	21	\$158,335,471	\$87,311,491
2046	22	\$158,335,471	\$84,871,437
2047	23	\$158,335,471	\$82,499,575
2048	24	\$158,335,471	\$80,193,997
2049	25	\$158,335,471	\$77,952,853
2050	26	\$158,335,471	\$75,774,340
2051	27	\$158,335,471	\$73,656,710
2052	28	\$158,335,471	\$71,598,260
2053	29	\$158,335,471	\$69,597,337
2054	30	\$158,335,471	\$67,652,332
2055	31	\$158,335,471	\$65,761,684
2056	32	\$158,335,471	\$63,923,872
2057	33	\$158,335,471	\$62,137,421
2058	34	\$158,335,471	\$60,400,896
2059	35	\$158,335,471	\$58,712,900



Table D-30 (Continued) Average Annual Benefits – 50-ft Alternative

2060	36	\$158,335,471	\$57,072,078
2061	37	\$158,335,471	\$55,477,111
2062	38	\$158,335,471	\$53,926,718
2063	39	\$158,335,471	\$52,419,653
2064	40	\$158,335,471	\$50,954,705
2065	41	\$158,335,471	\$49,530,697
2066	42	\$158,335,471	\$48,146,486
2067	43	\$158,335,471	\$46,800,958
2068	44	\$158,335,471	\$45,493,034
2069	45	\$158,335,471	\$44,221,661
2070	46	\$158,335,471	\$42,985,818
2071	47	\$158,335,471	\$41,784,514
2072	48	\$158,335,471	\$40,616,781
2073	49	\$158,335,471	\$39,481,683
2074	50	\$158,335,471	\$38,378,307
TOTAL PRESENT VALUE ==>			\$3,895,047,231
AVERAGE ANNUAL BENEFIT ==>			\$147,809,587

Federal	Fraction	Decimal
Discount Rate	2 7/8	2.875
0.037948	50 Yr. Amortization Factor	

D-5.0 NED BENEFITS AND COSTS

D-5.1 Benefit/Cost Analysis

In the evaluation and comparison of project depth alternatives, which is necessary to arrive at the selected plan, NED costs play a critical role. NED costs include both the financial and economic costs associated with a project throughout its lifecycle. Each of these types of costs and their sources are discussed in this section of the report. Additionally, the NED costs for the depth alternatives being considered in this analysis will be identified.

D-5.2 NED Costs

Financial costs of the proposed project consist of the construction and mitigation costs accrued during construction of the project and over its lifecycle. New Orleans District cost engineers prepared the cost estimate for each of the proposed deepening alternatives for use in the economic



analysis. The sum of these costs is used to determine Interest During Construction (IDC), which represents the economic cost of building a project. The next section defines IDC and provides an explanation as to how it is calculated and included in the analysis. Together, these costs represent the estimated first cost of construction.

Another financial cost not included above is the annual cost accrued over the life of a project due to Operation, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) activities that represent an increase over the current OMRR&R costs to maintain the channel. OMRR&R was excluded from the list of financial costs above because it is not included in the calculation of IDC. IDC takes into account only those costs incurred during construction.

Interest During Construction (IDC) represents an economic cost of building a project that is considered in the selection of the recommended plan, but does not factor in as a paid cost. IDC is the cost of the foregone opportunity to invest the money required to construct a project for another use. The hypothetical return on another investment, measured as IDC, is counted as an NED cost. As an economic, rather than a financial, cost, IDC is not considered in the determination of cost-sharing responsibilities.

IDC reflects that project construction costs are not incurred in one lump sum, but as a flow over the construction period. This analysis assumes that construction expenditures are incurred at a constant rate over the period of construction, an assumption which is supported by the *NED Manual for Deep Draft Navigation*.

The calculation of IDC is summarized in the *NED Manual for Deep Draft Navigation* as follows.

If B is the project base year (the year in which construction costs end and the project begins to derive benefits), then the total cost incurred during construction, including actual expenditures and implicit interest payment, is the equivalent lump-sum expenditure in the base year, C_B , which is computed as:

$$C_B = \sum_{i=1}^t C_i (1+r)^{t-i}; \text{ where}$$

C_i construction expenditures in period i

r per unit interest rate; and

t number of construction periods up to the year that the project is implemented, which is the start of the period of analysis

Therefore, $IDC = C_B$ - Estimated First Cost of Construction



In this analysis, the IDC is evaluated using a flow of constant monthly construction expenditures. Calculating the hypothetical interest earned on each monthly construction payment and summing them to arrive at the total construction investment cost (CB) enables the calculation of IDC by taking the difference between CB and estimated construction cost. IDC is, therefore, a function of both estimated total construction cost and construction time. The longer it takes to construct a project, the larger the hypothetical alternative investment grows. The implication behind this fact is that IDC accounts for a larger proportion of NED Costs the larger the project and the longer it takes to construct.

Table D-31 contains the project costs associated with each project depth and configuration evaluated in this analysis. The costs were annualized at the FY17 discount rate of 2.875% over 50 years.

Table D-31

Channel Alternative	50 ft. Through S. LA	50 ft. Full Channel	48 ft. Through S. LA	48 ft. Full Channel	50 ft. SWP/48 ft. Through S. LA ¹	50 ft. SWP/48 ft. Through BR ²	50 ft. Through S. LA/48 ft. Through BR ³
First Cost of Construction	\$88,971,120	\$183,076,433	\$5,551,980	\$88,663,029	\$87,770,010	\$170,881,059	\$172,082,169
Construction Duration (in months)	48	48	48	48	48	48	48
IDC	\$ 3,910,948	\$8,047,583	\$244,051	\$3,897,405	\$3,858,151	\$7,511,505	\$7,564,303
Total Investment Cost	\$92,882,068	\$191,124,016	\$5,796,031	\$92,560,434	\$91,628,160	\$178,392,564	\$179,646,472
Average Annual	\$3,524,697	\$7,252,791	\$219,948	\$3,512,491	\$3,477,113	\$6,769,656	\$6,817,240



Construction Cost							
Annual Incremental O&M	\$18,126,110	\$131,446,950	\$13,443,710	\$100,007,021	\$13,443,710	\$100,007,021	\$104,689,421
Total Average Annual Cost	\$21,650,806	\$138,699,741	\$13,663,658	\$103,519,512	\$16,920,824	\$106,776,677	\$111,506,660

D-5.3 Net Benefits and Benefit-Cost Ratio

Having identified the benefits and costs associated with the deepening of the channel, identification of the proposed alternative requires a comparison of the average annual net benefits resulting from each project depth. Table D-32 below contains the NED annual Cost and Benefits for incremental channel depths and the resulting net benefit and benefit-cost ratios at the FY17 discount rate of 2.875%. Alternatives 2 and 3 represent deepening the entire channel from Southwest Pass to the Port of Baton Rouge to depths of 48 feet and 50 feet, respectively.

Table D-32 Project Results

	Alternative 2	Alternative 3
Average Annual Benefits	\$105,900,000	\$147,810,000
Average Annual Costs	\$103,520,000	\$138,700,000
Net Benefits	\$2,380,000	\$9,110,000
BCR	1.02	1.07

D-5.4 Optimization

Alternatives 2 and 3 looked at deepening the entire MRSC to a uniform depth; however, further analyses were performed by focusing specifically on the port level. It was here at the port level where there was clearly an opportunity to obtain the greatest net benefits by considering deepening the channel incrementally by port.



As shown in table D-33, the greatest net benefits with a B/C ratio of 5.47 occur at a depth of 50 feet through the Port of South LA (including the three lower crossings of Fairview, Belmont, and Rich Bend) but not through the Port of Baton Rouge. This is mainly because the greatest incremental O&M costs occur in the remaining nine crossings in which the Port of Baton Rouge is located. As shown below, the average annual incremental cost to maintain a 50 ft. channel through the Port of South LA is approximately \$18.1 million; however, the average annual incremental cost to maintain a 50 ft. channel through the Port of Baton Rouge (i.e., the full channel) is approximately \$131.4 million, which is a difference of \$113.3 million. The same degree of difference in the incremental O&M costs is shown with the 48 ft. depth alternative. The average annual incremental cost to maintain a 48 ft. channel through the Port of South LA is \$13.4 million as opposed to \$100.0 million for maintaining the same channel depth through the Port of Baton Rouge, yielding a difference of \$86.6 million. As such, in both instances, deepening the channel above the Port of South La is not economically justified as the incremental benefits simply do not outweigh the incremental cost of doing so. Three other scenarios were studied and included in table D-31, but none produced the greatest net benefits. Deepening the channel both at Southwest Pass to 50 feet and through the Port of South LA to 48 feet actually produced the highest B/C ratio at 5.62. However, average annual net benefits totaled only \$78.1 million compared to that of the NED plan at \$96.8 million. The two other scenarios (50 feet at Southwest Pass, 48 feet through Baton Rouge; 50 feet through South LA, 48 feet through Baton Rouge) also did not produce the greatest net benefits.



Table D-33 Average Annual Costs and Benefits

Channel Alternative	50 ft. Through S. LA	50 ft. Full Channel	48 ft. Through S. LA	48 ft. Full Channel
First Cost of Construction	\$ 88,971,120	\$ 183,076,433	\$ 5,551,980	\$ 88,663,029
Interest During Construction	\$ 3,910,948	\$ 8,047,583	\$ 244,051	\$ 3,897,405
Total Investment	\$ 92,882,068	\$ 191,124,016	\$ 5,796,031	\$ 92,560,434
Average Annual Const. Cost	\$ 3,524,697	\$ 7,252,791	\$ 219,948	\$ 3,512,491
Average Annual Increm. O&M	\$ 18,126,110	\$ 131,446,950	\$ 13,443,710	\$ 100,007,021
Total Average Annual Cost	\$ 21,650,806	\$ 138,699,741	\$ 13,663,658	\$ 103,519,512
Total Average Annual Benefits	\$ 118,436,481	\$ 147,809,587	\$ 84,519,999	\$ 105,900,338
Net Excess Benefits	\$ 96,785,675	\$ 9,109,847	\$ 70,856,340	\$ 2,380,826
B/C Ratio	5.47	1.07	6.19	1.02

Channel Alternative	50 ft. SWP/48 ft. Through S. LA ¹	50 ft. SWP/48 ft. Through BR ²	50 ft. Through S. LA/48 ft. Through BR ³
First Cost of Construction	\$ 87,770,010	\$ 170,881,059	\$ 172,082,169
Interest During Construction	\$ 3,858,151	\$ 7,511,505	\$ 7,564,303
Total Investment	\$ 91,628,160	\$ 178,392,564	\$ 179,646,472
Average Annual Const. Cost	\$ 3,477,113	\$ 6,769,656	\$ 6,817,240
Average Annual Increm. O&M	\$ 13,443,710	\$ 100,007,021	\$ 104,689,421
Total Average Annual Cost	\$ 16,920,824	\$ 106,776,677	\$ 111,506,660
Total Average Annual Benefits	\$ 95,023,734	\$ 117,078,601	\$ 139,816,821
Net Excess Benefits	\$ 78,102,911	\$ 10,301,924	\$ 28,310,160
B/C Ratio	5.62	1.10	1.25

Note: Costs and benefits reflect 2016 price levels and were annualized at the current FY17 Federal discount rate of 2.875 percent.

¹ 50 feet through Plaquemines and New Orleans, 48 feet through South LA.

² 50 feet through Plaquemines and New Orleans, 48 feet through Baton Rouge.



D-5.5 NED Plan

Although the project is authorized to 55 feet for the full channel (i.e., through the Port of Baton Rouge), the economic analysis indicates that the greatest net excess benefits are achieved by deepening the channel to a depth of 50 feet through the Port of South LA and not through the Port of Baton Rouge. The nine crossings in which the Port of Baton Rouge is located simply incur incremental O&M costs that are prohibitive when compared to the incremental benefits. Deepening the channel through the Port of Baton Rouge may be implemented in a future construction phase; however, this would require a facility by facility analysis for each crossing to determine if these additional increments are in fact economically justified.

For the NED plan, average annual costs are \$21.7 million and average annual benefits are \$118.4 million. Total average annual benefits minus total average annual costs equals the average annual net benefits of the project which in this scenario comes to \$96.8 million. The benefit cost ratio is accordingly 5.47 to 1 (Table D-34).

Table D-34 Tentatively Selected Plan

Investment Cost

Total Project Construction Cost	\$ 88,971,120
Interest During Construction	\$ 3,910,948
Total Investment Cost	\$ 92,882,068

Average Annual Cost

Interest and Amortization of Initial Investment	\$ 3,524,697
Average Annual Incremental OMRR&R	\$ 18,126,110
Total Average Annual Cost	\$ 21,650,806

Average Annual Benefits	\$118,436,481
Net Annual Benefits	\$ 96,785,675
Benefit Cost Ratio (computed at 2.875%)	5.47



7 percent OMB rate: At this discount rate, the NED plan average annual costs are \$25.3 million and average annual benefits are \$114.5 million. Average annual net benefits are \$89.2 million, and the benefit cost ratio is 4.53 to 1.



APPENDIX E

Plan Formulation
(Not Used at This Time)



APPENDIX F

Scoping Report



**US Army Corps
of Engineers**

New Orleans District

National Environmental Policy Act

SCOPING REPORT

**Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, General Reevaluation Study and
Supplemental Environmental Impact Statement**

July 2015

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National Environmental Policy Act

SCOPING REPORT

Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project General Reevaluation Report and Supplemental Environmental Impact Statement

July 2015

1.0 INTRODUCTION

The National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190; 42 U.S.C 4321 *et seq*) and the Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR §§ 1500-1508) require the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony. The NEPA procedures insure that environmental information is available to the public before decisions are made and before actions are taken. Additionally, NEPA requires an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action. This process is referred to as scoping.

The U.S. Army Corps of Engineers, Mississippi Valley Division, New Orleans District (CEMVN) published a Notice of Intent (NOI) to prepare a Draft Supplemental Environmental Impact Statement (EIS) for the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project in the *Federal Register* (volume 80, number 92, pp 27296-27298) on May 13, 2015.

A public scoping meeting was held in Belle Chasse, LA on May 26, 2015, and in New Orleans, LA on May 28, 2015, and Baton Rouge, LA on May 28, 2015. NEPA scoping meeting announcements were advertised in the Times Picayune and New Orleans Advocate several days prior to the meetings. A mailing list was compiled utilizing an internal CEMVN mailing database and individual letters were mailed to Federal, State and local agencies, Parish and city council members and other interested parties and stakeholders. A total of 80 individuals signed the attendance records positioned at the main entrance of the meeting hall. These included, but were not limited to, private citizens, industry stakeholders and non-governmental organizations.

2.0 STUDY BACKGROUND AND AUTHORITY

The 1981 Feasibility Study entitled “Deep-Draft Access to the Ports of New Orleans and Baton Rouge, Louisiana” (1981 Feasibility Study) was authorized by Section 2 of the Rivers and Harbors Act of 1945, (Public Law 79-14), which combined several existing deep-draft projects on the Mississippi River and modified them to provide new navigation channel dimensions. The 1981 Feasibility Study, which included an Environmental Impact Statement (EIS), recommended deepening the Mississippi River’s navigation channel to a 55-foot depth from Baton Rouge to the Gulf of Mexico. A Chief of Engineers Report was completed in April 1983, and a Record of Decision was signed on December 23, 1986. The Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana project was authorized for construction by Section 101 of the 1985 Supplemental Appropriations Act (Public Law 99-88).

The authorized plan provides for a navigation channel with a 55-foot depth over a 750-foot bottom width from the Gulf of Mexico to Baton Rouge, Louisiana, and a turning basin at the head of the deepened channel in Baton Rouge. Authorization also included deepening the existing 35 feet deep by 1,500 feet wide channel at the New Orleans harbor to 40 feet, providing river training works in South Pass and Pass a Loutre, and creating wetlands and upland habitat with dredged material along Southwest Pass.

Phase I of the Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana Project consisted of a 45-foot channel from the Gulf of Mexico to river mile 181 near Donaldsonville, Louisiana, and was completed in December 1987. Phase II consisted of the remainder of the 45 foot channel from river mile 181 to Baton Rouge, and was completed in December 1994. Phase III of the Project was identified as the deepening of the entire channel to 55 feet from the Gulf of Mexico to Baton Rouge. The Non-Federal Sponsor, the State of Louisiana, Department of Transportation and Development, has requested that an incremental phase of deepening the entire length of the channel to 50 feet be considered. A final phase of deepening the channel to 55 feet may be considered in the future. The Water Resources Reform and Development Act of 2014 amended the Water Resources and Development Act of 1986, to increase the Federal threshold for full Federal channel maintenance responsibilities from 45 feet to 50 feet deep.

The General Reevaluation Report will identify the depth that creates the greatest net benefits up to a 50 foot channel in order to proceed to implementation and to phase the remaining work accordingly. A report released by the Institute of Water Resources (IWR) in June 2012 evaluated the preparedness of U.S. ports to accommodate Post-Panamax size vessels. The Panama Canal is being enlarged to accommodate vessels that draft 50 feet (Post-Panamax vessels) and the enlarged waterway is expected to be completed in 2016. The IWR report found that these vessels currently call at U.S. ports and will dominate the world fleet in the future. Post-Panamax vessels will call in increasing numbers at U.S. ports that can accommodate them. Currently, Mississippi River ports can accommodate Post-Panamax vessels with drafts of up to 45 feet, but not some of the larger vessels with drafts in excess of 45 feet. There may be economic justification in expanding port projects to accommodate post-Panamax vessels. The ports located along the lower Mississippi River, being the dominant ports for the export of grains from the U.S., will likely play a key role in meeting these future needs if they are ready with a post-Panamax sized channel.

3.0 STUDY PURPOSE AND NEED

The purpose of the GRR and SEIS is to identify the depth that creates the greatest net benefits up to a depth of 50 feet in order to implement the deepening the Mississippi River channel from the current depth of 45 feet. An evaluation of population growth trends, trade forecasts and examination of the current port capacities shows that there is very likely economic justification for deepening the channel. This GRR and SEIS will evaluate existing conditions, alternative designs, and provide environmental analysis of anticipated impacts associated with dredging and disposal alternatives. The handling of dredged material generated during construction, the engineering design of dredged material disposal areas, and several other aspects of the Project, that were evaluated in the 1981 Feasibility Report and EIS, will be updated as appropriate.

4.0 STUDY AREA

The study area is located in the southeastern portion of Louisiana and consists of the Mississippi River below Baton Rouge and its major outlet to the Gulf of Mexico, Southwest Pass. The area includes the 45 foot channel of the Mississippi River which services 4 of the top 15 ports in the United States including the largest port, the Port of South Louisiana. The Mississippi River, Gulf of Mexico to Baton Rouge Louisiana project authorized the construction of the channel to a depth of 55 feet. The project has been constructed and maintained to dimensions of 45' x 750' from New Orleans to Mile 18 BHP and 45' x 600' from Mile 18 BHP to Gulf of Mexico allowing for transfer of over 400,000,000 tons of cargo each year.

5.0 PROJECT GOALS & OBJECTIVES

The initial planning goal is to confirm that the authorized project is economically justified to move forward to construction. The ultimate goal of the project is to improve deep draft navigation on the MRSC to the authorized 50-55 feet in two phases (Phases III and IV). Phase III would increase the depth from 45ft. to 50ft. from the Gulf of Mexico to Baton Rouge. The final Phase IV would be pursued at a later date and would deepen the channel from a depth of 50 ft to 55 ft.

Planning Constraints

- Avoid or minimize potential impacts on existing ecological resources in the lower delta.
- Avoid impacts or minimize potential impacts to existing channel training works in the lower MS River Delta, particularly in South West Pass.
- Avoid impacts or minimize potential impacts to the riverine and hurricane risk reduction system adjacent to the Mississippi River Ship Channel

Planning Objectives

The plan formulation will be based on the following project objectives, while keeping the constraints in mind:

- Reduce transportation costs caused by vessel light loading, tidal/river stage delays, or other transportation costs for commercial deep draft navigation relating to insufficient depths in the Mississippi River Ship Channel, from the entrance channel in the Gulf of Mexico (Mile 22 BHP) to Baton Rouge (Mile 232.4), beginning in 2020.

* Measuring: Transportation cost savings

* Data Needed: Current and Future Shipping Fleet data

- Preserve, enhance, and restore ecological resources in the lower delta adjacent to the Mississippi River Ship Channel.

* Measuring: Acres of Marsh Created from Beneficial Use, AAHUs

* Data Needs: Beneficial use material available by year, bathymetry data, and land loss rates

- Reduce navigation concerns and improve vessel safety relating to insufficient width, in the Mississippi River Ship Channel Crossings (Mile 181 to Mile 232.4) beginning in 2020.

* Measuring: TBD

* Data Needed: TBD

- Maintain or improve operations and maintenance dredging intervals within Mississippi River Ship Channel Crossings, particularly in areas where improvements have already been investigated for the existing 45 ft depth channel, “*Mississippi River Ship Channel Gulf To Baton Rouge, Louisiana, Phase II 45Foot Channel (Mile 181-232.4), Design Memorandum No. 1, Supplement No. 2, Volume I.*”

* Measuring: Shoaling rates

* Data Needed: Deposition Rates, Annual Dredging Cost, Training Dikes Construction Cost

6.0 SCOPING MEETING

On May 18, 2015, a scoping meeting public notice fact sheet was mailed to approximately 407 individual mailing addresses compiled from an internal CEMVN mailing database. These individual addresses were comprised of various Federal, State and local agencies and officials, Parish and city government representatives, non-governmental organizations, and individual stakeholders and members of the public. The fact sheet provided an overview of the meeting purpose, date, address and time as well as sufficient project background, study alternatives, the purpose and need and issues/resources to be addressed. Two questions were also provided as a means of focusing the public’s concerns:

- *Question #1: What are the most important issues, resources, and impacts that should be considered in the SEIS?*
- *Question #2: Are there any other alternatives or modifications to the tentative alternatives that should be considered in the SEIS?*

In addition to the individual letters, four separate scoping meeting publications were run in three local newspapers on the following dates:

- *May 19 and May 26, 2015 – Plaquemines Gazette*
- *May 24 and May 28, 2015 – New Orleans Advocate*
- *May 24 and May, 2015 – Baton Rouge Advocate*

The May 13, 2015 Notice of Intent (volume 80, number 92, pp 27296-27298) identified the NEPA public scoping meeting dates, locations, times and meeting formats. The first scoping meeting was held on May 26, 2015 at the Belle Chasse Branch Library, in Belle Chaase, Louisiana and began at 6:00 p.m. with an Open House wherein the public was invited to visit a series of poster stations staffed by the project delivery team members and subject matter experts. The second scoping meeting was held at the New Orleans District, in New Orleans, LA and began at 8:30 a.m. The third scoping meeting was held at the Louisiana State Police Training Academy, in Baton Rouge, LA and began at 6:00 p.m. Each meeting began with Open House wherein the public was invited to visit a series of poster stations staffed by the project delivery team members and subject matter experts. The posters on display covered the following topics:

- *Project Study Area Map* – map depicting the region of the Mississippi River between Baton Rouge, LA and the Gulf of Mexico Louisiana showing river crossings, existing authorized depths, and areas south of Venice, LA.

- *Mississippi Watershed Map* – map showing the United States and identifying the Mississippi River Watershed as well as the major ports of the nation.
- *Panama Canal Expansion diagram* – comparison of the existing and future expansion of infrastructure in the Panama Canal.

Following the open houses, brief presentations were made to the attendees by the Senior Project Manager and Lead Planner. This presentation provided an overview of the NEPA process, discussed the historical background of Mississippi River navigation, highlighted the prior environmental studies and authorizations, and provided the context for the current study and project scoping meeting. Meeting attendees were informed that all comments and questions received during the meeting and those postmarked before June 15, 2015 would be included in the project scoping report.

After the presentations, the facilitator initiated the public comment period of the meeting. Individuals were invited to present their verbal and/or written scoping comments to be recorded without interruption. This part of the meetings continued until no further scoping comments were offered. In total, 80 individuals signed the attendance records positioned at the main entrance of the meeting halls. As the meetings concluded, all attendees were reminded to pick up postage-paid comment cards if they wished to submit additional comments at a later date.

7.0 SCOPING COMMENTS

This NEPA Scoping Report presents and summarizes the scoping comments expressed at the public scoping meetings, as well as all other scoping comments received during the scoping comment period beginning May 13, 2015, and ending June 15, 2015. This information will be considered both during the study process and in preparation of the draft Supplemental EIS. Each scoping comment was reviewed for content and categorized by where in the draft Supplemental EIS individual comments would likely be addressed. A transcript of comments made at the scoping meeting was prepared by a certified court reporter and is presented in Appendix A.

A combined total of 77 comments were recorded from scoping meeting participants and comments submitted during the scoping comment period (Table 1). Table 1 identifies the section of the draft Supplemental EIS where comments are likely to be addressed and the source of the comment. A scoping comment may be addressed in more than one section of the draft Supplemental EIS if such consideration is required to appropriately address the ramifications of the comment. Draft Supplemental EIS subject matter headings include: purpose and need for action (PN); alternatives, including the proposed action (Alt); affected environment (AE); environmental consequences (EC); and consultation and coordination (CC) with the Federal, state and other agencies. Compliance with regulations (Federal, state, and local environmental laws and regulations) is included in the latter category. Compliance with major environmental laws and regulations such as the Endangered Species Act of 1973, the Coastal Zone Management Act of 1972, and the Fish and Wildlife Coordination Act will be addressed in specific sections of the draft Supplemental EIS (especially in the Environmental Consequences section).

Table 1. Mississippi River Ship Channel, Gulf to Baton Rouge, Louisiana, General Reevaluation Study – Summary of Scoping Comments

Table 1. This table categorizes scoping comments by EIS subject matter, which is where an individual comment would likely be addressed in the draft Supplemental EIS. EIS categories include: PN = Purpose and Need; ALT = Alternatives; AE = Affected Environment; EC = Environmental Consequences; CC = Consultation, Coordination, and Compliance with Regulations (Federal, state, and local environmental laws and regulations). An individual scoping comment may be categorized under more than one EIS subject matter heading. A transcript of oral scoping comments from the NEPA public scoping meeting is provided in Appendix A. Copies of all written comments are provided in Appendix B. NOTE: Court reports of scoping meeting oral comments were not modified and public comments may have grammatical or spelling errors.						
Draft Supplemental EIS section where comment addressed						NEPA SCOPING COMMENTS
#	PN	ALT	AE	EC	CC	
Byron Enclade, Public Scoping meeting, Belle Chaase, LA						
1		X	X	X		Comment 1: You guys have taken any consideration that on some of these new passes that have been made now on the upper end halfway up the Mississippi River, what will that do when salt water starts coming back in? Of course, you know I'm talking about Mardi Gras Pass here. I mean that thing is about 50 or 60 or maybe even 100 foot wide and it's getting wider every year. Do y'all have any intentions of dealing with that and incorporating that into your plan?
		X				Comment 2: And if you don't have the funds to go all the way to Baton Rouge at 55, have y'all ever considered maybe going up to St. Bernard at 55? Because we know it's crucial trying to get ships to come through the Panama Canal and they are digging that at 55 so if we go less I'm just asking those questions.
						Comment 3: I support it 100 percent.
		X	X	X		Comment 4: So, what we're asking you, consider that when you are doing this project, there's an opportunity to give something back to the people. The revenue will pass by us, the fishing communities, historically trapping communities, we live off the land, so all I ask of you all is to say look, these people are not going to fight us, let's give them something back. So thank you.
Ken Ragas, Public Scoping meeting, Belle Chaase, LA						
2		X	X	X		Comment 1: I'm sure you are familiar with the Corps of Engineers study in February of 2014 of the crevasse south of Fort St. Phillip which accounted for 49 percent land loss, and it was actually a land loss accelerant as written up in that document like. I look at this dredging besides being an economic driver for the port of New Orleans and all them, I look for it as kind of a new incentive. I mean we could use every cubic yard that y'all have to dredge in the river to build the land in Plaquemines Parish. Because the CPRA has written off everything south of, Venice, okay, that's where the Delta starts. And we want to continue to be part of the United States, and so we're not going anywhere. So, please, save us.
		X				Comment 2: Another question I have is how wide is the channel going to be? I saw that you had a 500 foot wide channel, is that going to remain the width of the channel, 750 foot between New Orleans and Venice?
						Comment 3: I'm in favor also.

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Ken Ragas, Public Scoping meeting, Belle Chaase, LA						
2		X				Comment 4: What would be the proper method of communicating to y'all on the, say, building of a ridge on south of Ostrica, I mean would that be through the Parish would be the correct way to do that, Plaquemines Parish would say could you please use such and such borrow to do such and such a project? Ostrica wants that levee, you know, before they bulldozed the Bohemia Spillway levee the levee once ran all the way to Batiste Collette Pass and turned. Mr. Delesdernier is very familiar with that. And after Hurricane Camille the levee was not maintained by the Corps of Engineers anymore so it's --they must have 30 cuts in it right now. Try to make it wider so we can get something.
Clay Guidry, Public Scoping meeting, Belle Chaase, LA.						
3		X	X	X		Comment 1: Do you have any estimate of dredge material if you are going to remove or you haven't got that far yet?
		X				Comment 2: Do you have any plans to cooperate with the Louisiana CPRA and some of their projects?
				X		Comment 3: And that's the only way we are ever going to rebuild some of our wetlands, with dredge material out of the Mississippi River.
		X	X	X	X	Comment 4: I would also like to make a comment about what Mr. Ken was talking about, when you are talking about salt water intrusion up the river you have got so many cuts and breaks in the river right now that I don't know how, if you widen it and deepen it, and you have more volume you are going to have more problems than just water supply in Belle Chasse if you don't close up some of these Mardi Gras Pass, Port St. Phillip, that's all consideration that you really need to look at because when we have low river events we have to be concerned about those water intakes. You might run all the way up to New Orleans. I used to work with my friend Bryon back at the Alliance Refinery and I seen them have to put in a desalination plant so that they could purify the water so it wouldn't contaminate their systems so that's pretty high up. And If you have more volume with deeper and wider you are going to have that problem.
		X				Comment 5: I worked with the CPRA and worked with the user groups, shrimp guys and oyster guys in doing some of these projects. And I'll push on my end and have the pipe ready for you so you can hook into it. Thank you.
						Comment 6: I am in favor of it most definitely.

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Clay Guidry, Public Scoping meeting, Belle Chaase, LA.						
3			X	X		Comment 7: Are you guys cooperating -- right now CRPA is conducting some studies, river studies and trying to build very large scale versions of 65,000 CFS mid Barataria River Road and that's going to have some effect on the flow of the river, shoaling, are you working with those guys to kind of incorporate what they want to do into what you want to do? Because I think the numbers they are using are probably not considering 54 or 55 feet that you have got issue for.
			X	X	X	Comment 8: A lot of that money is not going to Plaquemines Parish, probably the largest percentage out of state, so what I would suggest is that you work with the Corps and set up your projects. I don't think the State can stop you from doing projects for Plaquemines Parish. And they are going to determine what cost it's going to be to get the sediment to wherever, and they may say well, we'll need this much money for this project. You take it from there, it's going to be less of a cost if you hire the dredging than you doing it yourself. That's what I try to get it across to CPRA, we should be marrying up, for want of a better word, with the Corps, and when they do their project we can have a project ready and pipeline waiting there. And if it takes a booster pump we should be doing the same thing, we should have those pipelines in place already and we don't. Instead we're spending 100 million dollars on consulting fees to see if we can build diversions.
Mark Delesdernier, Public Scoping meeting, Belle Chaase, LA.						
4						Comment 1: I fully support your project for 50 foot
			X			Comment 2: Now I would say since '48 we have had ships that can come in here and load way more than 45 feet but we restricted, and if we don't do something about this we're going to lose this business to Houston, we're going to lose it to Charleston, Mobile, the Texas Ports. We're at the bottom of the funnel for mid America.
			X			Comment 3: It's going to be important because if you are in the marine industry and you go to Houston they are already saying, God if we had the Mississippi River what we could do. And that's true and we really need to not sit on our hands, we really need to move on this project.
			X			Comment 4: So it just goes to tell you that diversions are not always are going to help the situation. But what we really need is the money to be able to take that dredge material and pump it into the swamps and rebuild our land, and that's what's going to be important with this project.
	X					Comment 5: One of the things you are going to have to consider is that the Corps is going to have to have the capacity with dredging to maintain this channel because you can't depend on private industry. Thank you.

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Charlie Bird, Public Scoping meeting, Belle Chaase, LA.						
5		X	X	X		Comment 1: My comment is who actually has the final authority to determine where that dredge material goes as far as the Corps? So if it's dredged in Plaquemines Parish technically that should go back in Plaquemines Parish and not another state or another Parish hopefully. It's not going to be cost effective to put it not close to where it's been dredged.
Sean Duffy, Public Scoping meeting, Belle Chaase, LA.						
6		X	X	X		Comment 1: Some of the things that I think are important enough to be on the record to say is since 2009 not only have we been doing the hopper dredges but in 2009 we started using cutter head dredges in Southwest Pass which hadn't been done in decades to the tune of about 4000 acres being created just through, in my mind, navigation partnering with the Corps to look at those kind of efforts. But I think one of the things that's important to remember here is dredging will be below Venice. So the areas for beneficial use to look at maximizing would be below Venice also.
						Comment 2: But I mean we face things that make, in my mind, no sense, elevation limits, and we have been part of successfully raising those limits in places in Southwest Pass. And if you have ever been down to Southwest Pass and seen something that you thought was too high I would love to know here it is. But I'll be glad to pick up the dredging conversation at a later time.
		X	X	X		Comment 3: It was over 50 and last year also it was monumental for the first time in a very long time Coastal Zone Consistency was awarded to the Corps partly because of these projects where we have been going down areas that cutter heads weren't allowed to work before and using them. And what's happened is now hopper dredges are working on sandy restoration projects, so we have had to use more cutter heads which means more beneficial use. All the cutter heads are beneficial use, there's just certain places you can't work a cutter head dredge. But in 2009 the places we thought we could not work on that list has changed a lot, there's only a couple of locations where a person was very restricted. And what's happened is there's a comfort with the cutter head dredges.
		X	X	X		Comment 4: That's the only area you have to dredge other than maybe a possible hot spot up to Bellmont Crossing which is mile 154 above header passes which is probably about ten miles above the Gramercy Bridge. So if you dredge from Venice on down the next place other than the New Orleans Harbor alongside the docks, if you have to dredge, the only place you have to dredge the channel once Venice is open is Bellmont Crossing, it's the first one that would have to be dredged.

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Benny Rousselle, Public Scoping meeting, New Orleans, LA.						
7		X	X	X		Comment 1: My name is Benny Rousselle with Plaquemines Parish Government, and our interest is in making sure that the saltwater up the river comes to a point where we would look at that to see if there’s any impact of the increase to our coastal water supply system. I know we talked about this before the meeting, but I want to go on the record to say that we are looking forward to those results and see what impact this project will have on our water system.
			X	X		Comment 2: How much of the river actually needs to be dredged to get to that 50 feet?
George Ricks, Public Scoping meeting, New Orleans, LA.						
8		X	X	X		Comment 1: My name is Captain George Ricks, I am president of the State of Louisiana Coalition. My organization and I would like to go on the record by saying we support this project under conditions that this project would make beneficial usage of dredging material for coastal restoration projects. I’d also like to caution the Corps to look into the possible effects that large scale river diversions that are now proposed in the master plan may have upon itself and may compromise the depth of the river after this project is done and also increase the saltwater wedge. I’d just like the Corps to take that into consideration in the further study of this project.
Joe Cocchiara, Public Scoping meeting, New Orleans, LA.						
9		X	X			Comment 1: The last time this was seriously studied was three decades ago. So, I would hope that the Corps’ study this time would take that into consideration that we really need to do this in a way that does help us see far into the future -- or at least contemplate alternatives as far into the future -- as unknown as that might be. With that in mind, my first suggestion is that the study go beyond 50 feet – that it go all the way to the full authorized depth of 55 feet. I understand there is no desire at this point to go beyond the 50 feet, but I think it would be unwise to take this opportunity, when you’ve “opened up the can of worms,” you got the consultants on board, you’re studying the economics, you’re studying the technical feasibility, you’re studying all the issues such as saltwater intrusion, why not let’s look at what the implications are of going all the way to 55 feet. I personally believe you will find a 55-foot project all the way to Baton Rouge remains economically viable as it did three decades ago from a net benefit standpoint. So, I strongly suggest that you consider looking all the way to 55 feet all the way to Baton Rouge in this project.

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Joe Cocchiara, Public Scoping meeting, New Orleans, LA.						
9		X	X			Comment 2: Secondly, I would also ask that you consider the deepening of the New Orleans Harbor to the full actualized depth of the main river shipping channel. There's been a point of difficulty over the past several years as the port has brought in larger and deeper container ships, particularly, and we would certainly hope to be able to tap into and take benefit of the full depth that's in the river for the harbor in New Orleans. Our containerized shipping business is our fastest growing business right now, and we would hope to be able to utilize and take advantage of the improvements of the Panama Canal and the improvements of this shipping channel.
		X				Comment 3: My third comment is perhaps a bit of a light comment, but I think you are wasting your time at any increments between 45 and 50. Perhaps you need to do that, but I feel truly confident that 50 is going to be the most justified depth of any depths between 45 and 50.
John Lopez, Public Scoping meeting, New Orleans, LA.						
10		X			X	Comment 1: There's one comment I'd like to make. I guess it's a question or comment that whatever comes out of it, it is consistent with the state master plan. So, my question is what assurance do we have that this process will end up as the tentatively selected plan or something be consistent with the state master plan?
Morgan Crutcher, Public Scoping meeting, New Orleans, LA.						
11			X	X	X	Comment 1: I have a question about the Corps' perspective on the high organization and ownership resources in the river. We've had past conflicts with the saltwater sill before and I can't imagine that this will be an issue again. What is the Corps' perspective on how those conflicts will be resolved in the future? Oh, sorry. My name is Morgan Crutcher. I am with the Coalition to Restore Coastal Louisiana.

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Sean Duffy, Public Scoping meeting, New Orleans, LA.						
12			X	X	X	Comment 1: First, on Mr. Lopez’ point about agreement with the state master plan. From a realistic standpoint, the dredging for this channel, if it is successfully funded and appropriated to move forward, is from Venice on down. I think one of the challenges with the state master plan, is there’s not a project in that area that at the lowest project on the river is about 28.5 below the diversion, so the first 50 miles of river are unaccounted for in the state master plan. There’s been a great deal of beneficial use over the last five years that it’s been getting done with cutter head dredges which led to coastal zone consistency, so I would believe there is some well-laid efforts that will help with increasing the beneficial use of dredge material which I believe is the intended goal across the board. I think that the sill discussion, there is an agreement between the state and the Corps, and I think that’s going to determine how that project is managed. So I would refer it back to that.
Mr. Hose, Public Scoping meeting, New Orleans, LA.						
13		X				Comment 1: The dredging, of course, to 50 feet is totally supported. My concern is the farther we go up river with any air draft limitations created particularly during a higher river. They are going to preclude the larger ships from going up-river anyway, unless they can ballast down. So I am just requesting that the Corps look at all the air draft limitations that might present themselves.
April Newman, Public Scoping meeting, Baton Rouge, LA.						
14				X		Comment 1: I’m with the Atchafalaya Basin Program. I’m curious how you will - - o r whether or not it is going to continue past the point where you’re doing dredging and how it’s going to affect things upstream, such as the Ole River construction? I was just wondering like how do you prevent the head coating from continuing to migrate upstream.
			X	X		Comment 2: Will this project affect the new flow lines?

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#	PN	ALT	AE	EC	CC	
Joseph Accardo Jr, Public Scoping meeting, Baton Rouge, LA.						
15	X	X				Comment 1: I'm the executive director of the Ports Association of Louisiana. Our trade association represents thirty-one (31) port s throughout the state and in particularly, the ports along the Mississippi River , Port of South Louisiana, Port of New Orleans, Port of St. Bernard, and Port of Plaquemines. Our boards strongly support the project deepening of the Mississippi River to fifty (50) feet. In my twenty (20) years of interaction with the importers and exporters on the Mississippi River, those who export and import bulk materials, such as grain, fertilizers, oil and gas , all have said to me that a deeper channel will permit larger ships to carry cargo at more a efficient return cost and will make Americans far more – American farmers, American manufacturers – far more competitive on world market. And so therefore, we as a trade association, and I 'm sure the -- the use of the Rive r w ill - - will strongly support this project. Thank you.
			X	X		
Greg Ducote, Public Scoping meeting, Baton Rouge, LA.						
16		X	X			Comment 1: I would like to know if there is any consideration within the study and are y' all going to look at any dredging in South Pass or -- and/or Pass a Loutre.
Bren Haase, Public Scoping meeting, Baton Rouge, LA.						
17						Comment 1: I just want to say, we're, you know, excited about this effort. I think that certainly we recognize the potential economic impact a deeper channel can have on -- o n both this region of the state. But I did have a few questions.

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Bren Haase, Public Scoping meeting, Baton Rouge, LA.						
18	X			X		Comment 1: Does the scope of this effort relate to the placement of the additional dredge material that will be generated from a deeper channel? I mean, is that -- wouldn't that be brought into consideration, because that's part of the economics?
		X	X	X		Comment 2: One of the big concerns of our agency is just the same as the others: trying to for a sustaining coast. And so, one of the questions I guess, would be is there any - - will t here be any consideration, I guess, as far as the landscape around the navigation channel and the sustainability of it? So, you know, if it's economically justified to deepen the channel but perhaps the landscape is not there to support the channels, is that -- is any part of that going to be brought into the thinking in terms o f whether, you know, this is a – a good idea?
						Comment 3: The third thing I had, I guess, was (inaudible) suite of tools that we have had available to evaluate some of these things that I would imagine and hope, I guess, that those will be use d in this effort as well. Do you know that yet? Or can you comment on that?
US Environmental Protection Agency, email dated June 03, 2015.						
19		X		X	X	Comment 1: EPA is particularly interested in an analysis of vegetated wetlands or submerged aquatic vegetation that may be adversely or beneficially impacted. We encourage consideration of beneficial use of the dredged material by either implementing wetland fill projects, or by making dredge material available to other entities, i.e. CWPPRA, State, Third Party Mitigation Bankers for other projects. We acknowledge that beneficial use is not always practical or feasible, but we believe it should always be considered in the evaluation process.
US Fish And Wildlife Service, letter dated June 04, 2015.						
20					X	Comment 1: The most significant fish and wildlife related problem in the study area and throughout coastal Louisiana is the rapid loss of valuable wetland habitat. Currently the State of Louisiana and the Corps are conducting modeling of the Mississippi River) for the Louisiana Coastal Area, Mississippi River Hydrodynamic Study, Main Channel of the Mississippi River. Those efforts are working to identify the best potential coastal restoration measures that can be developed.

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US Fish And Wildlife Service, letter dated June 04, 2015.						
20					X	Comment 2: The Service's 49,000 acre Delta National Wildlife Refuge (NWR) is within the study area and currently material dredged from routine maintenance of the Mississippi River is disposed beneficially on that NWR. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on a NWR will require the Corps to obtain a Special Use Permit from the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager for further information on and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR. The Refuge Manager for the Delta NWR is Ms. Shelly Stiaes, (Shelly_Stiaes@fws.gov or 337.882.2000). Louisiana Department of Wildlife and Fisheries' (LDWF) Pass-a-Loutre Wildlife Management Area (WMA) encompasses approximately 115,000 acres and is located within the Mississippi River Delta. Please contact the LDWF Office (504-284-5267) for further information regarding any additional permits or coordination that may be required to perform work on that WMA. Both of these public lands could be impacted by any reduced flows of sediment laden water currently being delivered by adjacent distributaries. A reduction of the water surface elevation via deepening of the channel could potentially result in decreased water flows down distributaries and an increase in erosion of these areas. Man-made crevasses have been constructed for both restoration and mitigation purposes; similarly reduced flows off of the distributaries could adversely impact the benefits from these crevasses. Appropriate investigations should be undertaken to determine if such adverse impacts will occur. If they are determined to occur appropriate on-site mitigation should be developed in operation with the Service, LDWF and other natural resource agencies and implemented concurrent with project construction.
				X	X	Comment 3: Currently the State of Louisiana and the Corps are conducting modeling of the Mississippi River for the Louisiana Coastal Area, Mississippi River Hydrodynamic Study, Main Channel of the Mississippi River. That study is attempting to identify the best potential coastal restoration measures that can be developed using the Mississippi River. Restoration alternatives focus on sediment diversions from the Mississippi River. Lowering of the river bed due to dredging may have an effect on river stages, thus the quantity and duration of flows that could be released by a sediment diversion. To determine if such an impact may occur the Service recommends that the models being used for the above mentioned

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20			X	X		hydrodynamic study be employed, as appropriate, to determine if such potential impacts are likely and their impact on those coastal restoration efforts quantified. Impacts to existing freshwater diversions and siphons should also be ascertained The Coastal Wetlands Planning, Protection and Restoration program, (CWPPRA) has funded restoration projects that involve dredging sediments from shoals in the river to restore eroded coastal marshes. If changes in the river flow patterns fr9m the proposed deepening decrease sedimentation on those shoals there could be a negative impact to such restoration efforts. Therefore, the Service recommends investigations be undertaken to determine and address these potential impacts.
		X		X		Comment 4: The Service recommends that to the extent feasible all dredged material should be used beneficially to restore coastal habitats that are in decline. The Service continues to urge the Corps to reduce or avoid the use of the Hopper Dredge disposal Area (HDDA), near the head of Pass-a-Loutre and South Pass in order to avoid or lessen the impacts to fish and wildlife habitat in Delta NWR and Pass-a-Loutre WMA. The Service commends the Corps for their habitat creation in the Mississippi River Delta using material excavated from the HDDA but urges the Corps to directly place dredged material at beneficial us sites. We also continue to recommend, when practicable, the expanded use of cutterhead dredges which have been used successfully in Southwest Pass to create wetland habitat along the channel. If hopper dredges are used for construction the Service r ecommends the Corps utilize the hopper dredge pump out technique to maximize beneficial use./ With the hopper dredge pump out technique an additional hopper dredge would be used so that while one is dredging the other could have dredged material pumped from the hopper for beneficial use. Moreover, material removed from the channel by hopper dredge and placed! in a designated beneficial use site would reduce the amount of material placed in the "Above Head of Passes" HDDA or the designated ocean disposal site as requested in the previous paragraph. To help plan the beneficial use of dredged material from construction and/or maintenance the Service recommends that the Corps determine dredging future locations and quantities of dredged material and provide this information to the resource agencies as early as possible.

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US Fish And Wildlife Service, letter dated June 04, 2015.							
20			X		X	Comment 5: The Service is concerned that any change to the slope of the river's water surface as a result of the deepening may result in changes to erosion (i.e., head cutting) and sedimentation patterns upstream of the dredging. Our concerns are focused on the tributary rivers and streams, side and secondary channels, and in-stream sand bars. All of those features potentially provide habitat to threatened or endangered species (i.e., pallid sturgeon, interior least tern, and fat pocketbook mussel) for which the Corps has defined conservation measures in the MVD Conservation Program to aid in the recovery of those species. The Service recommends that investigations be undertaken to determine if adverse impacts from the deepening may affect the Conservation Program or those species habitat.	
			X	X		Comment 6: Deepening and enlarging channels can result in erosion due to increased channel instability. An increase in the size and number of vessels can also increase erosion of shorelines due to wavewash. Increased protection of river banks and levees may be needed to reduce such erosion resulting in impacts to fish and wildlife habitat. Maintaining or reforesting the batture to reduce wave energy on levees should be examined as a possible alternative to normal erosion protection measures (e.g., revetments, foreshore protection). Impacts from all of the above factors should be addressed in the study.	
						X	Comment 7: Mitigation for adverse impacts to fish and wildlife resources should be undertaken concurrent with the channel deepening. In addition, an assessment of mitigation from the previous deepening should be undertaken to gain insight on improving construction techniques and determining longevity of such mitigation.
					X	X	Comment 8: Bird nesting colonies are present in the project area; sortie colonies present may not be currently listed in the database maintained by the LDWF. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season. We recommend that you coordinate with this office early in the planning phase to avoid and minimize impacts to nesting bird habitat and ensure that potential constraints with nesting birds are considered in the design of the project and unnecessary delays are avoided. If dredge material

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20				X	X	<p>disposal activities are likely to impact nesting shorebirds a nesting bird abatement plan should be developed in coordination with this office prior to commencement of project construction. The Service is willing to help identify additional measures <i>that</i> could be incorporated in the project design and construction timeline to minimize impacts to nesting birds while also avoiding impacts to the project construction sequence and timeline. To minimize disturbance to any colonial nesting birds, the following restrictions on activity should be observed:</p> <p>For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably along Louisiana's brown pelican colonies, however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. The LDWFs' Fur and Refuge Division should be contacted to obtain the most current information about the nesting chronology of individual brown pelican colonies. Brown pelicans are known to nest on barrier islands and other coastal islands in St. Bernard and Plaquemines Parishes.</p> <p>For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorant, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).</p> <p>For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted/ to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).</p>
		X	X	X		<p>Comment 9: The increased depth of the channel may increase the frequency of salt water intrusion events requiring the salt water sill to be constructed more often. The greater frequency of construction may use shoal material that is also being examined for 4edicated marsh creation dredging; this potential conflict should be investigated. If additional infrastructure is needed to provide a more reliable fresh water source to downstream areas impact associated with those activities should also be addressed.</p>

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20		X	X	X	X	<p>Comment 10: Below is a list of federally-listed threatened and endangered species that could potentially be affected by the Corps' proposed channel deepening. In addition, a brief description of basic information regarding those species is provided. Should the proposed action directly or indirectly affect any of the listed species further consultation with this office will be necessary.</p> <p>The endangered West Indian manatee (<i>Trichechus manifitus</i>) is known to regularly occur in Lakes Pontchartrain and Maurepas and their associated coastal waters and streams. It also can be found less regularly in other Louisiana coastal areas, most likely while the average water temperature is warm. Based on data maintained by the Louisiana Nat4ral Heritage Program (LNHP), over 80 percent of reported manatee sightings (1999-2011) in Louisiana have occurred from the months of June through December. Manatee occurrences in Louisiana appear to be increasing and they have been infrequently observed in the Mississippi River. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species number due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. During in-water work in areas that potentially support manatees all personnel associated with the project should be instructed about the potential presence of manatees, manatee speed zones, and the need to avoid collisions with and injury to manatees. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 972 and the Endangered Species Act of 1973. Additionally, personnel should be instructed not to attempt to feed or otherwise interact with the animal, although passively taking pictures or video would be acceptable.</p> <p>All on-site personnel are responsible for observing water-related activities for the presence of manatee(s). We recommend the following to minimize potential impacts to manatees in areas of their potential presence:</p> <p>All work, equipment, and vessel operation should cease if a manatee is spotted within a 50-foot radius (buffer zone) of the active work area. Once the manatee has left the buffer zone on its own accord (manatees must not be herded or harassed into leaving), or after 30 minutes have passed without additional sightings of manatee(s) in the buffer zone, in- water work can resume under careful observation for manatee(s).</p> <p>If a manatee(s) is sighted in or near the project area, all vessels associated with the project should operate at "no wake/idle" speeds within the construction area and at all times while in waters where the draft of the vessel provides less than a four-foot clearance from the bottom. Vessels should follow routes of deep water whenever possible.</p>

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US Fish And Wildlife Service, letter dated June 04, 2015						
20		X	X	X	X	<p><i>If used, siltation or turbidity barriers should be properly secured, made of material in which manatees cannot become entangled, and be monitored to avoid manatee entrapment or impeding their movement.</i></p> <p><i>Temporary signs concerning manatees should be posted prior to and during all in-water project activities and removed upon completion. Each vessel involved in construction activities should display at the vessel control station or in a prominent location, visible to all employees operating the vessel, a temporary sign at least 8Yz "X 11" reading language similar to the following: "CAUTION BOATERS: MANATEE AREA/ IDLE SPEED IS REQUIRED IN CONSRUCTION AREA AND WHERE THERE IS LESS THAN FOUR FOOT BOTTOM CLEARANCE WHEN MANATEE IS PRESENT". A second temporary sign measuring 8Yz "X 11" should be posted at a location prominently visible to all personnel engaged in water-related activities and should read language similar to the following: "CAUTION: MANATEE ARE EQUIPMENT MUST BE SHUTDOWN IMMEDIATELY IF A MANATEE COMES WITHIN 50 FEET OF OPERATION".</i></p> <p><i>Collisions with, injury to, or sightings of manatees should be immediately reported to the Service's Louisiana Ecological Services Office l(337/291-3100) and the Louisiana Department of Wildlife and Fisheries, Natural Heritage Program (225/765-2821). Please provide the nature of the call (i.e., report of an accident, manatee sighting, etc.); time of incident/sighting; and the approximate location including the latitude and longitude coordinates, if possible.</i></p>
			X	X	X	<p><i>Comment 11: The pallid sturgeon (Scaphirhynchus albus) is an endangered, bottom-oriented, fish that inhabits large river systems from Montana to Louisiana. Within this range, pallid sturgeon tend to select main channel habitats in the Mississippi River and main channel areas with islands or sand bars in the upper Missouri River. In Louisiana it occurs in the Mississippi River. The pallid sturgeon is adapted</i></p>

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20			X	X	X	<p>to large, free-flowing, turbid rivers with a diverse assemblage of physical characteristics that are in a constant state of change. Life history details and subsequent habitat requirements of this fish are not known. However, the pallid sturgeon is believed to utilize Louisiana riverine habitat during reproductive stages of its life cycle. Habitat loss through river channelization and dams has adversely affected this species throughout its range.</p> <p>Entrainment issues associated with dredging operations in the Mississippi River is a potential effect that should be addressed in analyzing current proposed project effects. We recommend the following to minimize potential impacts to pallid sturgeon associated with dredging to ensure protection of the pallid sturgeon: (1) the cutterhead should remain completely buried in the bottom material during dredging operations. If pumping water through the cutterhead is necessary to dislodge material or to clean the pumps or cutterhead, etc., the pumping rate should be reduced to the lowest rate possible until the cutterhead is at mid-depth, where the pumping rate can then be increase; (2) during dredging, the pumping rates should be reduced to the slowest speed feasible while the cutterhead is descending to the channel bottom.</p>
			X	X	X	<p>Comment 12: The red knot (<i>Calidris canutus rufa</i>), federally listed as a threatened species, is a medium-sized shorebird about 9 to 11 inches (23 to 28 centimeters) in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non- breeding plumage is dusky gray above and whitish below The red knot breeds in the central Canadian arctic but is found in Louisiana during spring !and fall migrations and the winter months (generally September through March).</p> <p>During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots</p>

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20			X	X	X	forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (<i>Donax variabilis</i>), a frequent and often important food resource for red knot, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation. Because red knots are known to utilize the Mississippi River Delta we recommend that the Corps investigate the feasibility of creating foraging and roosting areas for red knots in association with dredged material disposal operations. Such habitat restoration/creation could be incorporated into an ESA Section 7(a)(1) Conservation Program that could aid the Service in recovery efforts for that species.
		X		X	X	Comment 13: In order to help the Corps address the above concerns the Service has identified the following planning objectives that should be incorporated into planning efforts: 1. Avoid and/or minimize impacts to wetlands, including submerged aquatic vegetation in the study area. 2. Avoid and/or minimize impacts to coastal restoration efforts in the study area and conduct sufficient investigations to obtain enough information so that restoration efforts can be designed to accommodate any possible changes with minimal impact to their effectiveness. 3. Avoid impacts to endangered or threatened species and their habitats within and upstream of the study area. Investigate the possibility of using dredged material to restore/create habitat for threatened or endangered species. 4. Avoid impacts to migratory birds. 5. Coordinate with the Service and other natural resource agencies in the planning of disposal areas and techniques and assessment of impacts and mitigation.

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Louisiana Department of Natural Resources, letter dated July 2, 2015						
21			X	X		Comment 1: DNR is well aware of the economic and strategic value of the Mississippi River to the State and the nation. Improvements to navigation that allow access of larger vessels to the lower Mississippi River ports will add significantly to that value. However, Louisiana would be remiss not to express concerns that proposed changes to the River may result in adverse impacts to valuable wetland habitat.
		X		X		Comment 2: The most recent Environmental Impact Statement (EIS) for the Mississippi River was completed in 1976. Since that time, there has been a great expansion in the understanding of Louisiana’s coastal processes and the vital role that the Mississippi River’s sediment supply plays in maintaining coastal integrity, along with the human dependence on an intact coast. Deltaic systems are by their nature dynamic, and many changes have occurred to the lower River since the last comprehensive environmental review. Man-made changes have been even more extensive, many of them the result of your agency’s activities in navigation and flood control. In addition to their positive values, the leveeing, channel training, dredged sediment disposal, and other actions taken by the Corps in the course of managing the River have also resulted in adverse impacts which were underestimated, not anticipated, and/or poorly understood in the mid-1980s. Louisiana urges the Corps to take the broadest possible view, and document the full suite of impacts resulting from these actions and processes as well as all potential effects from deepening. The hydrodynamics of the delta distributaries and their effects on deltaic development, especially Pass a Loutre, should be examined in the light of actions taken by the Corps in the course of managing the River. During the public scoping meeting, one of the Corps presenters was understood to say that the SEIS would not address cumulative and secondary impacts resulting from the proposed channel deepening. Please be reminded of the requirements under NEPA at 40 CFR §1502.16, Environmental consequences: ... This section ... shall include discussions of... (b) Indirect effects and their significance (Sec. 1508.8). And §1508.7 Cumulative impact. "Cumulative impact" is the impact on the environment which results 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 but collectively significant actions taking place over a period of time. §1508.8 Effects.

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Louisiana Department of Natural Resources, letter dated July 2, 2015						
21		X	X	X		<p>"Effects" include:</p> <p>(a) Direct effects, which are caused by the action and occur at the same time and place.</p> <p>(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.</p> <p>Effects and impacts as used in these regulations are synonymous. Effects may result from actions which have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.</p> <p>Given the obsolescence of the existing environmental document, OCM strongly urges your agency to evaluate the indirect, cumulative, and secondary impacts already experienced along the lower Mississippi River as part of quantifying the existing conditions/no action alternatives, and as a means of anticipating future indirect, cumulative, and secondary impacts which may result from the proposed deepening project.</p>
				X	X	X

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Louisiana Department of Natural Resources, letter dated July 2, 2015						
21			X	X	X	disposal pipeline to provide beneficial use opportunities for both the deepening project and future maintenance dredging.
			X	X	X	Comment 3: Currently the State of Louisiana and the COE are conducting modeling of the Mississippi River to identify the best potential coastal restoration measures that can be developed using the Mississippi River. Lowering the river bed may have an effect on river stages, thus the quantity and duration of flows that could be released by a sediment diversion. Louisiana recommends modeling to determine if potential impacts are likely and to quantify their impact on coastal restoration efforts.
						Comment 5: Deepening and enlarging channels can result in erosion due to increased channel instability. Also, an increase in the size and number of vessels can exacerbate erosion of shorelines due to wavewash. Louisiana recommends modeling to determine if potential impacts are likely and to quantify their impact on the river system.
			X	X		Comment 6: The increased depth of the channel may increase the frequency of salt water intrusion events. Louisiana recommends modeling to determine if potential impacts are likely and to quantify their effect on coastal Louisiana.
The New Orleans Board of trade, letter dated June 10, 2015						
22						Comment 1: We are confident that deepening the Lower Mississippi River will have a positive effect on the maritime industry as well as the economy of both the state and entire nation. On behalf of the membership, The New Orleans Board of Trade would like to go on record as fully supporting the deepening of the Lower Mississippi River from the Sea Buoy to Baton Rouge to fifty (50) feet. We appreciate being allowed to submit this letter of support for this important project.
Chalin Perez, Port Eads Fishing Club, letter dated June 15, 2015						
23		X	X			Comment 1: I am writing to object to any further dredging at the Head of Passes that does not also include at the same time the actual dredging of South Pass to its approved depth. We are told that the dredging of South Pass has not been done in years simply because of funding. The U.S. Coast Guard abandoned the aids to navigation in South Pass on information that the U.S. Corps of Engineers would not get funding to dredge South Pass. The aids to navigation have been replaced. The present dredging at the

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Port Eads Fishing Club, letter dated June 15, 2015						
23		X	X			Head of Passes is causing the silting of South Pass. Some sections are not marked as to the dangers to navigation. Any dredging approval and the funding should include the dredging of South Pass. South Pass had been navigable since the first explorers traveled up the Mississippi River and it is only the dredging at the Head of Passes and the Corps failure to maintain South Pass that the present conditions exist.
The World Trade Center New Orleans, letter dated Jun 15, 2015						
24						Comment 1: WTCNO is confident that deepening the river will have a positive effect on Louisiana's economy and ability to facilitate trade, leading to an increase in economic opportunities for the state and the nation. On behalf of the membership of WTCNO and the WTCA, we would like to go on record as fully supporting the deepening of the Lower Mississippi River, from the Sea Buoy to Baton Rouge, to fifty feet. We appreciate the opportunity to submit this letter of support, as we feel strongly about the positive impact of this project. If you have any additional questions or if we can be of any assistance, please feel free to contact me.
Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25						Comment 1: At the outset we would make one over-arching observation: efficient and successful navigation of the lower Mississippi River is critical to the US economy, and we strongly support efforts to maintain the competitive advantages for the port systems along the Lower Mississippi River. Those advantages are good for both national and Louisiana interests.
		X	X	X		Comment 2: Within that context, and regarding the scope of this investigation, we strongly urge the U.S. Army Corps of Engineers (USACE) to seize the opportunity to fully integrate this effort with work already underway on the Mississippi River to find the means to successfully forge a united path forward for the people, economy, culture and environment of the Lower Mississippi River. The continuing rate of land loss within the delta coupled with a changing and uncertain future require a new and a management paradigm for the lower river - management that recognizes the need to realistically and pro-actively balance navigation, flood control and the utilization of ecosystem services. The survival of the Lower Mississippi River and its delta depends upon it.

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Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25		X	X	X		Comment 3: Let it not be said of us in the future that by failing to think about and examine the broader implications of the project before us, we made the same mistake here as we made in the past, which was to discount the potential impacts of a project because we so favor the potential benefits.
		X	X	X		Comment 4: This reevaluation study provides a key opportunity to consider the long-term future of the navigation system and to integrate its needs with the ecosystem restoration program and flood control system of the Lower Mississippi River (LMR). This study should intersect with the ongoing Mississippi River Hydrodynamic and Delta Management Study (MRHDM) and the Mississippi River Flowline Study and Water Control Manual Update to create a vision for comprehensive management of the LMR. All three studies are being developed separately by the USACE. Integrating these efforts would be far more effective than treating them as separate factors that are pitted against one another competing for limited financial and natural resources. The long-term sustainability of the navigation channel and the efficacy of the flood storm risk reduction system for millions of people and vital infrastructure relies upon a robust Mississippi River Delta providing ecosystem service such as storm surge attenuation and floodplain management. Comprehensive management of the river can provide more robust means to manage user needs, fitted together to strengthen the whole.
		X	X	X		Comment 5: In order to fully identify and assess the potential direct, indirect and cumulative impacts of this navigational deepening project, it is essential to use the best science available to define baseline conditions of the LMR. It is not a static system. The 2014 MRHDM geomorphic assessment of the LMR by Little and Biedenbarn observed significant decadal timescale changes in the stability of the river channel. The reach of the river between Empire and River Mile (RM) 4, part of which will likely require dredging if the channel is deepened to 50-ft, has shifted from a trend where the channel was deepening over time (degradation) in 1960s and 1970s to a trend where the channel is filling in over time (aggradation) in the 1990s and 2000s. This shift to aggradation suggests that this reach of the river channel which might not have required dredging in 1981, would now require dredging to maintain the existing 45-ft channel, let alone 48-ft or 50-ft channel depth. Channel stability is not the only baseline condition of the system that has changed since the 1981 EIS, relative sea level has risen at least 10-inches between 1981 and 2014. This and many other conditions of the river and the surrounding system may have changed since the 1981 study. Compared to 1981, there is much more information available about baseline environmental conditions, such as subsidence, sea level rise, the hydrodynamics and sediment dynamics of the river and how they can affect the

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Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25		X	X	X		<p>navigation channel, infrastructure and the amount and frequency of required dredging and wetland loss and the resulting reduced storm surge buffering capacity of the system. Indeed, in accordance with 40 CFR 1502.9(c)(1)(i), the amount of new information and evidence of changing circumstances relating to a discussion of baseline conditions at the mouth of the river over the next 50 years is so vast compared to the information and analytic capability available in 1981 it is appropriate for the Corps to undertake a robust, new and thorough assessment of current and projected baseline conditions and not view this assessment simply as a “supplement”. This supplemental EIS should use the MRHDM study and others sources of new data and modeling capacity to provide a whole new assessment of these dynamic baseline conditions and how they are affecting the sustainability of the 45-ft channel. In general, the question should be what the implications of these shifting forces are on the integrity and sustainability of the current navigation channel at 45-feet and then use that as starting place to look forward by decade over the next 50 years.</p> <p>Another aspect of the changing environment that an examination of river channel deepening must consider is the delta restoration program that Congress authorized in Title VII of 2007 WRDA and that Louisiana’s2012 Coastal Master Plan (2012 CMP) describes. By the time this supplemental EIS is completed, the State will have made substantial progress on projects selected in the 2012 CMP and made considerable progress on its 2017 Coastal Master Plan. A description of various options for the restoration program and the timing of the implementation of that program is necessary since deepening of the navigation channel could have an impact on the restoration program, and the restoration program could affect the channel and the benefits and costs of maintaining a deeper channel. Since, at a conceptual level, the goal of the restoration program is to convey sediment from the LMR into the delta wetland complex via diversions and/or dredging and pumping, the potential exists to control disposal of sediment in the navigation channel where it requires dredging and to promote deposition at upstream points where the material can be used beneficially via dredging and pumping for sustainable wetland creation higher in the estuarine basins on either side of the lower river.</p>
		X	X	X		<p>Comment 6: The major environmental impacts identified in the 1981 study, marsh loss and salt wedge migration, should be reexamined using information available today. In addition, changes in the hydro and sediment dynamics in the river and storm surge propagation upriver associated with deepening the navigation channel should be investigated. The ongoing MRHDM effort has developed a full suite of modeling tools that should be used in this study, including the local and regional Delft3D models, FVCOM, AdH and HEC-6T. By using the full suite of tools, the forecasted impacts of channel deepening on a local and regional scale can be</p>

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Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25		X	X			<p>better refined and the effects of shifting conditions and environmental uncertainties on the navigation channel and dredging needs, such as future sea level rise, subsidence, changes in river discharge patterns and changes in precipitations patterns, can be forecasted to estimate the dredging needed to maintain the project alternatives over the 50-years.</p> <p>Salt wedge migration: As part of the 1981 feasibility analysis, a saltwater sill and freshwater holding facilities were considered part of the USACE mitigation responsibility for the adverse impacts of the salt wedge migration upwards within the deeper channel. A sill was constructed in 1988 and again in 2012 at -45-ft, five feet higher than a -50-ft channel and 10-ft higher than a -55-ft channel. A sill constructed at this height is clearly in conflict with the proposed depths of the channel whose purpose is for navigation. Complicating matters further, the borrow source identified with construction of the sill is the same source identified as a borrow site for marsh creation projects within the 2012 CMP. This study should anticipate conflicts in resource needs along the river and develop mutually-agreeable solutions.</p> <p>Marsh loss: The 1981 study presents estimates of the number of acres of marsh near the mouth of the river and over a broader area that are likely to be lost with no deepening of the river below its then depth of 40-ft. That study projected loss of different marsh types without the channel deepening at 10 years intervals. The supplemental EIS should include similar forecasts for changes in marsh acreage with and without project based on the latest information from the USGS 2011 land area change study, the 2012 CMP, and the MRHDM study. Additionally, projections of the number of acres of marsh that would be created by decade with material dredged from the initial channel deepening and maintenance of the project alternatives should be compared with that information with a 50-foot channel in place. The 1981 EIS seemed to assume that new marsh created in this manner was sustainable. In any event, any new marsh created at the mouth would erode and subside just like existing marsh. These processes should be identified, since environmental benefit claims are time sensitive and not permanent.</p> <p>Changes in hydro and sediment dynamics in the river: The deepening of the river channel from 45 to 50-ft may shift the location and quantity of sediment deposited in the LMR channel and the location of bars in the river that have been identified as resources needed for coastal restoration projects. This supplemental study should use the tools developed through the MRDHM study to examine possible changes to the hydro and</p>

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Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25		X	X	X		sediment dynamics of the river due to channel deepening over the 50 year life of the project that could have implications for the delta restoration program, particularly changes that could impact the availability of sediment for sediment diversions and dredging and pumping higher up in the estuarine system. Additionally, this study should collaborate with the MRDHM study to investigate the potential benefits of reduced dredging requirements that could be reaped from sediment diversion projects. The possible impacts of this deepening project on the resources needed for ecosystem restoration and the dredging-reduction benefits that may be derived from sediment diversion projects again highlights the need for an integrated river management that proactively balances navigation, flood protection and ecosystem restoration. Storm surge propagation upriver: Hurricanes can lead to storm surge propagating up the Mississippi River. During Hurricanes Katrina and Isaac, storm surge increased river stage at the USACE Carrollton gage in New Orleans by at least 10-ft and 6-ft, respectively. An important impact to consider as part of this deepening study is the increased storm surge height and distance of propagation upriver that may result, intensifying pressure on the river levees, particularly those in Plaquemines Parish.
			X	X	X	Comment 7: The final selected plan for possible channel deepening should be consistent with the currently approved State Master Plan. It is incumbent for both Federal and State partners to recognize the consistency requirements as they relate to the state master plan and that they endeavor to establish consistency within the execution of the channel deepening study.
		X	X	X	X	Comment 8: Mitigation is required under 33 U.S.C. section 2283(d) and the Clean Water Act, for “damages to ecological resources, including terrestrial and aquatic resources, and fish and wildlife losses created by such project” unless the Secretary of the Army issues a written determination that the project will have “negligible adverse impact on ecological resources and fish and wildlife without the implementation of mitigation measures.” In developing the required mitigation plan, the EIS/Re-Evaluation report should consider piping dredged material from the deeper channel upstream further into the Barataria Basin and the Breton Sound Basin where the wetlands created could be more sustainable because of their location in these estuaries and because they could be sustained with sediment delivery into the basins via sediment diversions.

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Audubon Society, Coalition to Restore Coastal Louisiana, Environmental Defense Fund, Lake Ponchartrain Basin Foundation, Louisiana Wildlife Federation, and the National Wildlife Federation, letter dated June 15, 2015.						
25		X	X	X		<p>Comment 9: The National Water Resources Planning Policy established by Congress in 2007 states that “all water resources projects” shall “protect and restore the functions of natural systems and mitigate any unavoidable damage to natural systems.” 33 U.S.C 1962-3 (established by § 2031(a) of the Water Resources Development Act of 2007, and immediately applicable to all water resources projects). Accordingly, this SEIS must evaluate alternatives that would promote protection and restoration of the natural land-building and Delta wetland preservation functions of the Mississippi River, and must ultimately select an alternative that is consonant with these objectives. In combination with the “no action”, 48-ft navigation channel and a 50-ft navigation channel alternatives outlined in the scoping notice, this study should therefore also consider, in each alternative, the possibility for the integrated use of sediment diversion projects to help defray the costs of maintaining a deeper navigation channel and to restore and preserve Delta wetlands.</p> <p>Thus, consistent with the purpose of an investigation of reasonable alternatives as set forth in ER 1105-2-100 G-16(14) and 40 CFR 1502.14(a) and 1508.25 and the requirements of the National Water Resources Planning Policy, the EIS should present as an alternative a broader framework for assessing the proposed deepening of the navigation channel that looks at the relationships between navigation, flood control, risk reduction and ecosystem restoration actions and strategies for integrating those actions and making them mutually supportive. Today they are often in conflict. This framework should recognize the long-term dependency of the navigation system on a healthy delta ecosystem. The reevaluation of a deeper channel provides an opportunity to advance thinking about better ways of managing the LMR to achieve multiple purposes rather than one purpose at a time. Indeed, evaluating the 50-ft channel in this broader LMR management context is the only way to assure its long-term sustainability.</p>

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Louisiana Coastal Protection and Restoration Authority, letter dated July 1, 2015						
26		X	X	X		Comment 1: The focus of the SEIS/GRS for this proposed action seems constrained to an analysis of the economic benefits of a deeper channel against the cost of constructing and maintaining the deeper channel. There is no apparent consideration for the need to establish a new environmental baseline in response to drastic alterations in the affected landscape that have occurred subsequent to the original 1981 Feasibility Study and EIS for the MRSC. CPRA is also concerned that this new study does not seem to consider the interaction of channel deepening with proposed coastal restoration efforts that aim to make use of Lower Mississippi River sediment and water resources.
		X	X	X		Comment 2: CPRA strongly supports the integration of the Louisiana Coastal Area Mississippi River Hydrodynamic and Delta Management (MRHDM) Study body of knowledge and evaluation tools with the proposed SEIS/Reevaluation Study. The products of the MRHDM Study represent millions of dollars and many years of cooperative effort between the United States Army Corps of Engineers and CPRA, manifested as the most detailed understanding of physical processes in the LMR to date and state of the art hydrodynamic modeling tools of the LMR channel and adjacent basins.
Port of New Orleans, letter dated July 15, 2015						
27		X	X			Comment 1: It is anticipated that the GRR will confirm a Channel depth of 50 feet. The Board intends to seek authorization in the next WRRDA to dredge the Harbor to the same depth as the Channel. The same data are required to study both the Channel and Harbor so it is reasonable to consider them simultaneously and it would take very little effort on the part of the Corps. Doing otherwise would be an inefficient use of Corps resources requiring an additional GRR for Harbor deepening and would unnecessarily delay the ultimate realization of the full benefit of a deeper Channel to the Port of New Orleans. The Board respectfully requests that the Corps include an evaluation of deepening the Harbor to 50 feet in the current GRR. Should you require additional information or wish to discuss this request further, please contact Ms. Andree Fant at S04-S28-3321 or fanta@portno.com.

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Big River Coalition, letter dated July 16, 2015						
28				X		Comment 1: The successful construction of the saltwater barrier on an average of every nine years has prevented the saltwater wedge from fouling the water intakes for the city of New Orleans as designed. Therefore, the saltwater sill should ameliorate any concerns about the saltwater wedge even if it has to be constructed more frequently.
						Comment 2: The Big River Coalition applauds the United States Army Corps’ of Engineers (Mississippi Valley New Orleans) and the Louisiana Department of Transportation and Development for undertaking this historic effort. The Coalition remains indebted to our federal and state project sponsors and will continue to assist with the process and to provide documentation as requested.

8.0 SUMMARY OF SCOPING COMMENTS

The concerns expressed at the public scoping meeting are summarized below. The primary concerns expressed by scoping participants regard the project alternatives, environmental consequences and affected environment, followed closely by the project alternatives and consultation and coordination, and purpose and need only slightly regarded as important. In general, all parties that presented comments were in favor of the project. However, some parties also raised serious concerns over an array of environmental uncertainties and potential negative impacts.

Local residents provided comments and questions regarding the affect on the local communities in Plaquemines Parish. A common concern was raised about the need for beneficial use of dredged material, especially in areas south of Venice. Residents were also concerned about the potential negative effects of saltwater contamination on water supply.

There were multiple comments from industry and maritime representatives stressing the need for deepening and widening the river, as well as a need for improved maintenance. Concerns were also raised concerning the effects of future diversions on the navigability of the lower Mississippi River. Some concerns were raise about the need to dredge Pass Loutre and South Pass and questions were raised as to if the new study would include such maintenance.

The state of Louisiana and a coalition of Environmental NGO's also presented insightful questions and comments during scoping. One common recommendation was to coordinate closely with Louisiana Coastal Protection and Restoration Authority to assure the project is in alignment with the Louisiana State Master Plan and be cohesive with the long term management of the lower Mississippi River. It was expressed that effective coordination would prevent future conflict of the ownership of resources in the river. Concerns about the potential for erosion and increased channel instability, and the most effective placement of material that would be used beneficially for purposes of coastal restoration were shared. Concerns that channel deepening may also effect salt wedge migration, marsh loss, storm surge upriver, and changes in dynamics of the river were also raised.

The last major category of comments dealt with dredging and the environmental impacts of the project. The US Fish and Wildlife Service submitted a letter providing a list of detailed comments to assist CEMVN during project planning and construction. The Service raised valid concerns and provided useful comments on issues concerning public lands, coastal restoration, mitigation efforts, increased erosion, endangered species, migratory birds, saltwater intrusion mitigation.

9.0 CONCLUSIONS

The scoping comments described herein will be addressed in the significant issues, range of alternatives, and consultation and coordination sections of the draft Supplemental EIS. Some comments are outside the scope of this project and CEMVN will consider them in consultation and coordination, where appropriate. The draft Supplemental EIS will be distributed for public comment and interagency review for a minimum of 45 days, which is anticipated to begin in August of 2016.



APPENDIX G

Planning Phase Value Engineering Report



**U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT**

***MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE PHASE III
PLANNING PHASE VALUE ENGINEERING REPORT***



September 2016

CEMVN-VE-16-04

**MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE PHASE III
PLANNING PHASE VALUE ENGINEERING REPORT**

SEPTEMBER 2016

POINTS OF CONTACT

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**MISSISSIPPI RIVER SHIP CHANNEL
GULF TO BATON ROUGE PHASE III
PLANNING PHASE VALUE ENGINEERING REPORT**

EXECUTIVE SUMMARY

INTRODUCTION

This report contains the results of the Value Engineering (VE) Workshop that was performed 13 – 15 September, 2016 at the New Orleans District Office. The USACE sanctioned six-step Value Engineering Job Plan was used to facilitate and document the workshop (see **Appendix A** – Value Engineering Job Plan and Workshop Agenda). The objective of this workshop was to incorporate VE analysis into the development of the project design to improve performance and/or cost-effectiveness.

The subject project was in the planning phase with the objective of determining comparative cost-effectiveness and optimization of incremental channel depths between the current 45 feet down to 50 feet of the Mississippi River from Baton Rouge to the Gulf of Mexico (see project map below). An economic summary of alternatives at the time of this workshop is also shown in the below table. A comprehensive presentation of project description and status at the time of this workshop is shown in **Appendix G**.

The primary VE Team was comprised of subject matter experts from the Memphis and New Orleans Districts. Key members of the project delivery team (PDT) including representatives from the local sponsor and their consultants also participated in the study. A roster of workshop participants can be found as **Appendix B**. As part of the workshop, the Team identified important project issues and established project performance attributes that were used to measure the viability of un-screened ideas (ref. **Appendix C**). A function analysis (F.A.S.T.) diagram was developed and is illustrated in **Appendix D**. ‘Brainstormed’ project improvement ideas were compiled and screened. **Appendix E** lists all ideas (Speculation List) categorized by their disposition (developed or not developed).

In addition to consulting PDT members throughout the workshop, the VE Team referenced a number of current informal project design notes and graphics, meeting minutes and other pertinent documents.



PROJECT MAP

Channel Alternative	50 ft. Through Port of S. LA	50 ft. Full Channel	48 ft. Through Port S. LA	48 ft. Full Channel	50 ft.SWP/48 ft. Through S. LA	50 ft. LMR/48 ft. All Crossings
First Cost of Construction	\$ 88,971,120	\$ 183,076,433	\$ 5,551,980	\$ 88,663,029	\$ 87,770,010	\$ 170,881,059
Interest During Construction	\$ 4,258,086	\$ 8,761,890	\$ 265,713	\$ 4,243,341	\$ 4,200,602	\$ 8,178,229
Total Investment	\$ 93,229,206	\$ 191,838,323	\$ 5,817,693	\$ 92,906,370	\$ 91,970,611	\$ 179,059,288
Average Annual Const. Cost	\$ 3,709,866	\$ 7,633,814	\$ 231,503	\$ 3,697,019	\$ 3,659,782	\$ 7,125,298
Average Annual Increm. O&M	\$ 18,126,110	\$ 131,446,950	\$ 13,443,710	\$ 100,007,021	\$ 13,443,710	\$ 100,007,021
Total Average Annual Cost	\$ 21,835,975	\$ 139,080,764	\$ 13,675,213	\$ 103,704,040	\$ 17,103,493	\$ 107,132,319
Total Average Annual Benefits	\$ 117,960,932	\$ 147,273,006	\$ 84,339,754	\$ 105,658,043	\$ 94,538,711	\$ 116,549,126
Net Excess Benefits	\$ 96,124,957	\$ 8,192,243	\$ 70,664,540	\$ 1,954,003	\$ 77,435,218	\$ 9,416,806
B/C Ratio	5.40	1.06	6.17	1.02	5.53	1.09

ECONOMIC SUMMARY OF ALTERNATIVES
(AT TIME OF VE WORKSHOP)

SUMMARY OF VE RESULTS

A brief description of major findings and a complete list of all VE recommendations are as follows:

(Major Findings)

- It appears that channel training 'soft dikes' could be installed in at least (8) of the (12) river crossings. Soft dikes have been placed in two crossings in the project reach and both have, and continue to perform well by inducing scour and significantly reducing dredging need. Expected performance of the proposed (8) dike installations would reduce future O&M in these crossings by a substantial amount. This would have a significant positive effect on the economics of extending the 50-ft channel through the Port of Baton Rouge.
- Further analysis and validation of projected shoaling rates and estimated dredging unit costs is recommended. In combination, a possible 'compounded' conservative total cost for dredging the river crossings may be currently tabulated resulting in alternative costs being overestimated. Project benefits over and beyond that presently allowed in USACE policy should also be considered in alternative evaluations.
- A possible alternative to be considered would be construction of a 50-ft channel through the Port of Baton Rouge with a plan of prioritizing maintenance dredging should future excessive shoaling rates be realized. Given the fact that, unlike most Civil Works projects, construction cost is relatively small as compared to future O&M, limited investment risk would be associated with this option.
- There appears to be some potential for use of dredged material from the river crossings. Such use may include both environmental and possible commercial utilization. This would require additional dredging cost and either dry or in-river stockpiling. Such cost would have to be provided by sources outside of USACE dredging per requirement of 'least cost' measures.
- Future dredging demand, along with competing dredging needs from environmental, State of Louisiana and regional states, may overwhelm the supply of available dredging plant and impact project performance and cost. As such, future planning should address projected future market conditions. The application of public-private-partnerships ('P3') may be considered as a viable option to providing new dredge plant if warranted.

(List of VE Recommendations)

1. *Construct river training structures (soft dikes) in selected channel crossings to reduce maintenance dredging.*
2. *Expedite construction; open Port of South Louisiana to 50-ft draft in 2 years.*
3. *Re-evaluate the economics to include planned future development and economic value to other states and the nation.*
4. *Validate dredged material quantity and cost estimates for crossings.*
5. *Consider constructing project through the Port of Baton Rouge; prioritize future O&M dredging as appropriate.*
6. *Do extensive planning for pipeline and utility relocations to minimize potential impacts to project implementation.*
7. *Consider reversing dredging operations for channel crossings through the Port of Baton Rouge from upstream to downstream.*
8. *Look for opportunities to piggyback CPRA, and other State projects to use dredged material.*
9. *Stockpile dredged material for potential use by others or for environmental improvement.*
10. *Consider additional HDDA (Hopper Dredge Disposal Area) locations.*
11. *Include re-construction or upgrade of existing training structures in the lower river system.*
12. *Update MVN total dredging demand projections; address possible market impact.*
13. *Consider public-private partnership ('P3') for dredge plant construction.*
14. *Consider VE recommendations from Dredging Programmatic and BUDMAT studies.*

VALUE ENGINEERING RECOMMENDATIONS

The VE Team identified **(14)** items that are believed to either improve project performance and/or cost-effectiveness. Recommendations are further developed and documented below.

The reader should note that these recommendations were developed in a very short period of time and are intended to present conceptual measures for consideration. Further evaluation and design is required to substantiate each recommendation and provide rationale for its implementation or rejection.

Also, a number of recommendations may 'conflict' with others. That is to say that one idea cannot be implemented with the other. No decision as to preference was made by the VE Team and all options are presented for further consideration by the PDT.

1. Construct river training structures (soft dikes) in selected channel crossings to reduce maintenance dredging -

References

U.S. Army Corps of Engineers, St. Louis District, Applied River Engineering Center (AREC);
http://mvs-wc.mvs.usace.army.mil/arec/Basics_Dikes.html

Determinations of Findings Report on The Impact of the Red Eye and Medora Crossings Soft Dikes on Vessel Traffic on the Mississippi River; University of New Orleans, May 2003, prepared for U.S. Army Corps of Engineers New Orleans District

Red Eye Crossing Soft Dikes Demonstration Project Final Report; U.S Army Corps of Engineers New Orleans District, 6 May 1998

Technical Report HL-95-13, Red Eye Crossing Reach, Lower Mississippi River, Report 2 Navigation Conditions, U.S. Army Corps of Engineers Waterways Experiment Station, March 1996

Solicitation No. DACW29-93-B-0040, Redeye Crossing Contraction Dikes, Mississippi River, Mile 224L AHP, East Baton Rouge Parish, Louisiana

Overview

It appears that the use of soft dikes to induce scour may be an effective means to significantly reduce anticipated maintenance dredging in (8) of (12) channel crossings in this project. Past application of such training structures in two crossings in the project area have, and continue to perform effectively and indicate probable success if used in other crossings.

Dikes, sometimes referred to as wing dams or spur dikes, are structures placed in a river to redirect the river's own energy to provide a variety of effects. The structures are usually constructed out of stone, but other materials have been used for construction including but not limited to timber piles, concrete, and sand filled geotextile bags and tubes. On larger rivers, dikes are used to manage sediment response distribution within the channel to deepen the channel and provide adequate depth for navigation. On smaller rivers and tributaries, they have been used primarily to divert flow and stabilize eroding banks.

Dikes are usually built perpendicular to the river flow and vary considerably in height and length. On large rivers, they are built approximately at a height midway up the channel and lengths can vary depending upon a variety of factors (*AREC*). Dikes have been the primary method employed by the U.S. Army Corps of Engineers on the Lower Mississippi River below the confluence of the Ohio and Mississippi Rivers (River Mile 954 Above Head of Passes (AHP)) to assist in maintaining the required authorized navigation channel for commercial barge traffic. These structures have proven to be very effective in helping to maintain the required depth and width of the channel by managing the sediment that moves through the river and helping to reduce the required amount of maintenance dredging in the various river crossings and other areas where sediment tends to be more concentrated.

It should be noted that river pilots do not favor any type of structure on the river bottom. They have, however accepted the use of soft dikes in Lower Mississippi River.

Soft Dikes in the Project Study Area

Although the required depths for the channel are different on the lower portion of the river below Baton Rouge (River Mile 234 AHP), it has been proven that dikes have been effective at helping to reduce the required maintenance dredging and improve the navigation channel in various reaches of the river. Within an 80-mile stretch of the river from just above Baton Rouge (Mile 234), to just above New Orleans (Mile 114), there are twelve river crossings. As the flow of the Mississippi River crosses from one bank to the other, bed material or bed load is dropped making a “HIGH” point or bar in the channel bottom. Along this reach of the river, the Corps of Engineers is currently responsible for maintaining a 500-ft wide by 45-ft deep ship channel (*USACE NO Red Eye Demonstration Report*). It is within these (12) river crossings that the majority of maintenance dredging is performed by the New Orleans District on an annual basis. Figure 1 below provides a schematic of the locations of the various river crossings in the study area.

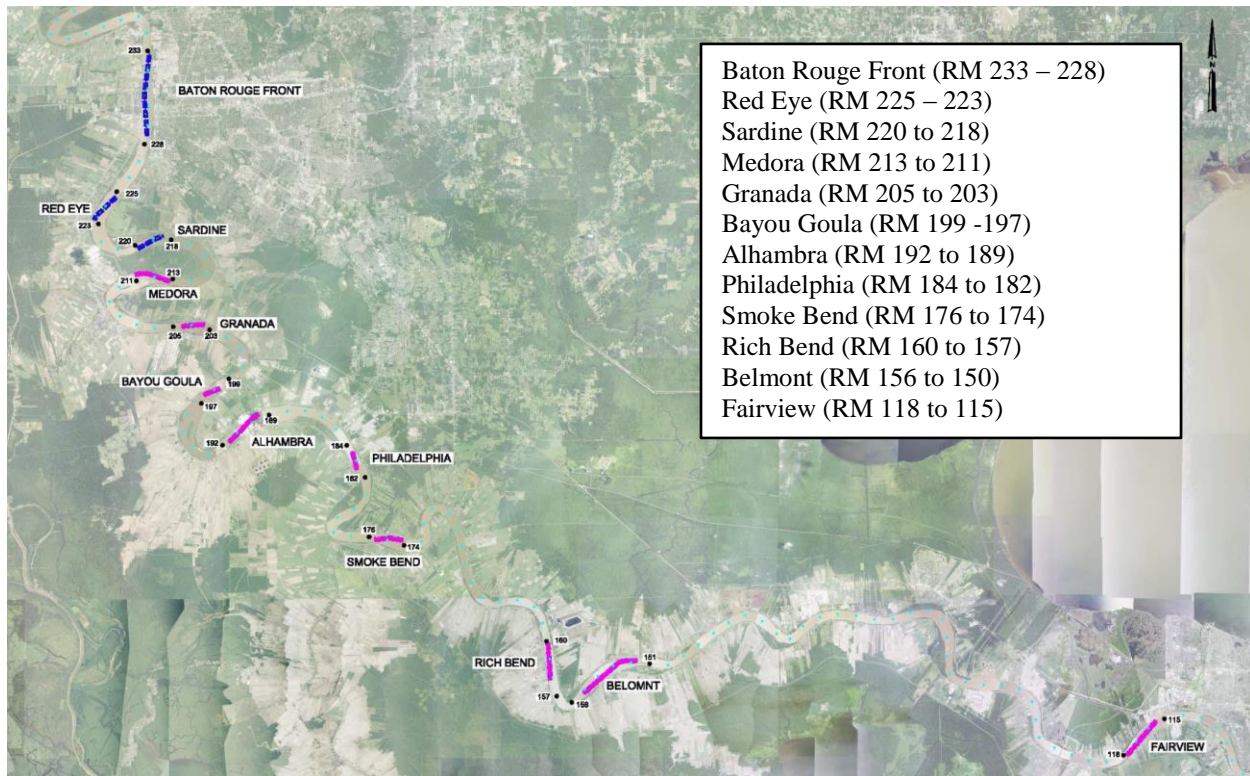


Figure 1. Maintained Channel Crossings (RM 234 AHP to RM 115 AHP)

In the early 1990s, the New Orleans District was authorized to conduct a demonstration project in one of these crossings at Red Eye (RM 225 to RM 223) to evaluate the effects and potential navigation impacts of construction of dikes within the ship channel. Prior to construction of the dikes, the U.S. Army Corps of Engineers Waterways Experiment Station developed both physical and numerical models of the crossing. The results were used to determine the effectiveness of the dike construction in reducing channel shoaling and required annual dredging in the reach. In addition, coordination and input was solicited from the commercial navigation industry and the local sponsor, Louisiana Department of Transportation and Development (LA DOTD). Initially, these entities were concerned at the prospect of stone dikes next to the channel and potential collisions with stone. Due to the high number of vessels using Red Eye Crossing, two design constraints were placed on the project. First, after construction and during low water there must always be a 2,000-ft navigation corridor. Second, the dikes would be built as low as the existing sandbar immediately downstream of the dike field so that tows could pass over the bar and the dikes during high water. In consideration of these concerns and constraints, the dikes were redesigned using sand-filled geotextile containers and geobags to mimic the design and anticipated effect of stone dikes and given the name “soft dikes”. The project was allowed to move forward and a construction contract was awarded in May 1993 under the maintenance project for the 40-ft navigation channel under the Mississippi River, Gulf of Mexico to Baton Rouge Project, O&M General. The work consisted of the construction of 6 soft dikes at various

lengths and elevations in the Red Eye Crossing reach at a final cost of approximately \$7.1 million. Figure 2 illustrates an example of soft dike placement location; Figure 3 shows low-water photographs of the final in-placed constructed soft dikes.

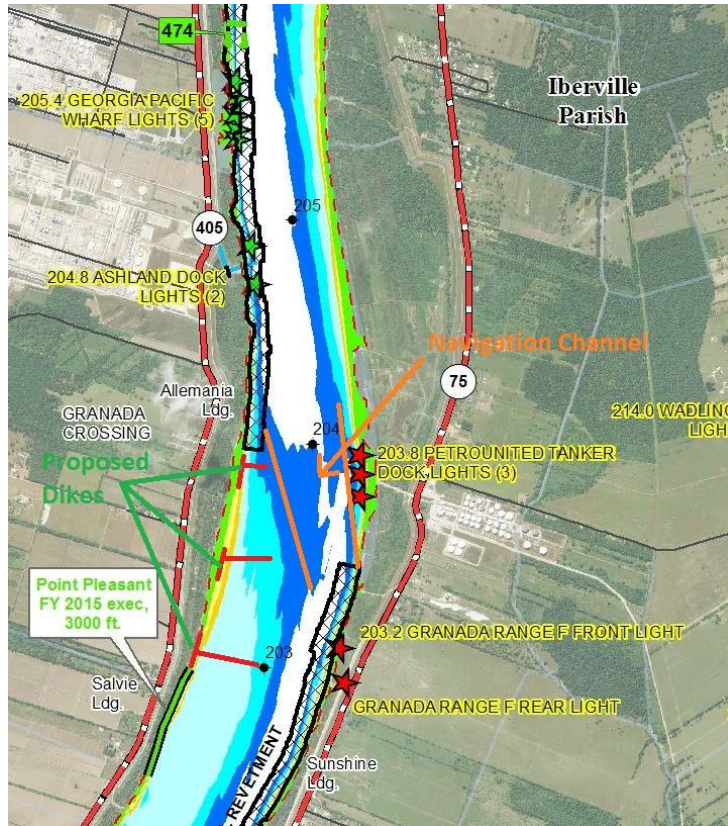


Figure 2 - Example of River Placement of Soft Dikes

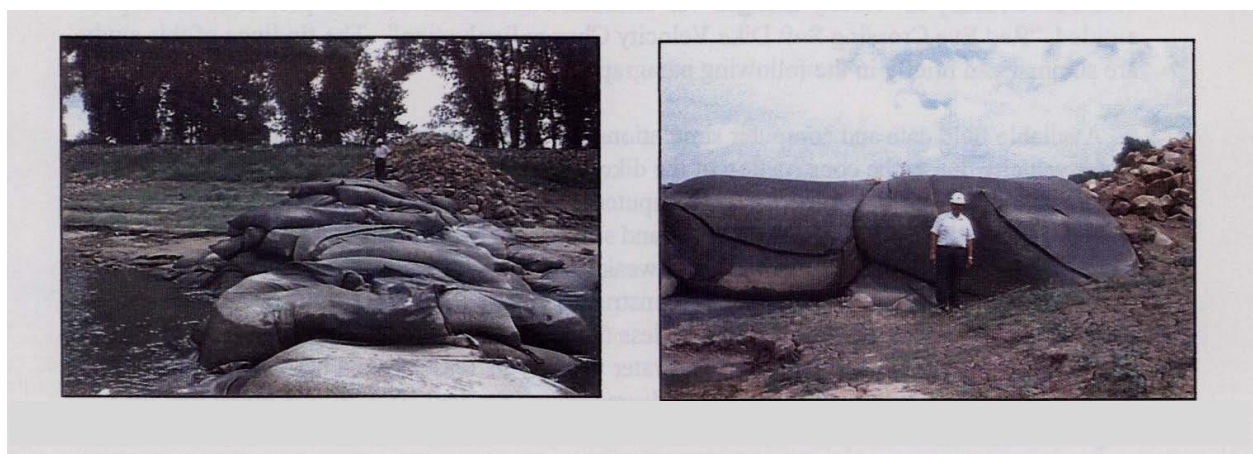


Figure 3 – Photos of Soft Dikes (low water)

Pre and post-construction monitoring and analysis was conducted of the soft dikes at Red Eye Crossing to evaluate performance. This monitoring included frequent detailed hydrographic surveying and analysis of the reach, and a detailed navigation study to include a pilot survey over 2 years post construction from July 1993 to September 1995 as well as videotaping of the reach before and after construction which coincided with the pilot survey. The detailed results of these studies are outlined in the final report dated 6 May 1998 entitled *Red Eye Crossing Soft Dikes Demonstration Project*. In summary the report findings indicated that the Red Eye Crossing Soft Dikes reduced the number of dredging days required to maintain the channel, and did not appear to be a hazard to navigation. The report outlined a reduction in the dredging in this reach in the following 2 years of approximately 50%. A few summary statements from the report recommended exploring the possibility of proceeding with design and construction of soft dikes at other crossings in the study area. "With the success shown at Red Eye, the longest and most complex crossing in this reach of the river, we also recommend to proceed with the design and construction of dikes at less complex crossings. In closing, we believe soft dike systems can provide a cost effective and efficient means of reducing the high cost of maintenance dredging at the deep draft crossings and will enhance our ability to provide a more reliable and dependable channel to our navigation customers." Subsequent soft dikes were successfully constructed at Medora Crossing (RM 213 to RM 211) and were also proven to reduce the required amount of maintenance dredging in this crossing.

Application and Recommended Way Forward

Based on the results of the soft dike demonstration project at Red Eye Crossing and subsequent construction at Medora Crossing, it is anticipated that similar construction would be successful at several of the other crossings within the study area. Based on discussions held on 14 September 2016 with engineers in the Waterways Section of the New Orleans District, it was determined that construction of soft dikes is feasible and practical in (8) of the (12) crossings. (7) of these crossings are in the Baton Rouge reach and one (Belmont) is located in the Port of South Louisiana reach. This proposed work includes the raising in elevation of the existing soft dikes at Red Eye and Medora as well as construction of new dike fields at (6) other crossings.

Current project estimates indicate a total projected increase of 148% of dredged material in the (12) crossings as a result of deepening the channel to 50 feet. Historic realized performance of the two soft dike installation indicates at least a 50% reduction in total dredging need versus the without dike condition. Note that actual dredging reduction may be more than 50%.

For (6) crossings where new dikes can be placed, a 50% reduction of total dredging need yields a **84%** reduction in the added incremental need (148%); for the two crossings with existing dikes, it is estimated that the net result of upgrading the dikes would decrease total dredging by 35% given the assumed inclusion of the current existing dikes in the shoaling model. This yields a **59%** reduction of the currently calculated added incremental need. Table 1 illustrates estimated potential **annual cost reduction of \$57.4 million.**

Crossing	Annual Incremental O&M Cost Reduction
Red Eye	$\$15,909,613 \times .59 = \$9,387,000$
Sardine	$\$4,317,095 \times .84 = \$3,626,000$
Medora	$\$13,673,667 \times .59 = \$8,068,000$
Granada	$\$4,115,000 \times .84 = \$3,457,000$
Bayou Goula	$\$11,328,074 \times .84 = \$9,516,000$
Alhambra	$\$14,189,655 \times .84 = \$11,920,000$
Smoke Bend	$\$3,626,962 \times .84 = \$3,047,000$
Belmont*	$\$10,000,000 \times .84 = \$8,400,000$
TOTAL	\$ 57,421,000

* Incremental Estimated Cost for Port of South LA Crossing with
Info Provided in Brief

Table 1. Estimated O&M Cost Savings for Soft Dikes

It should be noted that there must be engineering and design considerations as well as cost considerations made in the planning phase of these projects to include potential impacts to navigation to include existing facilities, relocation of pipelines, construction windows, impacts to channel and bank stability on the constructed banks and opposite banks, and required future maintenance of the constructed soft dikes. Other factors to consider include determination of the approximate elevations (heights) of the soft dikes with respect to the Low Water Reference Plane (LWRP) so as to minimize impacts to navigation of the deep draft channel and consideration of a step up approach to the heights of the structures as done with the Red Eye project. In addition, it is noted that specific authorization for construction of these features must be verified and/or gained prior to initiation of any work.

Costs for Construction of Soft Dikes Estimated Annual O&M Cost Savings

The Red Eye Crossing Soft Dikes were used as the basis for determining the approximate costs of constructing the recommend soft dikes at the various crossings as presented in Table 1 above. A representative design reach for construction of soft dikes is depicted in Figure 4 below.

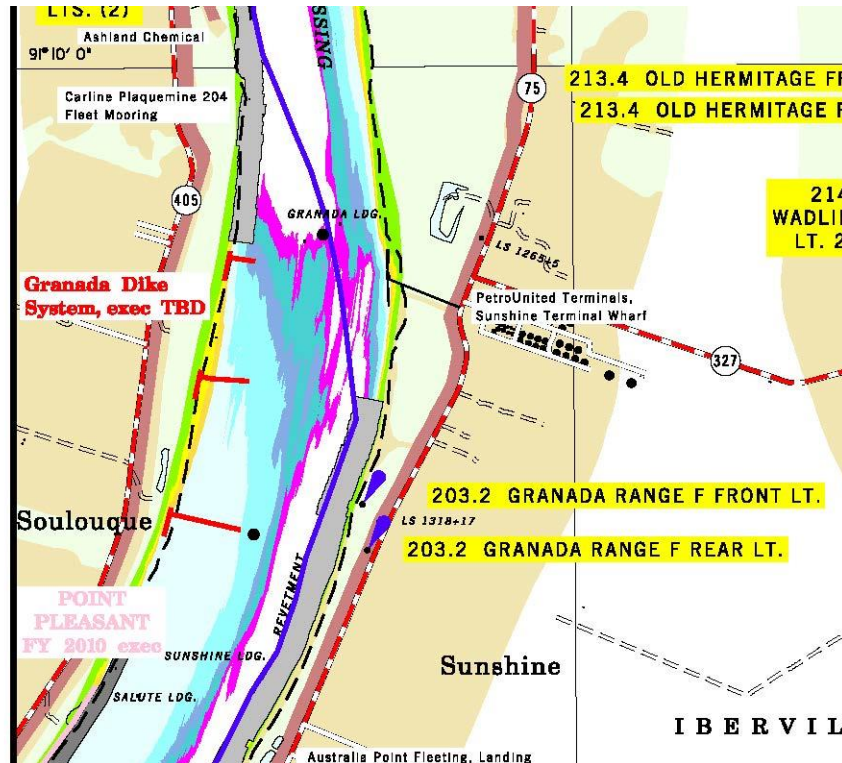


Figure 4. Representative Reach for Soft Dike Construction

An average cost per soft dike was calculated using the average cost per dike for the Red Eye structures and inflating that cost to today's dollars using a historical cost index. Calculations are as noted below:

Red Eye Dikes

- 6 dikes constructed @ total cost of \$7.1 million
- 7,700 total linear feet of structures

Cost per linear foot = $\$7,100,000 / 7,700 \text{ LF} = \$922/\text{LF}$

Cost per dike based on linear feet constructed:

Dike 1 – 680 feet x $\$922/\text{LF} = \$626,960$

Dike 2 – 960 feet x $\$922/\text{LF} = \$885,120$

Dike 3 – 1,270 feet x $\$922/\text{LF} = \$1,170,940$

Dike 4 – 1,350 feet x $\$922/\text{LF} = \$1,244,700$

Dike 5 – 1,690 feet x \$922/LF = \$1,558,180

Dike 6 – 1,750 feet x \$922/LF = \$1,613,500

Average Cost Per Dike = \$7,100,000 / 6 dikes = \$1,183,333.33

Inflation Index from 1992 to 2016 = 2.08

Approximate Cost Per New Dike for 2016 = \$1,183,333.33 x 2.08 = \$2,461,125.33 =

~\$2.5 million

Approximate Cost Per Upgraded Dike (Red Eye and Medora) – Assumed to be 50% of Full Cost =

~ \$1.25 million

Table 2 depicts the approximate first construction costs of the proposed dikes for the various crossings:

Crossing	No. Proposed Dikes	*Construction Costs (Millions)
Red Eye	6 (Upgrade)	\$7.5
Sardine	2	\$5.0
Medora	3 (Upgrade)	\$3.8
Granada	3	\$7.5
Bayou Goula	4	\$10.0
Alhambra	5	\$12.5
Smoke Bend	5	\$12.5
Belmont	3	\$7.5
TOTAL		\$66,250,000.0

* \$1.25M per dike for Upgrade, \$2.5M per dike for new dike

Table 2. Construction Costs for Proposed Soft Dikes

Equivalent Added Annual Cost Calculation:

Using the current 50 Yr. Economic Life index at 3 1/8% of 25.16 results in the following equivalent cost for soft dikes:

\$66,250,000/25.16 = **\$2,633,000** per year of equivalent added cost

Estimated Net Annual Project Alternative Benefits

Estimated net additional benefits to project alternatives are substantial as calculated below for the primary two alternatives under consideration:

50-ft Channel through the Port of Baton Rouge:

Annual O&M savings from anticipated dike performance:	\$57,421,000
Added equivalent annual cost for dikes:	<u>2,633,000</u>
Net additional <u>annual</u> benefits:	\$54,788,000

50-ft Channel through the Port of South Louisiana:

Annual O&M savings from anticipated dike performance:	\$8,400,000
Added equivalent annual cost for dikes: (\$7.5M /25.16)	<u>298,000</u>
Net additional <u>annual</u> benefits:	\$8,102,000

Summary

This alternative analysis strongly indicates that soft dike systems can provide a cost effective and efficient means of reducing the high cost of maintenance dredging at proposed deepened river crossings and will enhance the Corps ability to provide a more reliable and dependable channel to our navigation customers. It also appears that the use of training structures is necessary for the potential viability of a 50-ft channel through the Port of Baton Rouge.

The current project authorization may, or may not, permit the inclusion of these training structures as a construction feature. Regardless, soft dikes can be placed with O&M funding.

2. Expedite construction; open Port of South Louisiana to 50-ft draft in 2 years - The current project implementation schedule for all alternatives indicates no realization of benefits until completion of four-years of construction. It appears that an aggressive, and properly coordinated, design and management plan, including relocations, could result in the opening of a 50-ft channel through the Port of South Louisiana in two years. Such an expedited schedule would improve project net benefits and B/C ratios as indicated below. The following table illustrates the current and proposed change in expenditures and project benefits for completing a 50-ft channel through the Port of South Louisiana in two years:

				(\$/MILLIONS)				
YEAR ->	3	2	1	YEAR '0'	1 - 48	xx	49	50
(CURRENT PLAN WITH 4-YR COMPLETION)								
CONSTRUCTION	-22.5	-22.5	-22.5	-22.5				
O&M					-18.1	xx	-18.1	-18.1
BENEFITES					118	xx	118	118
=====	=====	=====	=====	=====	=====	=====	=====	=====
YEAR TOTAL:	-22.5	-22.5	-22.5	-22.5	99.9	xx	99.9	99.9
(PROPOSED PLAN WITH 2-YR COMPLETION)								
CONSTRUCTION	-45	-45						
O&M			-18.1	-18.1	-18.1	xx	0	0
BENEFITES			118	118	118	xx	0	0
=====	=====	=====	=====	=====	=====	=====	=====	=====
YEAR TOTAL:	-45	-45	99.9	99.9	99.9	xx	0	0
=====	=====	=====	=====	=====	=====	=====	=====	=====
YEAR ->	3	2	1	YEAR '0'	1 - 48	xx	49	50

**ESTIMATED CHANGE IN EXPENDITURES AND BENEFITS FOR PROPOSED
2-YEAR EXPEDITED CONSTRUCTION THROUGH THE PORT OF SOUTH LOUISIANA**

(From MVN Economics)

Change in net annual benefits for all 50-ft depth alternatives: +\$6,853,000

(Present worth of +\$172.4 million)

Change in B/C ratio of 50-ft depth alternatives through Port of South Louisiana:

50-ft Channel through the Port of Baton Rouge: B/C from 1.06 to 1.11

50-ft Channel through the Port of South Louisiana B/C from 5.40 to 5.43

3. Re-evaluate the economics to include planned future development and economic value to other states and the nation - Federal policy may restrict the calculation of full economic value of project benefits. It is recommended that all factors be considered to better assess economic benefits.

The Mississippi River is the highway to the vast central portion of the United States. Much of the commodities and goods produced in the heartland of the United States are brought to world markets via the Mississippi River. Much of the Midwest grain and crop production can only competitively enter world markets through waterborne commerce utilizing the Mississippi River. Products are transported from the rest of the world to the 31 states connected to the river. In addition to transportation, a deeper Mississippi River will spur plant development and expansion, and job creation.

Total United States waterborne foreign commerce in 2014 was 2,345,765,063 short tons. Of that total, the Lower Mississippi River system from Baton Rouge to the mouth of the river handled 490,389,626 tons of waterborne commerce (Source: U.S. Army Corps of Engineers, Navigation Data Center, 2015). According to the USACE, the ports of the Lower Mississippi River handled 20.9% of all U. S. waterborne commerce, both foreign and domestic.

Current federal policy constrains benefit calculation and may not include the important factors discussed above. It is recommended that additional project benefits be considered in determining cost-benefit for project alternatives.

4. Validate dredged material quantity and cost estimates for crossings - Presently (12) channel crossing sites are being dredged to maintain a navigable channel 45 feet deep and approximately 500 feet wide through the upper portion of the Port of South Louisiana and through the Port Baton Rouge. Reaches outside these crossing areas, the prevailing river depths are substantially deep and require minimal maintenance effort. Dredging needs then pick up again on the lower portion of the Mississippi River just above and including Southwest Pass and Bar Channel area.

Dredging is performed primarily by dustpan dredges and current estimated annual average dredging in the (12) crossings is about **19.5 million cubic yards (MCY)**; average historical cost is estimated at **\$1.23 per cubic yard (CY)**.

For the proposed 50-ft deep x 500 ft wide channel, current estimates indicate the (12) channel crossings will require an average annual dredging of **48.4 MCY** (148% increase); unit cost used for this alternative considers continued use of dustpan dredges at a rate of **\$3.20 per CY** which includes a 40% contingency.

Determining projected sediment rates by changing the minimum depth through the crossings is difficult to determine, especially factoring in the fact that the sediment placement is high-river event driven. The present dredged material quantity projections are based on a one dimensional model study and the project manager indicated that additional studies are being performed. Unit cost estimates reflect uncertainties, including but not limited to, slope transition quantities associated with the channel deepening. The 40% contingency is higher than the usually applied 25%.

Given the limitations of a short duration feasibility analysis it would appear that both the projected estimated dredging quantities and unit cost are very 'conservative' (high end). It should be noted, however, that these two factors are ***not independent*** of each other. That is to say that a conservative estimate of quantities compounds the alternative cost when conservative unit prices are then applied. As such, there appears to be a higher risk that the current alternative cost may be high versus low.

It is therefore recommended that both estimated projected dredging quantities and unit cost be validated and refined for the (12) channel crossings.

5. Consider constructing project through the Port of Baton Rouge; prioritize future O&M dredging as appropriate - With the inclusion of the above recommended soft dikes and possible realization of lower unit dredging costs deepening and maintaining the ship channel to -50 ft. through the Port of Baton Rouge (PBR) may be warranted. Given the significant 'positive' risks of lower than anticipated O&M dredging need, via possible performance of the proposed river training features, and lower actual unit dredging costs current O&M costs may be significantly lower than currently estimated.

It's important to note that unlike most Civil Works projects the construction cost of including the PBR is relatively low as compared to estimated future O&M costs. As such, the 50-ft channel and training features could be constructed with limited investment risk. Should future O&M be excessive, funding prioritization would be made to maintain the river below the PBR to 50-ft with 45-ft (or slightly deeper) maintenance of the PBR.

6. Do extensive planning for pipeline and utility relocations to minimize potential impacts to project implementation - The current feasibility relocations report included a study area from River Miles (RM) 233.4 to RM 110.6 and resulted in 49 pipelines plus several other utilities that may or may not require relocation. Note that this was a conservative number as some of these facilities may have enough coverage below the 50' channel cut and will not require relocation. At the time of this report it was unknown as to whether these facilities met this requirement so a conservative approach was taken and consequently all utilities were stated to need relocation. The current estimated costs for this item of work are shown below in Table 1.

Directional Drilling Cost/LF	LF	Total Cost
\$13,336	3000	\$40,008,000.00
Contingencies	25%	\$10,002,000.00
Subtotal		\$50,010,000.00
E&D (10%)		\$5,001,000.00
S&A (8%)		\$4,800,800.00
Total		\$59,011,800.00

Table 1 – Current Estimated Costs for Relocation of Utility Infrastructure

The various breakdown of the types of facilities are shown in Table 2 along with the latest known utility owner. Keep in mind that some of these facilities may have changed ownership since the latest provided data from the aforementioned utility owner. Other important information taken from the study include:

- Costs are based on directional drilling as this is seen as the most cost effective way to relocate pipeline under the river.
- The minimum length of total pipeline requiring relocation is estimated to be 3000'.
- Entrance and exit points were included in the cost of the relocation and would be installed on each side of the batture located 20' from the toe of the riverside of the levee.
- Hot tapping will be utilized when connecting the new and old pipelines to transfer product prior to final capping and abandonment of the old pipeline.
- Costs in Table 1 above include a 25% contingency, 10% allowance for E&D, and an 8% allowance for S&A.
- The price in Table 1 includes allocation to relocate the facilities to accommodate a dredge depth of 50'.

While the current feasibility study includes relocating or ensuring the relocation of facilities below the 50' dredge cut, it may be prudent to make sure that any facilities requiring relocation are relocated to the project authorization depth of 55'. This could save potential dollars on any future relocations if future projects exceed depths of 50' and approach the authorized depths of the study.

In addition, it will be crucial to ensure that these relocations are completed in sufficient time ahead of the release of the actual dredging contract. To accomplish this task, actual owners will need to be identified if different from those in Table 2. Also, sufficient information will need to be gathered to ensure the following:

- What size pipeline is involved in the relocation?
- At what depth is the current pipeline and will it require relocation?
- Who's responsible for paying for the relocation? This generally will be noted in the permit but could revert back to State and Federal guidelines.
- Execute the pipeline relocation agreement in sufficient time to allow for the relocation of the facilities before award of the dredging contracts.
- Develop a plan to deal with the pipeline owners who do not follow guidelines and ensure utility relocation in a significant amount of time prior to needing relocation.

It's very important to ensure utility relocation and allow for a contingency in time prior to dredging these sites. Proper guidelines and protocol should be established well in advance and all interested parties should be involved early on in the planning stage. Any delay in relocation of facilities could prove detrimental to the project and cost significant dollars in benefits. Currently, yearly benefits are estimated at \$118M per year. It is important to the Government as well as the Sponsor that there are no delays in accruing benefits for this project. A timely and well executed plan for the relocations will ensure that this doesn't happen.

Owner	Diameter	Type	River Mile	Qty
Enterprise	16"	NG	233.4	1
Acadian	10.75"	NG	233	3
Acadian	16"	NG	233	1
Mid La Gas	12"	NG	233	1
Bengal	24"	Maint	233	1
Dow	4"	LPG	233	1
Unknown	12"	Brine	197.9	2
Enterprise	Unknown	NG	190.2	1
Kinder Morgan	24"	NG	190.2	2
El Paso	5"	Gas	190.2	1
Southern Nat Gas Co.	12"	Gas	190.1	4
El Paso	5"	Gas	190	1
Kinder Morgan	30"	NG	190	1
Enterprise	8.63"	EGL	189.8	2
Shell	Unknown	Unknown	189.5	6
Gulf South	Unknown	NG	183.4	3
Boardwalk	Unknown	NG	183.3	3
Concha	10"	Propylene	183	1
Shell	Unknown	HVL	182.9	1
Enterprise	10"	HVL	182.9	1
Enterprise	4"	NG	182.7	1
Shell	10"	HVL	182.1	1
Central Bell	Unknown	Unknown	175.5	3
LA Power & Lt. Co.	Unknown	Unknown	175.4	1
Marathon Ash.	30"	Unknown	159.5	1
Shell	40"	EPL	159.5	1
Marathon	30"	CRD	159.5	3
Equilon	40"	Oil	159.3	1
Boardwalk	Unknown	NG	158.2	1
Monterey	6"	Gas	158.2	1
Totals				51 Facilities

Table 2 - Utility Owner and Types of Facilities within the Dredging Footprint RM 233.4-RM 110.6

7. Consider reversing dredging operations for channel crossings through the Port of Baton Rouge from upstream to downstream -

Current dredging practice for maintaining channel crossings through the Port of Baton Rouge (PBR) crossing consists of starting at the downstream crossing and proceeding upstream within the limits of this VE study. Dredging from downstream to upstream crossing results in the dustpan dredges discharging and redepositing a portion of the sandy/silty material in the previously dredged downstream crossings. The amount of sediment redeposited in the previously dredged crossing from dredging operations upstream should be a measurable amount but no data was available for this VE study and the amount could be very minimum or could be more substantial. If the sanding rate is determined to be substantial, it would result in cost savings over the 50 year life for the VE study or perpetual savings for the future by reversing the crossing dredging order. Reversing the crossing dredging order would negate filling of the previously dredged downstream crossing at a faster sediment rate than what sediment rates would occur at normal and low stages on the Mississippi River.

A potential negative of reversing the dredging operations would be it would take longer to open up the total length of the channel for the Port of Baton Rouge for a draft of 48 or 50 feet as proposed for this VE study at stages approaching low water river stages initially and/or annually. Depending on how long it would take to dredge the crossings by contract time by using one or multiple dredges could nullify any gains in reversing the dredging order for crossing in the Port of Baton Rouge limits. Dredging operations that take a significant amount of time to open the channel for the Port of Baton Rouge limits could negate benefits from larger ships delivering cargo at the lower businesses sooner.

No recommendations are given for this VE report or cost saving by reversing the dredging operations by starting at the upstream crossings and proceeding downstream. The point of this recommendation is to further investigate to determine the sanding rates on the previously dredged downstream crossings from upstream dredging operations. This investigation could be done as a demonstration type project to conduct multiple surveys of the downstream crossing during dredging operations upstream as compared to sanding rates at low normal flows during non-dredging. Based on the Maritime reports discussed during the VE study, the crossing appear to be surveyed every two weeks or so, therefore, the data for evaluation is most likely available in records. Based on the significance of the sediment deposit rate, a further evaluation would be conducted at that time to see if this alternative would be viable either as a onetime benefit for the initial deepening of the channel or become an order of work for annual dredging.

8. Look for opportunities to piggyback CPRA, and other State projects to use dredged

material - The VE team believes that there is an opportunity to coordinate and align CPRA and other State projects, such as projects outlined in the State Master Plan, with the future maintenance dredging required to maintain the 50' channel depth. While the mandate of federal implementation of least-cost dredging must be maintained, additional cost for beneficial use may be obtained from other sources including the authorized Beneficial Use of Dredged Material (BUDMAT) program, the State or other third party.

The 2012 Coastal Master Plan and updated 2017 Plan outline numerous restoration projects that could benefit from the material generated by the construction and maintenance of the channel.

<http://www.coastalmasterplan.louisiana.gov/>

Louisiana State Parks (Statewide Comprehensive Outdoor Recreation Plan 2014-2019 SCORP) discusses numerous development projects and improvements that could be aligned with the maintenance dredging schedule. Sites for disposal and material processing and excavation could be identified as park projects come online.

<http://www.crt.state.la.us/louisiana-state-parks/grant-opportunities-for-outdoor-recreation/louisiana-outdoor-recreation/2014-2019-scorp/index>

Additionally, coordination with other organizations such as the Lower Mississippi River Conservation Committee (LRMCC) and working to expedite some of their restoration projects, programs and initiatives.

<http://www.lmrcc.org/about-us/>

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/la/programs/?cid=nrcs141p2_015683

<http://www.brec.org/index.cfm/page/2518/n/362>

Since the dredged material in the Southwest Pass and Bar Channel areas is being used or distributed back into disposal areas for habitat and reuse purposes, the main benefit from this alternative will come from the dredged material of the twelve crossings within the study area (See Figure 2.) The base dredging quantity for the crossings is 8,588,600 CY and the O&M quantity for the crossings is projected to be 48,377,000 CY per year.

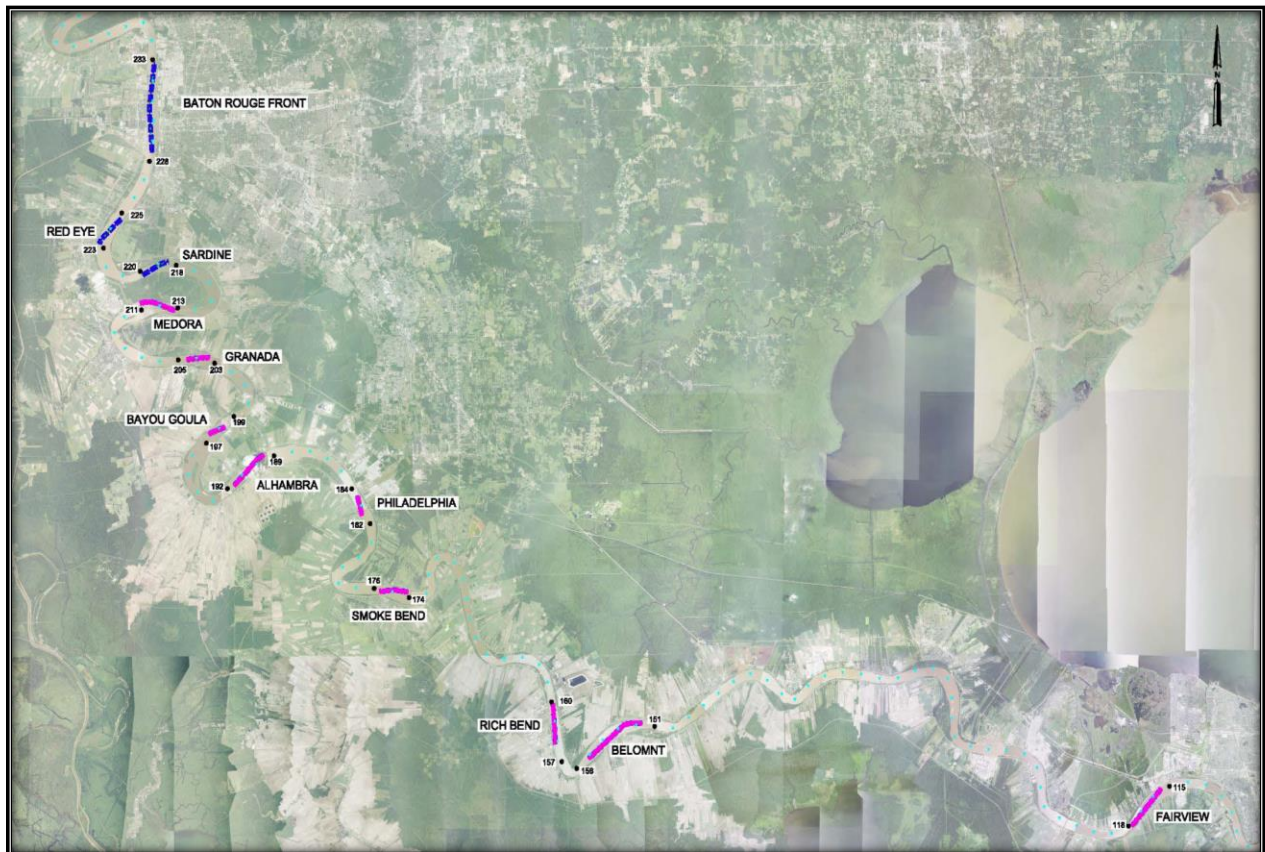


Figure 2 - Twelve Crossings within the Study Footprint

Commercial use may prove to be cost-effective. Throughout the project life, multiple scenarios will prevail within the project footprint where dredged material generally distributed back into the channel can be used on other projects. Any benefit to other projects could also be deemed a benefit to the economy. If the proper planning and coordination is implemented it's not unreasonable to think that a modest 20-25% of the material can be utilized for such uses. If the material is within a reasonable haul to other projects it could provide a material cost benefit to the economy of an estimated \$5/CY. At the same time a portion of this material will not be

potentially back in the channel costing the Government a currently estimated ¹\$3.21/CY on future dredging projects which ultimately reduces future O&M costs.

Use can range from highway projects, various construction projects, concrete products, backfill material, park areas or many more such uses. Various projects similar to this have already been performed and partnered with the (CPRA) Coastal Protection and Restoration Authority. More information pertaining to these projects can be found at the following web address:

<http://cims.coastal.la.gov/outreach/Default.aspx>.

Should such market demand volume, dredging cost and use value be realized, net economic benefits to the project would be substantial.

Another potential use near the crossings would be habitat creation/restoration on the river batture. ²The batture community develops on the slope between the natural levee crest and major streams/rivers. It is a pioneer community which is first to appear on newly formed sand bars and river margins. The area receives sands and silts with each flood. The soils are semi-permanently inundated or saturated. Soil inundation or saturation by surface water or groundwater occurs periodically for a major portion of the growing season. Consequently, dredged material could be used to make artificial batture sites that would ultimately provide habitat for wildlife as well as provide eco habitat for various plant species.

The potential development of batture nature parks can also be considered as a sub-option.

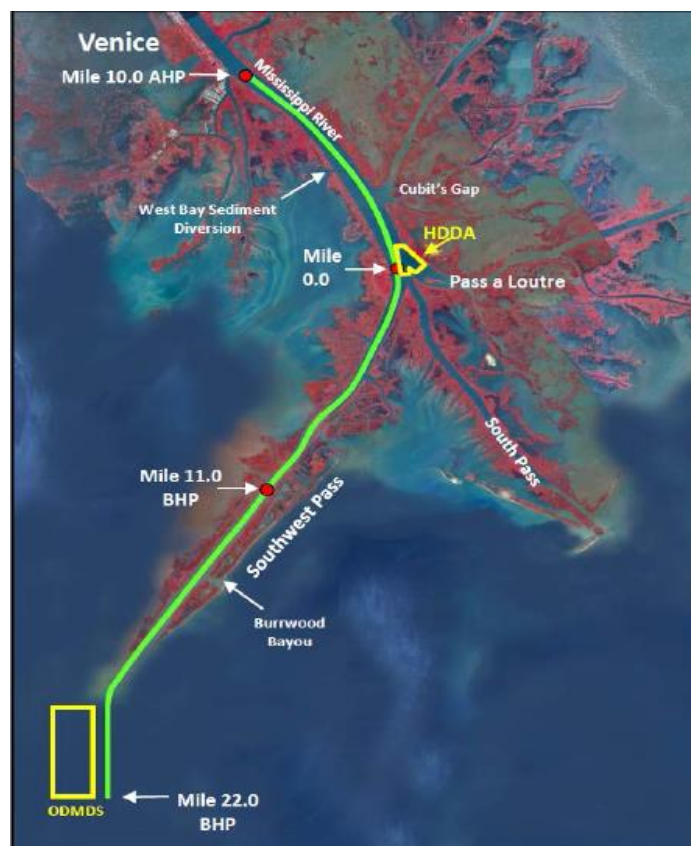
It should be noted that federal O&M dredging is mandated to employ least-cost methods. As such, the State (or other approved entity) would have to invest the additional dredging cost for stockpiling versus side-cast dredging. Beneficial use for habitat creation or rehabilitation, however, could be funded by the USACE Beneficial Use of Dredged Material (BUDMAT) authority.

10. Consider additional HDDA (Hopper Dredge Disposal Area) locations - There are presently two HDDA locations for dredge disposal sites as shown on the map 1 below. These two areas take dredged material from hopper dredge units. The site near Mile 0.0 is currently re-dredged and material is used for environmental restoration (ref. BUDMAT program). Apparently the present two HDDA disposal sites are filling up faster than the dredge material is being mined. Additional sites along the lower portion of the ship channel would reduce dredging costs by

reducing the time it takes to drive to each site, placed dredge disposal sediment and return to the dredge area.

There are no HDDA disposal sites for the upper reaches of this project (Ports of South Louisiana and Baton Rouge) where there are (12) crossings that are dredged annually. Generally these sites are dredged by dustpan dredges which distribute the vacuumed sediment materials only a short distance of around 500 – 1,000 feet from the point where the dredge is dredging. Having multiple HDDA disposal areas on the upper reaches of the ship channel would allow both hopper and cutter head dredges to deposit materials for dredging these crossing sites so that the State of Louisiana and/or the BUDMAT program could utilize these materials. Multiple HDDA sites in this stretch of the river would allow both hopper and cutterhead dredges to be used in the event that dustpan dredges were not available for dredging these crossings in the event this project was implemented with construction to follow at a fast pace to incur benefits sooner in the project schedule or overwhelm the dustpan dredging capability.

There are no cost saving shown for this alternative. However, creating multiple HDDA sites would provide a means of utilizing hopper and cutterhead dredges in the crossings and perhaps creating a stockpile for secondary dredging and beneficial use.



Present HDDA Locations

11. Include re-construction or upgrade of existing training structures in the lower river system

Existing rock and timber pile dike training structures in the lower river navigation system (SW Pass and Bar Channel) have deteriorated and have limited functionality. In order for the proposed project to be efficiently maintained (minimize O&M dredging) it is critical that these structures be upgraded. It is recommended that such work be added as part of the construction of this 50-ft channel upgrade or as an immediate order of O&M work.

12. Update MVN total dredging demand projections; address possible market impact -

Current navigation channel and other needs require about 90 - 100 million cubic yards (m c y) of dredging per year. Future planned navigation and coastal restoration projects indicate a potential significant expansion of the District's dredging program.

In the previous Dredging Program VE study of 2009 a rough attempt at estimating annual future dredging was made. These projections were updated in March 2015 and again for this study as indicated in the below tables. The first indicates maximum future dredging demand via inclusion of the Port of Baton Rouge maintained to a 50-ft channel depth and the second with the Port of Baton Rouge maintained at the current 45-ft depth with downstream reaches through the Port of South Louisiana deepened to 50-ft. In conjunction with other district projects, increased annual dredging demand could range from 30 – 60 mcy per year. This will be a substantial increase that may be realized in a relatively short period of time given authorization and funding of this project.

If the maximum level of increased dredging demand is realized two-to-four additional dustpan, cutterhead (or other large capacity) plants would be needed in a short period of time to meet this need (Ref. OD-T Memorandum of July 31, 2009 in 2015 (or 2009) Dredging Program VE Study estimating dredging plant requirements to accommodate the above program increase). For the high-end increase may require some government involvement to avoid plant shortage and associated performance and market impact (see next recommendation). A lower anticipated dredging demand would require less new plant and may not indicate government participation in fabricating new plant.

In addition to MVN future demand there may also be future increase in demand by other federal and state agencies. It will be important to include these entities in our regional dredging program near and long-term strategies. Given the extensive anticipated program expansion there appears to be a need to form a permanent standing management group to develop and execute such strategic planning.

MVN - ESTIMATED PROJECTED TOTAL DREDGING NEED THROUGH FY 2027; HIGH-END ESTIMATE (INCLUDES 50-FT CHANNEL THROUGH PORT OF BATON ROUGE)														Sep-16	
	Project	Project	Year:	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027 ->	
Area	Type	Total Estimated Dredging Quantity (million CY):			86	93	98	97	96	148	138	147	145	145	148
		ROUNDED:			90	90	100	100	100	150	140	150	150	150	150
MS River	CM	Mississippi River		42	42	42	42	42	42	42	42	42	42	42	42
	CM	Baton Rouge Harbor		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	CM	Baptiste Collette Navigation Channel Maintenance Dredging		0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	FPNAV	Baptiste Collette Navigation Channel Deepening								?					
	FPNAV	Baptiste Collette Navigation Channel Maintenance Dredging								?					0
	FPNAV	Inner Harbor Navigation Canal Lock Replacement								?					
	FPNAV	MS River Deepening							35	35	35	35	35	35	35
Barataria	FPLCA	MRGO Ecosystem Restoration							13	13	13	13	13	13	13
	FPLCA	LCA - MSR Delta Management (est max dredging)									5	5	5	5	5
	CM	Tiger Pass		1	1	1	1	1	1	1	1	1	1	1	1
	CM	Fourchon		0.03			0.03			0.03			0.03		
	FPLCA	Caminida Headlands Restoration		2.5	2.5										
	FPLCA	Shell Island Restoration		1.5	1.5										
	FPLCA	Bayou DuPont		3	3	3	3	3	3	3	3	3	3	3	3
Terrebonne	CM	Houma Navigation Canal (HNC) Bay and Bar			2			2			2				2
	FPNAV	HNC Deepening							1	1	1	1	1	1	1
	FPLCA	Terrebonne Basin Islands Restoration				10	10	10	10						
Atchafalaya	CM	Port of Iberia							?						?
	CM	Atchafalaya River		12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	CM	Atchafalaya Basin		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	CM	Freshwater Bayou				0.5				0.5					0.5
	CM	Calcasieu River		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	CM	Mermentau River/Basin		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
SW LA	FPLCA	SW Coastal									2.6	2.6	2.6	2.6	
(General)	CM	GIWW		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	CM	Miscellaneous New Orleans District Maintenance Dredging		7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	FPLCA	CWPPRA Projects		0.8 to 6	0.8 to 6	0.8 to 6	0.8 to 6								
			(average)		3.5	3.5	3.5	3.5							
	Other Projects Not Currently Identified and 'Contingency'			5	10	10	10	10	15	15	15	15	15	15	15
	CM	= Current Channel Maintenance													
	FPNAV	= Future Navigation Project													
	FPLCA	= Future Louisiana Coastal Area or State Master Plan Ecological Restoration Project													

MVN - ESTIMATED PROJECTED TOTAL DREDGING NEED THROUGH FY 2027; LOW-END ESTIMATE (INCLUDES 50-FT CHANNEL THROUGH PORT OF SOUTH LA)														Sep-16	
	Project	Project	Year:	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027 ->	
Area	Type	Total Estimated Dredging Quantity (million CY):			86	93	98	97	96	120	110	119	117	117	120
		ROUNDED:			90	90	100	100	100	120	110	120	120	120	120
MS River	CM	Mississippi River		42	42	42	42	42	42	42	42	42	42	42	42
	CM	Baton Rouge Harbor		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	CM	Baptiste Collette Navigation Channel Maintenance Dredging		0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	FPNAV	Baptiste Collette Navigation Channel Deepening							?						
	FPNAV	Baptiste Collette Navigation Channel Maintenance Dredging							?						0
	FPNAV	Inner Harbor Navigation Canal Lock Replacement							?						
	FPNAV	MS River Deepening							10	10	10	10	10	10	10
Barataria	FPLCA	MRGO Ecosystem Restoration							13	13	13	13	13	13	13
	FPLCA	LCA - MSR Delta Management (est max dredging)									5	5	5	5	5
	CM	Tiger Pass		1	1	1	1	1	1	1	1	1	1	1	1
	CM	Fourchon		0.03			0.03			0.03			0.03		
	FPLCA	Caminida Headlands Restoration		2.5	2.5										
	FPLCA	Shell Island Restoration		1.5	1.5										
	FPLCA	Bayou DuPont		3	3	3	3	3	3	3	3	3	3	3	3
Terrebonne	CM	Houma Navigation Canal (HNC) Bay and Bar			2			2			2				2
	FPNAV	HNC Deepening							1	1	1	1	1	1	1
	FPLCA	Terrebonne Basin Islands Restoration				10	10	10	10						
Atchafalaya	CM	Port of Iberia							?						?
	CM	Atchafalaya River		12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
	CM	Atchafalaya Basin		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
	CM	Freshwater Bayou				0.5				0.5					0.5
	CM	Calcasieu River		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	CM	Mermentau River/Basin		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
SW LA	FPLCA	SW Coastal									2.6	2.6	2.6	2.6	
(General)	CM	GIWW		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	CM	Miscellaneous New Orleans District Maintenance Dredging		7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	FPLCA	CWPPRA Projects		0.8 to 6	0.8 to 6	0.8 to 6	0.8 to 6								
		(average)		3.5	3.5	3.5	3.5								
	Other Projects Not Currently Identified and 'Contingency'			5	10	10	10	10	12	12	12	12	12	12	12
	CM	= Current Channel Maintenennce													
	FPNAV	= Future Navigation Project													
	FPLCA	= Future Louisiana Coastal Area or State Master Plan Ecological Restoration Project													

13. Consider public-private partnership ('P3') for dredge plant construction - Current future dredging estimates indicate that if constructing and maintaining a 50-ft channel through the Port of Baton Rouge is implemented, dredging demand from the New Orleans District would increase by approximately 67% in a short period of time (see above recommendation). Given the fact that current dredging capacity is dictated by dredge availability, the projected quantity will far exceed the available dredge plant in and beyond the region.

While private industry will 'respond' to this need by manufacturing additional dredge fleet as projects progress, it is likely that such plant development will severely lag project demand. It isn't likely that private industry will produce more plant than is needed as they will perceive a risk of over-supplying intermediate need. Such projected constant shortages will likely limit bid completion and raise prices substantially.

A possible means of avoiding this problem may be government partnerships with private industry to fabricate new plants in advance of individual project need. Such partnerships are currently being encouraged by USACE (known as 'P3'). There are various 'lease/purchase' and other innovative procurement options that balance risk and optimize financial advantages between the government and industry. In general, the government can secure capital at relative low cost and industry can take tax advantages of ownership via depreciation deduction. Such advance fabrication of dredge plants could help in achieving adequate resource supply to meet projected project demand.

It is imperative to note that no entity within MVN (or the Corps at large) is currently tasked or has the proper means to pursue or develop the above suggested government participation in dredge plant fabrication. Also, current law may prohibit such as specifically related to dredging. District management should consider establishing a task force to address this (and perhaps other) resource availability issue(s). A detailed discussion defending the reversal of current policy and allowing expansion of the Federal dredge fleet can be found in the May 31, 2002 report entitled "The Case for the Federal Hopper Dredge Fleet on the Pacific Coast".

Federal Interest in Public-Private Partnerships

A roundtable policy discussion on P3 for Ports and Waterways was held in 2014 with members of various Port Commissions, the Waterways Council, and the Chief of Operations and Regulatory, HQ, Corps of Engineers and Chaired by U. S. Rep John Duncan (R-TN). The purpose

of the discussion was to examine the use and opportunities for P3s across all modes of transportation, economic development, public buildings, water and marine infrastructure.

In September of 2105, MVN and ASCE hosted a workshop with project stakeholders to discuss alternative financing concepts. Utilizing the P3 concepts, the IHNC Lock replacement as well as Larose to Golden Meadow Hurricane Protection Project were identified to focus on as pilot projects. The path forward was decided to engage P3 private sector expertise to complete in FY16, and to develop a P3 pilot program to develop a private investment plan for the two recommended projects. Once complete, use the lessons learned for future projects such as Morganza to the Gulf, SELA, and Comite.

There are also many organizations and support groups that have programs that can assist and facilitate P3 in projects such as the NCPPP (national Council for Public-Private Partnerships). See links below for event and federal participation examples:

<http://www.ncppp.org/about/overview-mission/>

<http://www.ncppp.org/army-corps-to-solicit-public-comment-on-p3-pilot-program-for-water-projects/>

<http://federalp3summit.org/>

<http://www.ncppp.org/events/past-events/dodfederal-energy-water-forum-presentations/>

14. Consider VE recommendations from Dredging Programmatic and BUDMAT studies -

A number of past VE studies contain additional recommendations applicable to this project that should be further considered. A summary list of such recommendations from two recent studies: *“MVN Dredging Program, July 2015”*, and *“Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report, October 2014”*, is shown as **Appendix F**.

APPENDIX A - VALUE ENGINEERING JOB PLAN AND WORKSHOP AGENDA

VALUE ENGINEERING JOB PLAN AND WORKSHOP AGENDA

This workshop was conducted using the six-phase Value Engineering Job Plan as sanctioned by USACE and SAVE International. This process, as listed below, was executed as part of daily activities as described in the following Workshop Agenda:

USACE VALUE ENGINEERING JOB PLAN

(Information Phase)

At the beginning of the study, the project team presents current planning and design status of the project. This includes a general overview and various project requirements. Project details are presented as appropriate. Discussion with the VE Team enhances the Team's knowledge and understanding of the project. A field trip to the project site may also be included as part of information gathering.

(Function Analysis Phase)

Key to the VE process is the Function Analysis Process. Analyzing the functional requirements of a project is essential to assuring an owner that the project has been designed to meet the stated criteria and its need and purpose. The analysis of these functions is a primary element in a value study, and is used to develop alternatives. This procedure is beneficial to the team, as it forces the participants to think in terms of functions and their relative value in meeting the project's need and purpose. This facilitates a deeper understanding of the project.

(Creativity Phase)

The Creativity Phase involves identifying and listing creative ideas. During this phase, the team participates in a brainstorming session to identify as many means as possible to provide the necessary project functions. Judgment of the ideas is not permitted in order to generate a broad range of ideas.

(Evaluation Phase)

The purpose of the Evaluation Phase was to systematically assess the potential impacts of ideas generated during the Creativity Phase relative to their potential for value improvement. Each idea is evaluated in terms of its potential impact to cost and overall project performance. Once each idea is fully evaluated, it is given a rating to identify whether it would be carried forward and developed as an alternative, presented as a design suggestion, dismissed from further consideration or is already being done.

(Development Phase)

During the Development Phase, ideas passing evaluation are expanded and developed into value alternatives. The development process considers such things as the impact to performance, cost, constructability, and schedule of the alternative concepts relative to the baseline concept. This analysis is prepared as appropriate for each alternative, and the information may include an initial cost and life-cycle cost comparisons. Each alternative describes the baseline concept and proposed changes and includes a technical discussion. Sketches and calculations may also be included for each alternative as appropriate.

(Presentation Phase)

The VE Workshop concludes with a preliminary presentation of the value team's assessment of the project and value alternatives. The presentation provides an opportunity for the owner, project team, and stakeholders to preview the alternatives and develop an understanding of the rationale behind them.

VALUE ENGINEERING WORKSHOP AGENDA FOR: Mississippi River Ship Channel – Re-evaluation

**WORKSHOP DATE AND LOCATION: 13 – 15 September, 2016
New Orleans District Office – Room 328**

Tuesday, 13 Sep

9:00 AM – 5:00 PM (START WORKSHOP)

Introductions

VE Facilitator presents overview of VE process and workshop schedule

(INFORMATION PHASE)

Project Manager (PM) presents project overview

Technical Manager(s) present current design status

VE Facilitator leads discussion to:

- . Identify, discuss and list project general and specific project issues
- . Identify, discuss and list project performance standards and attributes

(FUNCTION ANALYSIS PHASE)

VE Facilitator leads group to develop project Function Analysis System
Technique (F.A.S.T.) Diagram

Wednesday

9:00 AM – 5:00 PM

VE Facilitator leads the following:

Review of project issues, performance attributes and functions

(CREATIVITY PHASE)

Conduct and document idea brainstorming session

(ANALYSIS PHASE)

Conduct and document idea screening

(DEVELOPMENT PHASE)

Assign recommendation write-ups

Present write-up format

Thursday

9:00 AM – 5:00 PM

Complete write-ups of recommendations

Presentation meeting of workshop results to be held at a later date.

APPENDIX B: WORKSHOP PARTICIPANT ROSTER

MISSISSIPPI RIVER SHIP CHANNEL VALUE ENGINEERING WORKSHOP 13 - 15 SEP 2016

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APPENDIX C: PROJECT ISSUES AND PERFORMANCE ATTRIBUTES

*As part of a comprehensive value analysis process, project issues were identified and discussed by the VE Team, PDT and Local Sponsors. Directly addressing these issues was included referred to as part of the Creativity Phase along with individual project functions in the F.A.S.T. diagram illustrated in **Appendix D**.*

Five 'evaluation criteria' used by the PDT in screening alternative measures were established as VE 'Performance Attributes' used as a means of determining idea viability.

Anticipated construction features were identified and order of magnitude cost estimates were developed in order to provide some relative basis for proposal comparison, where applicable.

PROJECT ISSUES

1. 45 ft depth limit creates shipping **inefficiencies** (due to light loading)
2. Safety Concerns with widths (decreases from >750 ft to 500 ft)
3. Maintenance Inefficiencies: At times of **high shoaling rates**, the deposition of sediment is higher
4. Saltwater intrusion – Low Risk
 - Flocculation changes only impacts SWP
 - Limited impacts due small potential changes in depths (1.5 ft)
 - Limited impacts to salt water sill activation
 - Lower channel has already migrated from a 45 MLLW depth to a 48 MLLW
 - No observed changes in the frequency of activation
 - 3D model being conducted to fully understand the Flocculation Process
 - No expected changes to the TSP based on results
5. Relative Sea Level Rise Impacts – Low Risk
 - Impacts to lower channel only
 - Limited impacts on plan selection

- Key assumption: Operations would continue to maintain existing bank lines
- High RLRS rates could reduce disposal cost. (More open water near channel)
- Deposition of material could vary by location
- 2D model is currently being conducted
- Annual O&M could be reduced, since 1D results assumed all shoaling occurred in Navigation channel

6. Relocations – Low Risk

- Expect all Relocations not to be a concern once fully investigated

7. Substantial increase in annual MVN dredging demand.

8. State strongly supports project through Baton Rouge

9. May not have accounted for new plants announced.

10. Benefits start after 4-yr construction

11. Dredge disposal plan.

12. Will disposal from crossings shoal other channel locations?

13. Added duration time to dredge crossings deeper; need for added plant.

14. Funding availability impact on keeping crossings open (dredged to full depth)

15. May be opportunity to improve crossing shoaling (soft dikes, etc.)

16. Current channel training features are not funded for repairs.

17. Can funds for this project (construction) be used to repair upgrading jetties, etc.

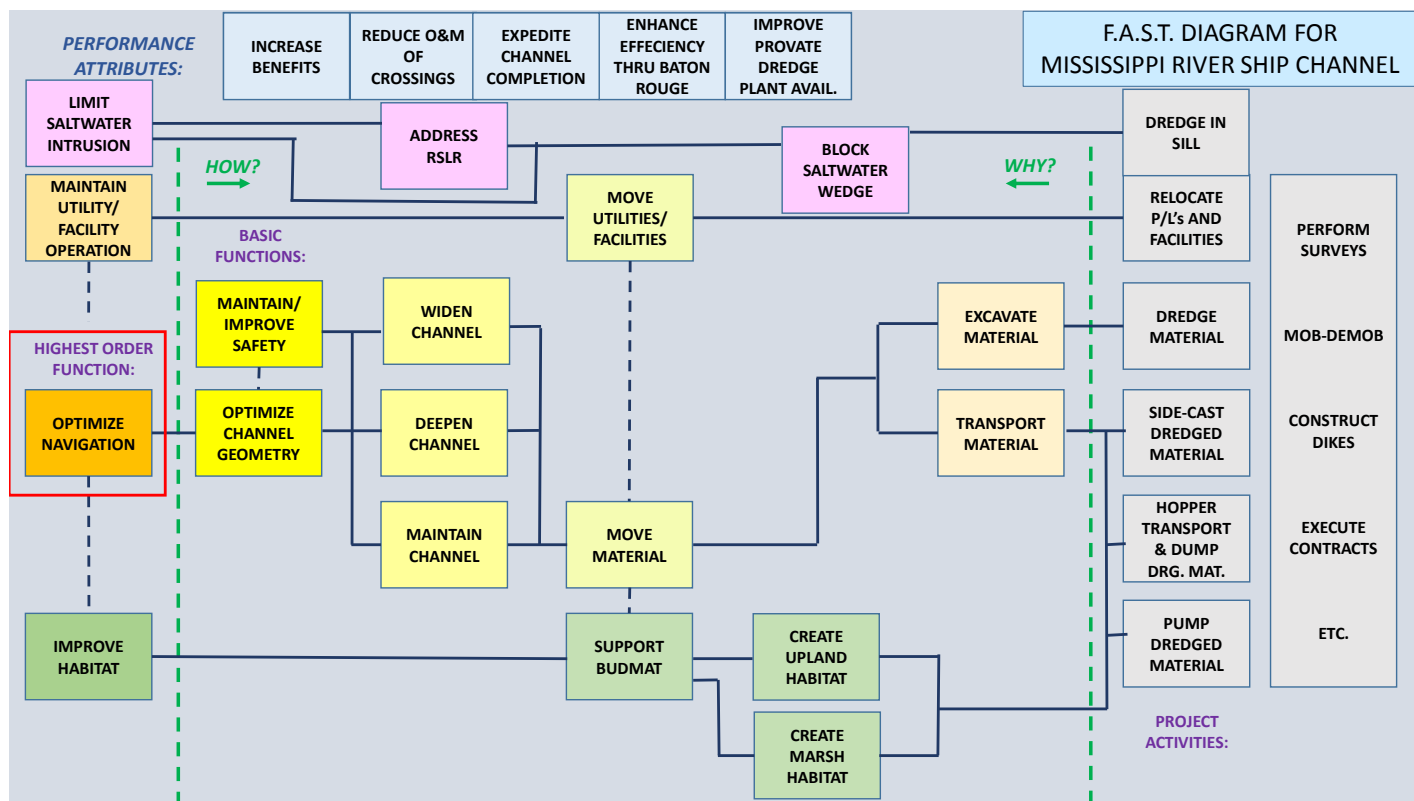
18. Are up-state benefits included?

PERFORMANCE ATTRIBUTES

The VE Team used the following evaluation criteria, also defined in the VE process as 'performance attributes', that were established by the PDT in screening project alternative measures:

1. Increase benefits
2. Reduction of operation cost of crossings
3. Expedite channel completion
4. Enhancing project efficiency through Baton Rouge
5. Improves private plant competitiveness and availability

APPENDIX D: FUNCTION ANALYSIS SYSTEM TECHNIQUE (F.A.S.T.) DIAGRAM



APPENDIX E: SPECULATION LIST

MISSISSIPPI RIVER SHIP CHANNEL - VE SPECULATION LIST			PAGE 1
AR	1	Update MVN total dredging demand projections; address possible market impact	
AR	2	Consider VE recommendations from Dredging Programmatic and BUDMAT studies	
AR	3	Look for opportunities to piggyback CPRA and other State projects; use dredged material	
w/3	26	Create batture park(s) - coordinate with state Parks	
w/3	29	Explore possible multi-purpose useage for dredged material	
AR	8	Evaluate benefits of construction of training structures (soft dikes, etc.)	
w/8	41	Add line item construction cost for training works TBD; reduce O&M accordingly	
AR	10	Expedite construction; open So LA d/s earlier than 4-years	
AR	17	Reconcile benefits caculation with state	
w/17	5	Consider economics to include other states and future plants, and development	
w/17	6	Re-evaluate future economic development on the river	
AR	20	Dredge crossings in BR area from u/s to d/s	
AR	30	Stockpile dredged material; bid out or free to other users	
w/30	21	Designate batture sites along crossings for disposal and re-use	
w/30	25	Find use for dredged material from crossings (road projects, etc.)	
w/30	27	Consider d/s dredging reduction benefit of removing material from the river	
AR	31	Consider additional HDDA locations	
AR	34	Do extensive planning for P/L relocations to minimize time	
AR	36	Do P3 on dredge plant construction	
w/36	4	Consider design-build	
w/36	12	Investigate measures to increase dredging competition/availability	
AR	37	Include re-construction or upgrade of existing training structures project construction	
AR	38	Re-vist / review dredge / validate material calculations for crossings	
AR	42	Composite recommendation: Re-visit benefits, add training features and reduce O&M,	
AR	43	Re-calculate B/C ratios with inclusion of training dikes and advance benefits to So LA	
AR	40	Construct project through B.R. with limited recommended contingent future O&M; re-eval after 10-years	
XBD	39	Show alternative cost in present worth (billions)	
XBD	9	Experiment with new dredging technology	
XBD	15	Keep integral project thru Baton Rouge	
XBD	16	Factor sponsor preference in plan selection	
XBD	23	Fully fund project construct at one time (eliminate mob-demob costs)	
XBD	24	Use corps dredges for construction	
XBD	28	Consider RSLR in channel depth	
XBD	35	Commintate with industry on potential MVN dredging future demand construct through Baton Rouge with contingent O&M limits; re-eval in 10-years	
X	7	Look at 48 ft in Baton Rouge; 50-ft So LA and d/s	
X	11	Get rid of restrictions on federal dredges	
X	13	Change OMB policy on 2.5 B/C ratio for funding priority	
X	14	Do not use 2.5 B/C as project selection criterion	
X	18	Extend railroad to move navigation goods	
X	19	Construct P/L along river (east and west banks)	
X	22	Assign monetary benefits to environmental use of dredged material	
X	32	Construct locks and dam with diversions	
X	33	Construct diversion/navigation channel off the river	
AR = Alternative Recommendation; X = Idea Eliminated; XBD = Being Done; 'w/xx' = Combin Item			
			48

APPENDIX F: List of Recommendations from Previous Recent VE Studies: “MVN Dredging Program, July 2015”, and “Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report, October 2014”,

Summary of VE Recommendations – MVN Dredging Program, July 2015:

PROGRAM MANAGEMENT

1. Develop future dredging needs schedule to include planned navigation, environmental restoration and other proposed projects
2. Build more dredging plant by means of direct government assistance or partnership with private industry
3. Pursue changing restrictions on the use of the Dredge Wheeler
4. Expand local sponsor partnership opportunities
5. Submit projects for GOMESA funding
6. Conduct expanded-scope regional dredging coordination; Revise Gulf Coast Cutterhead Group
7. Create regionalization demonstration project of appropriations for all MVN projects
8. Create a formal Gulf Coast Corps Authority Management Strategy for Dredging
9. Get more funds allocated during Continuing Resolutions
10. Perform dredging on biannual basis to maximize the amount of dredging for a given dollar
11. Conduct lessons learned workshops, to include contractors, for continued improvement of program
12. Establish a standardized database for dredging information input, sharing, and use

CONTRACT OPTIONS

13. Shorten dredging contracts to free up equipment; Optimize contract length to reflect actual production rate
14. Analyze efficiency of equipment usage
15. Utilize more Request for Proposal (RFP) contracts when a low number of bidders are anticipated
16. Use options contract to address limited end-of-year funds
17. Use base + future year(s) option contracts; Award multi-year open-by-amendment contracts for dredging
18. Include options to contract for multiple federal projects within a certain proximity to minimize mobilization/demobilization to extent possible

19. Use location-based IDIQ contract
20. Obtain waiver for Continuing Contract Clause where policy is driver
21. Change incentive clause pay ratio from 1:1 to a more favorable percentage for the government

TECHNICAL CONSIDERATIONS

21. Use side-cast dredge (e.g. McFarland, Merritt) for demonstration project, especially in the Atchafalaya River Bar Channel
22. Re-visit 2007 hopper pump-out review analysis for Mississippi River Dredging
23. Utilize permanent pipelines for material placement where advantageous
24. Include some upland and intermediate elevation for marsh creation dredged material placement
25. Excavate previously utilized dredge upland placement sites for use on other projects
26. Consider beneficial use placement of material via advance maintenance over-dredging of channel within authorized depth; pay difference with BUDMAT funds
27. Dredge sediment traps consistent with beneficial use

Summary of VE Recommendations – Beneficial Use of Dredged Material West Bay and Tiger Pass, Plaquemines Parish, Louisiana, Design Phase Value Engineering Report, October 2014

1. Modify Recently Awarded HDDA Dredging Contract to Include BUDMAT Features
2. Endorse Fish and Wildlife Service (FWS) Proposed Island/Delta Alternative
3. Obtain Advance O&M Funds in FY 15 and Combine with BUDMAT Work
4. Eliminate Hopper Release to HDDA; Pump Out to BUDMAT Target Areas
5. Consider Advanced Maintenance Over-Dredging of Channel
6. Create Sediment Trap(s) via Dredging the West Side of the River (Coast Guard Anchorage Area)
7. Amend NEPA to Allow Higher Island and/or Marsh Elevation
8. Increase Contract Performance Period (HDDA Dredging)
9. Consider purchasing all land for all alternatives up-front
10. Build Sediment Trap(s) Near Venice for BUDMAT Marsh/Island Creation West and Northwest of Venice (Future BUDMAT Project)

APPENDIX G: PROJECT INFORMATION PRESENTATION

Mississippi River Ship Channel, Gulf to Baton Rouge, LA, Phase III

20 Sept 2016 - TSP Milestone

USACE

New Orleans District

Regional Planning

Environment Division

South

Planning Chief: Troy Constance

Senior PM: Marti Lucore

PM: Steve Keen

**Planner: Travis Creel and
Jennifer Vititoe**



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Legislative Authority and Construction

Project Authority:

- 1985 Supplemental Appropriations Act (PL-99 88) Authorized for construction
- 1986 - Record of Decision
- 1986 - Water Resources Development Act (PL 99-662) formalized the project cost-sharing provisions
- Project Authorized to a depth 55'
- Agreement with NFS currently only supports construction and maintenance to a depth of 45'

Non-Federal Sponsor: The Louisiana Dept. of Transportation and Development

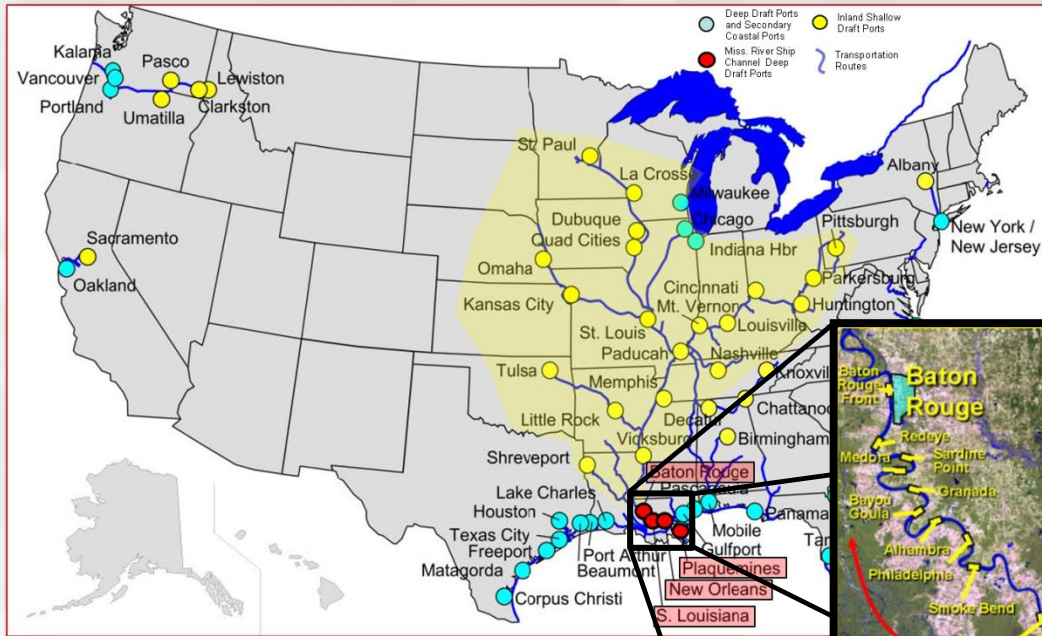
- Construction in December of 1987 and provided for a depth of 45 feet from Donaldsonville, LA (Mile 181.0) to the Gulf of Mexico
- Construction in December 1994 involved deepening of the MRSC to 45 feet between Donaldsonville, LA (Mile 181.0) to Baton Rouge and included dredging eight river crossings

Initiate General Reevaluation Report

- LaDOTD supported construction if building a 50 foot deep channel is viable



Study Area



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Problems/Opportunities

Purpose: The purpose of the GRR is to evaluate the depth that creates the greatest net benefits up to a depth of 50 ft, in order to proceed to implementation of deepening the MRSC from the current depths*

Problem: Transportation Cost Inefficiency

- 45 ft depth limit creates shipping **inefficiencies** (due to light loading)
- Safety Concerns with widths (decreases from >750 ft to 500 ft)
- Maintenance Inefficiencies: At times of **high shoaling rates**, the deposition of sediment is higher

Opportunities:

- Reduce light loading
- Allow for easier maneuvering
- Efficiencies of operation and maintenance dredging intervals



*Maintained Conditions for the Lower Mississippi River (~ Mile 12 Above Head of Passes (AHP) to the Gulf through Southwest Pass) are at a depth of 48.5 ft.

Study Characteristics/Issues:

- Maintenance frequency not typical when compared to the rest of the nation
- Changing laws related Cost Share Agreement
- Multiple ports on one waterway (Largest model built or run by PCX)

TSP Selection Criteria:

- Intent of the study is to identify the next increment of construction for the entire channel based on:
 - Benefit to Cost Ratio greater than 1
 - Net Excess Benefit to the nation
- Results in a Director's Report to justify the next construction increment



Alternatives Considered at AMM

Initial Array:

- **Alt1 Exist45:**

45 ft depth with a 500 ft channel width at the crossings,

45 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

45 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

- **Alt2 Exist48:**

48 ft depth with a 750 ft channel width at the crossings,

48 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

48 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico

- **Alt3 Exist50:**

50 ft depth with a 750 ft channel width at the crossings,

50 ft depth with a 750 ft channel width from mile 181 AHP to mile 17.5 BHP and,

50 ft depth with a 600 ft channel width from mile 17.5 BHP to the Gulf of Mexico



Screening Alternatives Considered

Consideration of Channel Width:

- Limited safety concerns related to channel widths with current shipping fleet
- Safety will be a concern with future shipping fleets as ship length increases

Result: Limited alternatives to varying channel depths only

Consideration of Existing Channel Depth:

- MVN Operations Division (MVN OD): “No changes to the current dredging depths for SW Pass until the MRSC Deepening Study can be completed”

Result:

- Alt 1 Exist45 became the “Appropriated” conditions for evaluations
- No Action Alternative became a base condition with a depth of 48 ft in Lower MS River



Revised Focus Array

Permutations: Combination of depths for Lower Mississippi and Crossings Considered

- Lower MS 48 ft Condition to 45 ft; Crossings remain at 45 ft (Appropriated Condition)
- Lower MS from 45 ft to 48 ft; Crossings remain at 45 ft
- **Lower MS remains at 48 ft; Crossings remain at 45 ft (Base Condition)**
- **Lower MS remains at 48 ft; Crossings deepened from 45 ft to 48 ft**
- **Lower MS deepened from 48 ft to 50 ft; Crossings deepened from 45 ft to 50 ft**
- Lower MS deepened from 48 ft to 50 ft; Crossings remain at 45 ft
- Lower MS deepened from 48 ft to 50 ft; Crossings deepened from 45 ft to 48 ft

Revised Focused Array (TSP Decision)

- **Appropriated Condition:** 45 ft (existing depth, Crossings) and 45 ft (Lower MS River)
- **Alternative 1 (No action/Base Condition):** 45 ft at Crossings) and 48 ft in Lower MS River)*
- **Alternative 2:** Lower MS at 48 ft and Crossings at 48 ft
- **Alternative 3:** Lower MS 48 ft to 50 ft and Crossings 45 ft to 50 ft



*Per ER 1110-2-8160, all depths should be reported in a Mean Lower Low Water (MLLW) tidal datum for all official documentation. Maintained Conditions for the Lower Mississippi River (~ Mile 12 Above Head of Passes (AHP) to the Gulf through Southwest Pass) are at a depth of 48.5 ft. Data point rounded to 48ft for economic models.

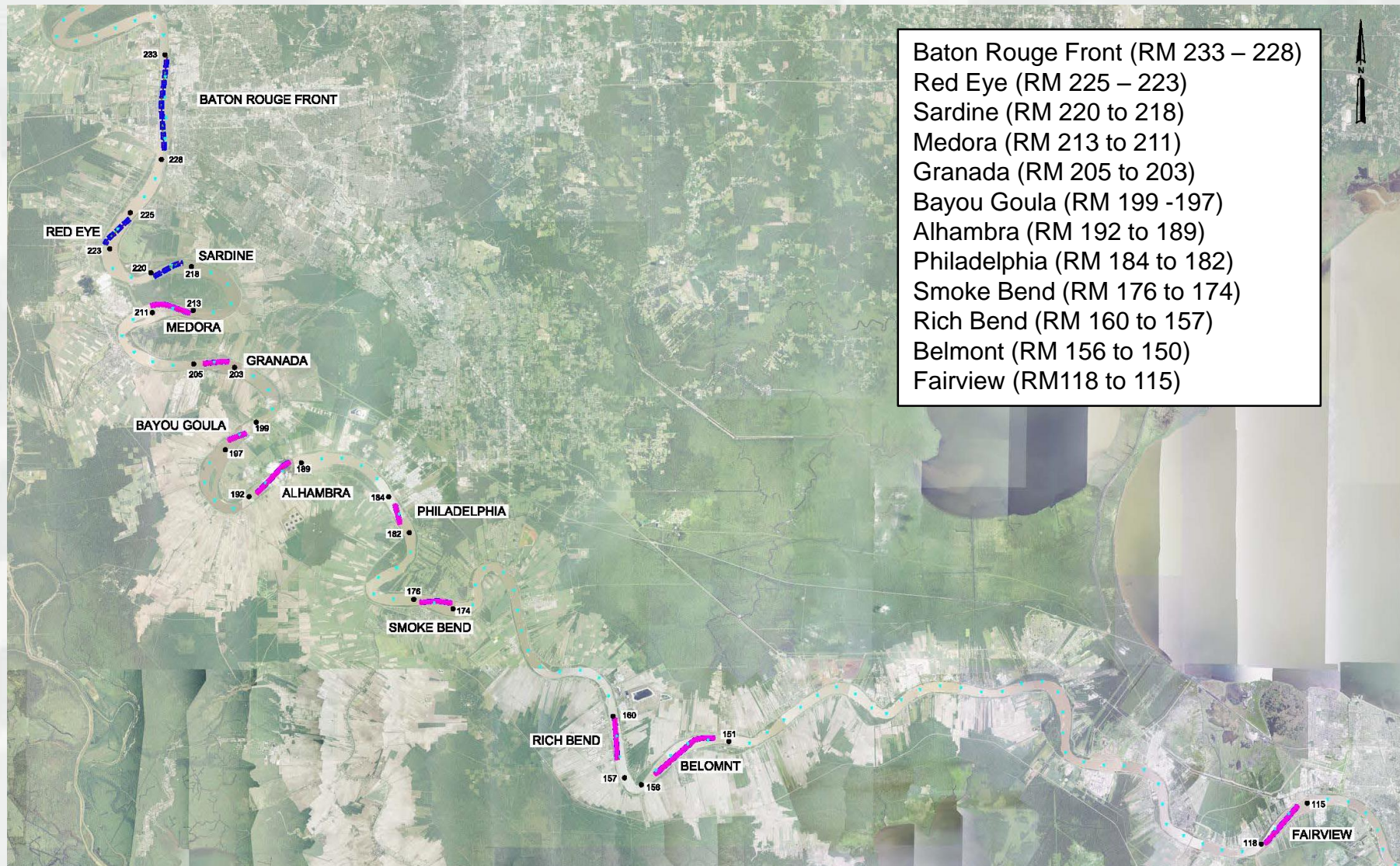
Engineering Evaluations

Areas of evaluations:

- Existing and Possible Future MS River Crossings
 - Lower MS: Southwest Pass and Bar Channel (Divided for cost estimates)
-
- All other areas naturally deeper than the authorized depth
 - Used existing dredging and 1D model to develop construction and O&M cost
 - Due to the limited change in depth between 48 ft and 50 ft in SWP, 2D and 3D not needed at this phase of study



Engineering: Crossings

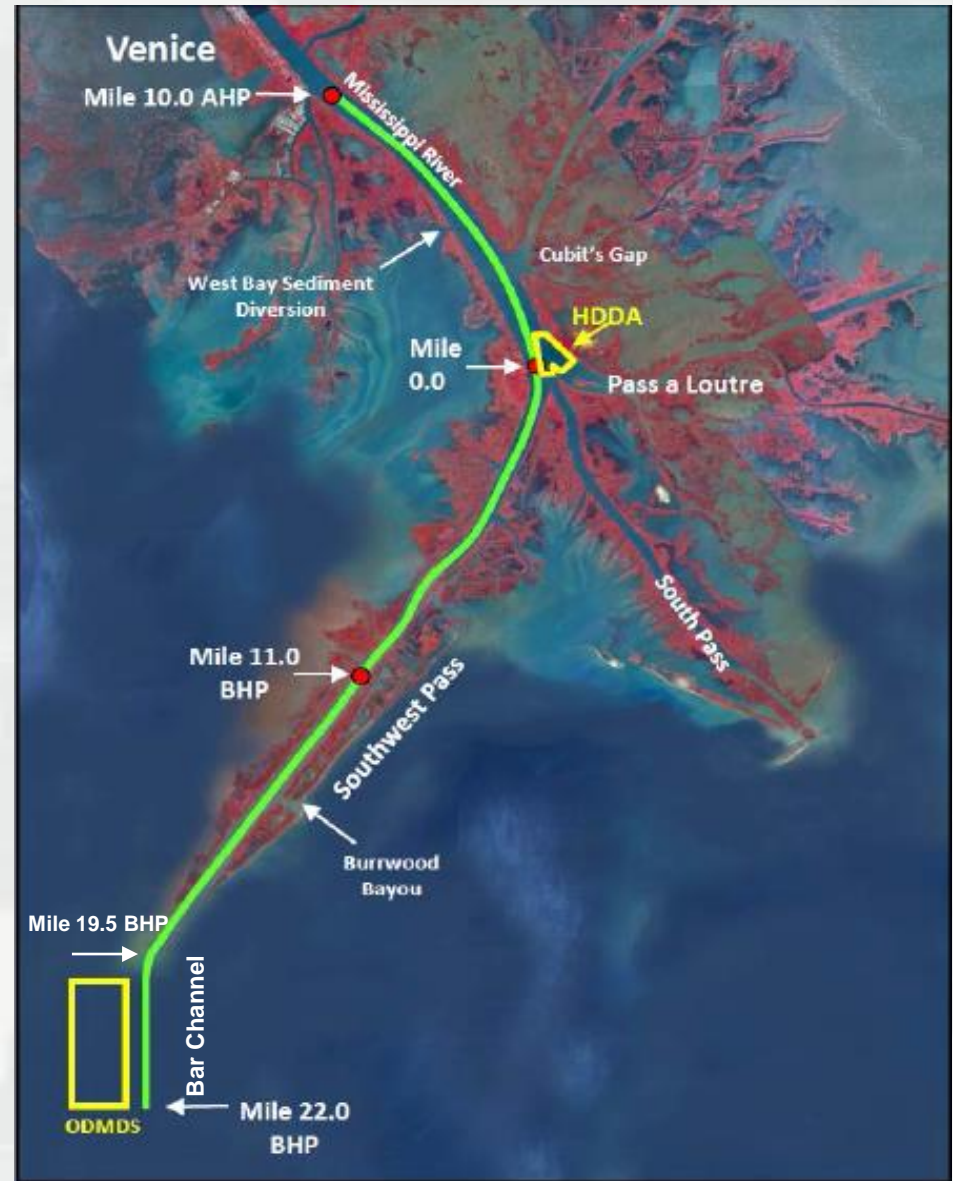


Engineering: Southwest Pass

Cubit's Gap to Head of Passes Reach
RM 7.0 or 6.0 AHP to RM 0.5 BHP

Southwest Pass
RM 0.5 BHP to RM 19.5 BHP

Bar Channel and Jetties
RM 19.5 BHP to RM 22 BHP



Engineering

Engineering Assumptions: Construction, O&M and Disposal

	Construction Method	O&M Method	Disposal Method
Crossings	Dustpan Dredge	Dustpan Dredge	Material Placed Downstream in Channel
Southwest Pass	Cutter Head Dredge	Combination of Cutterhead and Hopper Dredges	Disposal Site
Bar Channel	Hopper Dredge	Hopper Dredge	Disposal Site

- Construction: 4-yr construction duration
- Operations and Maintenance: 3 dredge cycles per year
- Documented in risk register (assumed current dredging practices would be conservative)



Engineering:

Construction from Appropriated Condition

Lower MS only

45 ft to 48 ft		
	Construction Quantities (CY)	Construction Cost
Crossings	N/A	\$84,939,642
Southwest Pass	21,204,000	
Bar Channel	1,905,200	
Total	23,109,200	

Considers constructing the Lower Mississippi, from the appropriated 45 ft depth to the existing condition of 48 ft



Plan Formulation – Economic Results

Construction from Appropriated Condition Lower MS only

MRSC – SWP and Bar Channel	
Average Annual Benefits and Costs (3.125%)	
Channel Alternative	From 45 ft to 48 ft
First Cost of Construction	\$84,939,642
Average Annual Cost	3,541,763
Average Annual Increm. O&M	None
Total Average Annual Benefits	\$45,922,826
B/C Ratio	13.0

O&M Cost for SWP and Bar Channel is equal for all depths, no incremental cost

SWP and Bar Channel at current depth of 48 ft MLLW is economically justified; based on ROM estimates

Negative benefit of \$46M annually if channel returned to 45 ft MLLW depth

No detailed economic runs were performed



Engineering

Construction from Base Conditions

Alternative 1: No Action		
Total	Construction Quantities (CY)	Construction Cost
	None	None
Alternative 2		
	Construction Quantities (CY)	Construction Cost
Crossings	5,467,000	\$88,663,029
Southwest Pass	N/A	
BarChannel	N/A	
Total	5,467,000	
Alternative 3		
	Construction Quantities (CY)	Construction Cost
Crossings	8,588,600	\$180,576,499
Southwest Pass	18,281,000	
BarChannel	1,619,000	
Total	28,488,600	

Base Conditions: Uses the existing 45 ft depth in Crossings, and 48 ft in Southwest Pass and Bar Channel

Alternative 1 45 ft depth (no action): Crossings, Southwest Pass, and Bar Channel would all remain at current depth and width, no construction cost

Alternative 2 48 ft depth: Bar Channel and Southwest Pass remain at the current depth of 48 ft, and Crossings are deepened from existing 45 ft to 48 ft

Alternative 3: 50 ft depth: Bar Channel and Southwest Pass are deepened from existing 48 ft to 50, and Crossings are deepened from existing 45 ft to 50 ft



Engineering:

O&M Dredging (Sediment) Only

Alternative 1: No Action			
	Current O&M Quantities (CY)	Current O&M Expenditures	Incremental Cost Increase
Crossings	19,419,180	\$23,969,413	N/A
Alternative 2			
	O&M Quantities	O&M Cost	Incremental Cost Increase
Crossings	38,397,000	\$124,308,045	\$100,338,632
Alternative 3			
	O&M Quantities	O&M Cost	Incremental Cost Increase
Crossings	48,377,000	\$155,451,482	\$131,482,069

- Incremental difference of dredging of the crossings only
- Alternative 1:
 - Quantities and Cost reflects the 5 year average of actual expenditures from Operations
 - Cost reflect an average cost of \$1.25 per cubic yard over the last 5 years
- Alternatives 2 and 3:
 - Quantities include the neat line estimate only
 - Cost includes a 20% increase in quantities for over depth
 - Cost reflect a cost of \$1.94 per cubic yard (conservatively used cost of more expensive dustpan dredge)
 - Cost includes PED (6%) and S&A (8%), and a risk based contingency
- Other O&M items for dredging of SWP and Bar Channel, and repair of training works remains constant for all alternatives. There is no increase is shoaling and dredge material between 45 ft, 48 ft, and 50 ft



Engineering – Total O&M

Alternative 1: No Action			
	Current O&M Quantities (CY)	Current O&M Budget	Incremental Cost Increase
Total	35,318,498	\$200,000,000	N/A
Alternative 2			
	O&M Quantities (CY)	O&M Cost	Incremental Cost Increase
Crossings	38,397,000	\$300,007,021	\$100,007,021
Southwest Pass	18,500,000		
BarChannel	3,750,000		
Total	60,647,000		
Alternative 3			
	O&M Quantities (CY)	O&M Cost	Incremental Cost Increase
Crossings	48,377,000	\$331,446,950	\$131,446,950
Southwest Pass	18,500,000		
BarChannel	3,750,000		
Total	70,627,000		

- **Cost for the No Action Alternative is based on Operations Divisions annual capabilities if fully funded. Quantities for the No Action Alternative are based on annual average of dredge quantities over the last 5 years**
- **O&M capabilities for the current project include the following:**
 - Dredging SWP (including the bar channel) and the crossings;
 - Dredging of New Orleans Harbor Access Area and Hopper Dredge Disposal Area
 - Repair of SWP foreshore rock & jetty repairs
 - Repair of SWP pile dire repair
 - Annual Saltwater Barrier Sill
- **Incremental Cost Increase reflects the increased O&M cost for each alternative above the current O&M capabilities**



Permutations

	Permutations						
	Appropriated		Alternative 1 (no action)	Alternative 2	Alternative 3	Alternative 3a	Alternative 3b
Change in depth at lower MS	48' to 45'	45' to 48'	48' to 48'	48' to 48'	48' to 50'	48' to 50'	48' to 50'
Incremental O&M Cost	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Construction Cost	N/A	\$84M	\$0	\$0	\$80M	\$80M	\$80M
Change in depth at crossings	45' to 45'	45' to 45'	45' to 45'	45' to 48'	45' to 50'	45' to 45'	45' to 48'
Incremental O&M Cost	\$0	\$0	\$0	\$100M	\$131M	\$0	\$100M
Construction Cost	\$0	\$0	\$0	\$89M	\$101M	\$0	\$89M
	Totals						
Total Incremental O&M Cost	\$0	\$0	\$0	\$100M	\$131M	\$0	\$100M
Total Construction Cost	\$0	\$59	\$0	\$89M	\$181M	\$80M	\$169M
Total Average Annual Cost	-\$3.5M	\$3.5M	N/A	\$103M	\$139M	\$3.4M	\$107M
Total Average Benefits	-\$45.9	\$45.9M	N/A	\$105M	\$147M	\$10.8M	\$116M
Net Excess Benefits	-\$42.3	\$42.3M	N/A	\$1.9M	\$8.1M	\$7.4M	\$9.4M
B/C Ratio	N/A	13.0	N/A	1.02	1.06	3.18	1.09

* Model uses existing conditions of SWP and Bar Channel at 48 ft



Plan Formulation – Economic Results

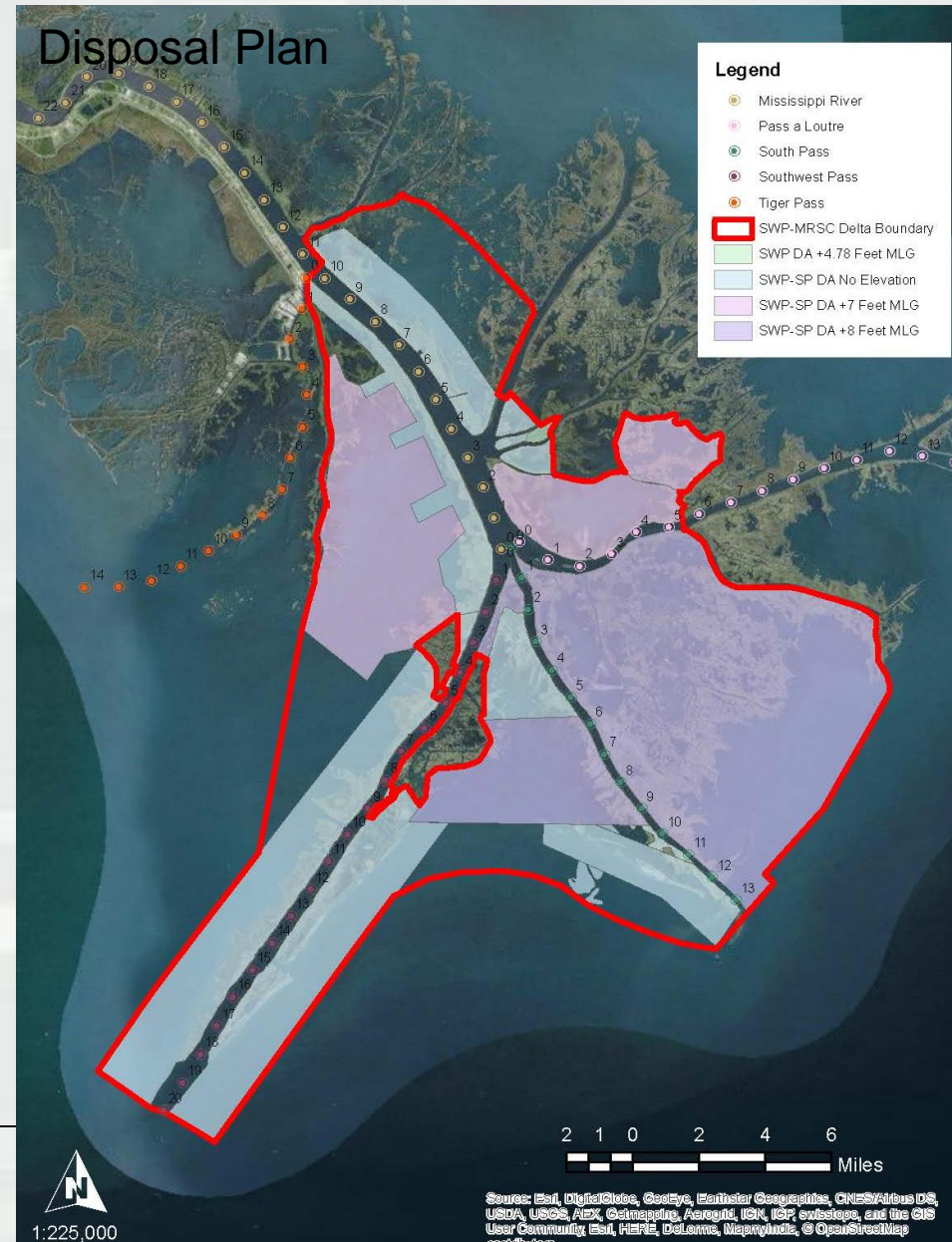
MRSC - Baton Rouge to Gulf Deepening Project		
Average Annual Benefits and Costs (3.125%)		
Channel Alternative	Alternative 2	Alternative 3
First Cost of Construction	\$88,663,029	\$183,076,433
Interest During Construction	\$4,243,341	\$8,761,890
Total Investment	\$92,906,370	\$191,838,323
Average Annual Const. Cost	\$3,697,019	\$7,633,814
Average Annual Increm. O&M	\$100,007,021	\$131,446,950
Total Average Annual Cost	\$103,704,040	\$139,080,764
Total Average Annual Benefits	\$105,658,043	\$147,273,006
Net Excess Benefits	\$1,954,003	\$8,192,243
B/C Ratio	1.02	1.06

- Economic Results for alternatives as originally defined
- Although not reflected in this analysis, there are real and tangible benefits to be gained in the region upriver from Baton Rouge by deepening the channel.
- RED (regional economic development) benefits come in the form of efficiencies that are separate from the transportation cost savings used by the Corps to evaluate a project.



Environmental Compliance

- Collecting and analyzing sediments as required for Sec 404 of CWA
- Formal coordination with the agencies ongoing (e.g., 401, 404, Sec 7 ESA, 106, etc.)
- Coordination documents will be included with the Draft Report in the DSEIS
- Beneficial use acres cleared:
 - Previously Cleared Disposal Area Total Acreage = ~ 143,207 acres
 - New Disposal Area Total Acreage = ~ 24,111 acres



Pending Risk Items

- **Saltwater intrusion – Low Risk**

- Anticipate limited impacts due small potential changes in depths (1.5 ft)
- Anticipate limited impacts to salt water sill activation
- No observed changes in the frequency of activation
- 3D model being developed to better understand potential shoaling impacts
- No expected changes to the TSP based on results

- **Relative Sea Level Rise Impacts – Low Risk**

- Impacts to lower channel only
- Limited impacts on plan selection
- Key assumption: Operations would continue to maintain existing bank lines
- High RLRS rates could reduce disposal cost. (More open water near channel)
- Deposition of material could vary by location
- 2D model is currently being conducted
- Annual O&M could be reduced, since 1D results assumed all shoaling occurred in Navigation channel

- **Relocations – Low Risk**

- Expect all Relocations not to be a concern once fully investigated



Tentatively Selected Plan

(Based on Criteria)

Alternative 3: Full 50 ft depth:

- Bar Channel and Southwest Pass are deepened from existing 48 ft to 50,
- Crossings are deepened from existing 45 ft to 50 ft

(Reflects cost of Alternative 3 – Subject to change with final Recommendation)

Investment Cost	
Total Project Construction Cost	\$183, 076, 433
Interest During Construction	\$8,761,890
Total Investment Cost	\$191,828,323
Average Annual Cost	
Interest and Amortization of Initial Investment	\$7,633,814
Additional Annual Cost (if applicable)	N/A
Average Annual Incremental OMRR&R ¹	\$131,446,950
Total Average Annual Cost	\$139,080,764
Average Annual Benefits	\$147,283,006
Net Annual Benefits	\$8,192,243
Benefit Cost Ratio	
Benefit Cost Ration (computed at 7%) ²	1.06

- Additional design work on train dikes to be include to further reduce the annual incremental OMRR&R

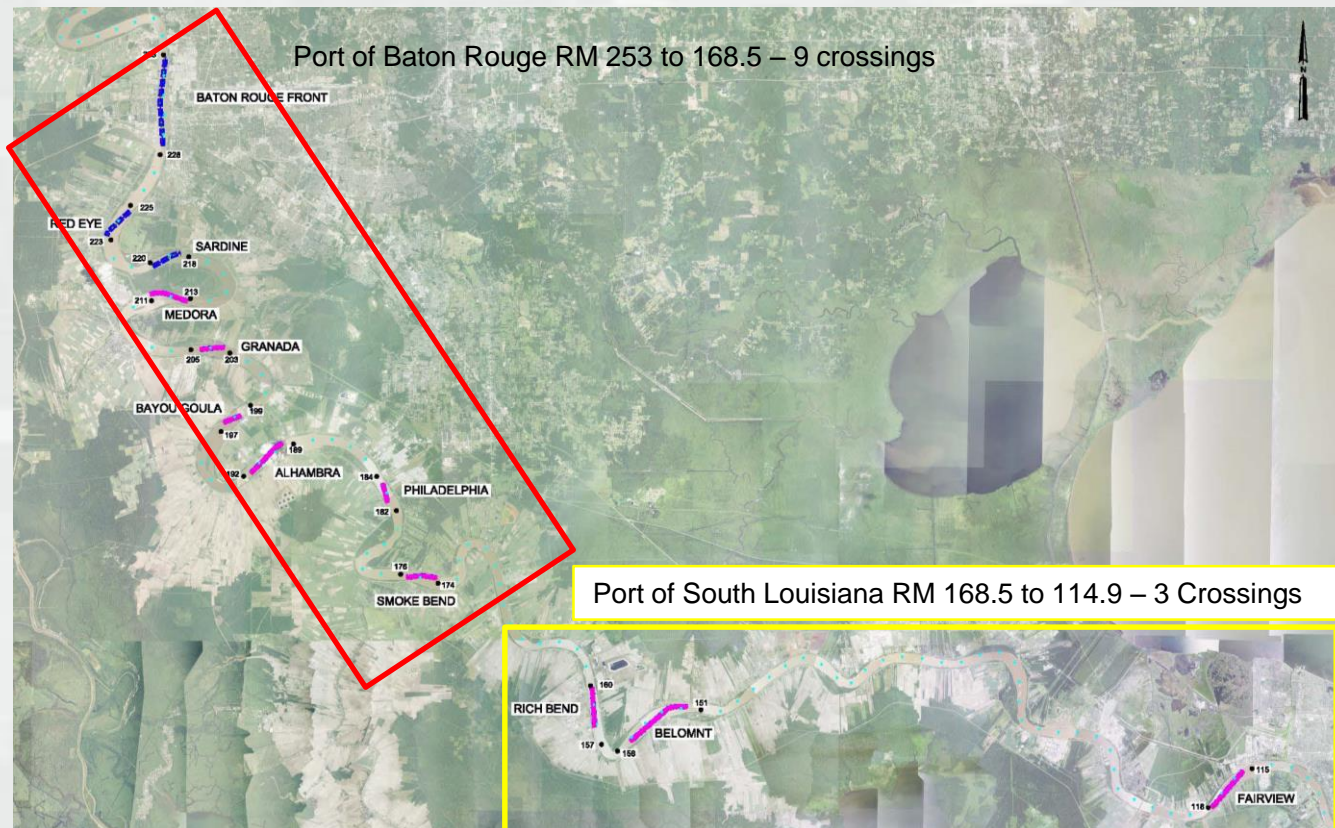


*Criteria defined as B/C greater than 1 and net excessive benefits

Optimization

Opportunities exist to optimize

- Alternatives 2 and 3 looked at deepening the entire MRSC to a uniform depth
- Permutations divided the MRSC between the Lower MS and the crossings
 - Opportunity to obtain greatest Net Benefits between alternatives 3 and 3a
 - Considered deepening crossings incrementally by ports



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Optimization

Channel Alternative	50 ft. Through Port of S. LA	50 ft. Full Channel	48 ft. Through Port S. LA	48 ft. Full Channel	50 ft. SWP/48 ft. Through S. LA	50 ft. LMR/48 ft. All Crossings
First Cost of Construction	\$ 88,971,120	\$ 183,076,433	\$ 5,551,980	\$ 88,663,029	\$ 87,770,010	\$ 170,881,059
Interest During Construction	\$ 4,258,086	\$ 8,761,890	\$ 265,713	\$ 4,243,341	\$ 4,200,602	\$ 8,178,229
Total Investment	\$ 93,229,206	\$ 191,838,323	\$ 5,817,693	\$ 92,906,370	\$ 91,970,611	\$ 179,059,288
Average Annual Const. Cost	\$ 3,709,866	\$ 7,633,814	\$ 231,503	\$ 3,697,019	\$ 3,659,782	\$ 7,125,298
Average Annual Increm. O&M	\$ 18,126,110	\$ 131,446,950	\$ 13,443,710	\$ 100,007,021	\$ 13,443,710	\$ 100,007,021
Total Average Annual Cost	\$ 21,835,975	\$ 139,080,764	\$ 13,675,213	\$ 103,704,040	\$ 17,103,493	\$ 107,132,319
Total Average Annual Benefits	\$ 117,960,932	\$ 147,273,006	\$ 84,339,754	\$ 105,658,043	\$ 94,538,711	\$ 116,549,126
Net Excess Benefits	\$ 96,124,957	\$ 8,192,243	\$ 70,664,540	\$ 1,954,003	\$ 77,435,218	\$ 9,416,806
B/C Ratio	5.40	1.06	6.17	1.02	5.53	1.09

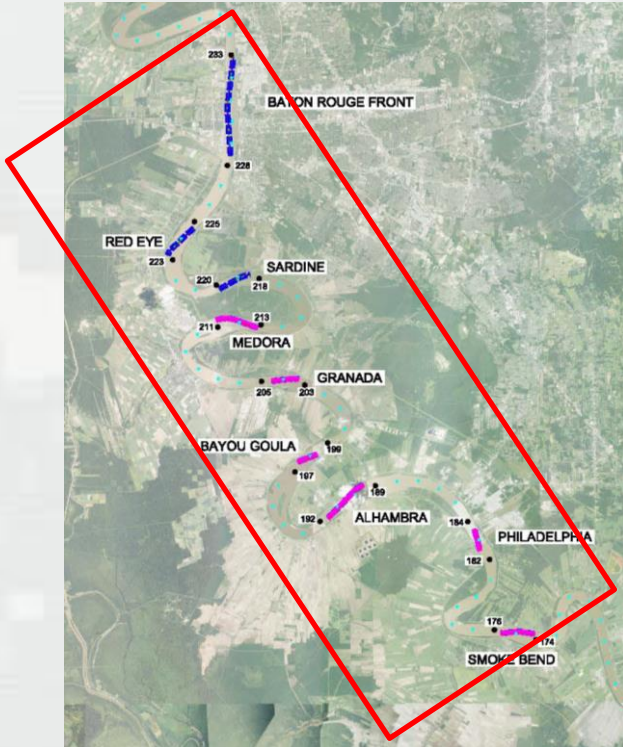
~ PRESENT WORTH OF TOTAL COST (\$B): \$0.5 \$3.4 \$0.3 \$2.6 \$0.4 \$2.7

Optimization

- Greatest Benefits occur at depth of 50' through the Port of South Louisiana (includes Bar Channel, Southwest Pass, and 3 crossings)
- Greatest Incremental O&M occurs in the crossings for the Port of Baton Rouge
- Greatest Net Benefit is deepening to 50' through Port of South LA



Optimization



Construction to 48' by Crossings within Port of Baton Rouge		
Crossing	Initial Construction Cost	Incremental O&M Cost
Baton Rouge Front	\$3,525,930.00	\$6,744,386.14
Red Eye	\$5,375,160.00	\$15,909,613.47
Sardine	\$680,400.00	\$4,317,095.12
Medora	\$2,201,580.00	\$13,673,667.80
Granada	\$262,440.00	\$4,115,000.03
Bayou Goula	\$29,160.00	\$11,328,074.78
Alhambra	\$471,420.00	\$14,189,655.26
Philadelphia	\$0.00	\$937,377.23
Smoke Bend	\$104,490.00	\$3,626,961.88

Optimization

- Construction and O&M quantities and cost show most of dredging occurs in the upper crossings
- There maybe opportunity to deepen crossing within the Port of Baton Rouge to 48' and experience increased benefits
- Would require a facility by facility analysis of the cost and benefits



Recommendation

- Deepen the channel to 50 ft through the Port of South of Louisiana
- Initiating construction downriver moving upriver, will allow for successive movement of large ships upriver
- Complete a nodal analysis of the facilities and crossings through the Port of Baton Rouge during the 4 year construction period

Recommendation: Complete the study as scheduled to deepen the channel to 50 ft through the Port of South of Louisiana, and complete a future study effort to occur concurrent to construction for the the nodal analysis of Port of Baton Rouge



Project Management - Implementation

- Funding Stream:

Through FY15	FY16	FY17	FY18
550,000	550,000	450,000	0

Tentatively Selected Plan Milestone	20 SEP 2016
Agency Decision Milestone	08 MAR 2017
Division Engineer Transmittal	27 OCT 2017
Civil Works Review Board (if needed for a Director's Report)	22 DEC 2017
30-Day S&A Review start	03 JAN 2018
30-Day S&A Review end	02 FEB 2018
Director's Report	30 MAR 2018



Steps to Next Milestone

Task	Dates
Draft Report Released ATR and IEPR Start	10-Nov-2016
Public Review Closes	30-Dec-2016
Agency Decision Milestone	08 MAR 2017



Questions and Open Discussion



Backup



BUILDING STRONG®

Vessel Calls

Plaquemines

	BC Capesize	BC	BC	BC Panamax	TOTAL
2025					
Existing Conditions	100	190	85	82	457
With Project 50'	100	190	85	79	454
2035					
Existing Conditions	113	212	110	77	512
With Project 50'	113	212	110	74	509
2045					
Existing Conditions	122	228	119	87	556
With Project 50'	122	228	119	82	551



Vessel Calls

New Orleans

	BC Capesize	PT Panamax	Aframax	Suezmax	PT Medium	BC Handymax	BC Handysize	BC Panamax	Chemical Tanker	General Cargo	TOTAL
2025											
Existing Conditions	44	30	67	3	14	364	36	85	299	365	1,307
With Project 50'	44	30	67	3	14	364	31	85	295	365	1,298
2035											
Existing Conditions	49	31	69	3	14	445	37	96	315	425	1,484
With Project 50'	49	31	69	3	14	445	29	96	312	425	1,473
2045											
Existing Conditions	53	32	71	3	15	526	46	107	318	485	1,656
With Project 50'	53	32	71	3	15	526	36	107	314	485	1,642



Vessel Calls

South LA

	BC Capesize	BC Handymax	BC Handysize	BC Panamax	PT Panamax	Aframax	Suezmax	PT Medium	Chemical Tanker	General Cargo	TOTAL
2025											
Existing Conditions	242	566	241	340	289	75	74	220	347	109	2,503
With Project 48'	242	566	241	311	289	71	74	220	291	109	2,414
With Project 50'	242	566	241	311	289	71	74	220	266	109	2,389
2035											
Existing Conditions	266	624	264	374	307	87	79	236	368	121	2,726
With Project 48'	266	624	264	344	307	82	79	236	310	121	2,633
With Project 50'	266	624	264	344	307	81	79	236	285	121	2,607
2045											
Existing Conditions	290	682	287	403	326	98	83	251	393	133	2,946
With Project 48'	290	682	287	371	326	93	83	251	327	133	2,843
With Project 50'	290	682	287	370	326	91	83	251	302	133	2,815



Vessel Calls

Baton Rouge

	BC Capesize	BC Handymax	BC Handysize	BC Panamax	PT Panamax	Aframax	PT Medium	Chemical Tanker	General Cargo	TOTAL
2025										
Existing Conditions	17	45	32	55	72	90	35	246	30	622
With Project 48'	17	45	21	55	72	90	35	230	30	595
With Project 50'	17	45	16	55	72	90	35	223	30	583
2035										
Existing Conditions	22	55	31	67	80	99	39	238	37	668
With Project 48'	22	55	16	67	80	99	39	220	37	635
With Project 50'	22	55	13	67	80	99	39	213	37	625
2045										
Existing Conditions	26	66	34	80	87	109	42	224	45	713
With Project 48'	26	66	20	80	87	109	42	205	45	680
With Project 50'	26	66	16	80	87	109	42	198	45	669



CEMVN-ED-SC
Cost and Specifications Team

August 11, 2016
Khaleghi/2736

MEMORANDUM FOR Chief, Relocation Team

SUBJECT: Mississippi River Deepening Feasibility Study, River Mile 233.4 to 110.6
(Revised List)

1. The cost of the directional drilling for this job is done as follows:

(Unknown pipe diameters are assumed 12")


The total cost of one foot of Directional Drilling based on the attachment:

$\$13,336 \times 3000 = \$40,008,000$
Contingencies (25%) = \$10,002,000

Subtotal = \$50,010,000
E & D (10%) = \$5,001,000
S & A (8%) = \$4,000,800

Project Total = \$59,011,800

- 2 For questions, contact Bijan Khaleghi, ext. 2736.



Thomas D. Murphy, P.E.
Chief, Cost Engineering Team

Owner	Mile	Qty	Size	Description	Status
Mile 234 to 229 - Dwg 4 (C-01)					
Enterprise	233.4	1	16"	Natural Gas	267 a
Acadian	233	3	10.75"		190
Acadian	233	1	16"		267
Mid La Gas	233	1	12"		219
Bengal	233	1	24"	Maint	415 a
Dow	232.7	1	4"	LPG	94 d

Vertical Clearance*

*From what point
(MLLW, River
Bottom)?

Mile 199 to 194 - Dwg 9 (C-06)					
?	197.9	2	12"	Brine	219 a

Owner	Mile	Qty	Size	Description	Status	Vertical Clearance*
Mile 193 to 188 - Dwg 10 (C-7)						
Enterprise	190.2	1	?	NG 219	a	
KinderMorgan	190.2	2	24	NG 415	a	
El Paso	190.2	1	5"	Gas 112	a	
Southern Natural Gas Co	190.1	4	12"	Gas 219	a	
El Paso	190	1	5"	Gas 112	a	
KinderMorgan	190	1	30"	NG 525	a	
Enterprise	189.8	2	8.63"	EGL 159	d	
Shell	189.5	6	?	? 219	?	-40

Mile 185 to 181 - Dwg 11 (C-8)

Gulf South	183.4	3	?	NG 219	a	-26
Boardwalk	183.3	1	30"	NG 525	a	
Concha	183	1	10"	Propylene 181	?	
Shell	182.9	1	?	HVL 219	a	
Enterprise	182.9	1	10"	HVL 181	a	
Enterprise	182.7	1	4"	NG 94	a	
Shell	182.1	1	10"	HVL 181	a	

Mile 179 to 172 - Dwg 12 (C-9)

Central Bell Tel. Co.	175.5	3	?	? 219	?	-38
La Pwr & Lt. Co	175.4	1	?	? 219	?	

Owner	Mile	Qty	Size	Description	Status	Vertical Clearance*
Mile 160 to 155 - Dwg 13 (C-10)						
Marathon Ashland	159.5	1	30		525 ?	
Shell	159.5	1	40"	EPL	700 d	
Marathon	159.5	3	30"	CRD	525 a	
Equilon	159.3	1	40"	Oil	700 a	
Boardwalk	158.2	1	?	NG	219 a	
Monterey	158.2	1	6"	Gas	127 a	-60

\$13,336



APPENDIX H

Engineering Documentation Report EDR-OD-01



**US Army Corps
of Engineers** ®
New Orleans District

Engineering Documentation Report

EDR-OD-01

MLG to MLLW Vertical Datum Conversion

Mississippi River Venice, Louisiana to the Gulf of Mexico (Vicinity of Southwest Pass) Louisiana

Prepared by:
US Army Corps of Engineers
New Orleans District
Engineering Division
Prepared by: CEMVN-ED-ST
Reviewed by: CEMVN-OD

02 November 2016

Location in ProjectWise:

pw:\\MVN-APPW02.mvn.ds.usace.army.mil:CEMVN01\Documents\Civil Works\Mississippi River - Baton Rouge to the Gulf of Mexico\South West Pass\Engineering Documentation Report\FINAL ROUTING EDR-2016 11

[FINAL ROUTING EDR-2016 11](#)

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Appendix A- Independent Technical Review (ATR) Certification

LIST OF ACRONYMS

- AHP: Above Head of Passes
- BHP: Below Head of Passes
- CEPD: Comprehensive Evaluation of Project Datums
- EDR: Engineering Documentation Report
- HQ: Headquarters office of the United States Army Corps of Engineers
- IPET: Interagency Performance Evaluation Task Force
- LCA: Local Cooperation Agreement
- LWRP: Low Water Reference Plane
- MLG: Mean Low Gulf datum, as a historic reference
- MLG^{SWP}: In practice usage of Mean Low Gulf as localized for this project
- MLLW: Mean Lower Low Water datum
- MVN: Mississippi Valley New Orleans District
- NAVD88: North American Vertical Datum of 1988
- NOAA: National Oceanic and Atmospheric Administration
- NWLON: National Water Level Observation Network
- OPUS: Online Positioning User Service
- SWP: Mississippi River Southwest Pass
- USACE: United States Army Corps of Engineers
- USACE MVN: United States Army Corps of Engineers New Orleans District

1. Introduction

The U.S. Army Corps of Engineers, New Orleans District is converting the vertical datum for all coastal navigation projects from Mean Low Gulf (MLG) to Mean Lower Low Water (MLLW) in accordance with USACE (2014), memorandum directing conversion from USACE HQ. This memorandum describes new policy for federal navigation projects where the decision documents supporting project authorization and the project authorization in law do not reference the Mean Lower Low Water (MLLW) datum.

According to the Memorandum “Navigation Projects Compliance with Vertical Datum Guidance” dated October 24, 2014:

“For federal navigation projects where the MLLW depth differs from the depths stated in the project authorization, an Engineering Documentation Report (EDR) shall be prepared in accordance with reference 1.d, paragraph 8.3 for each project and posted on a navigation home page for each district. The EDR will be of limited scope to document the datum change only.”

The Mississippi River, Baton Rouge to the Gulf of Mexico project is currently authorized to (-)55 ft. MLG and maintained to (-)45 ft. MLG, respectively. Currently, the deep draft navigation channel is maintained as follows: New Orleans to the Gulf of Mexico (includes Southwest Pass) is maintained to (-)45 ft. MLG and New Orleans to Baton Rouge (includes Deep Draft Crossings) is maintained to (-)45 ft. LWRP.

This report documents the calibration / relationship between the localized MLG as used in practice for this project and the NOAA-maintained MLLW that provides for no impact in current project channel maintenance practices. The report provides details on how this relationship was determined and will be applied. For ease of use this relationship will be used south of river mile 13.4 AHP and continuing down Southwest Pass (SWP), as this is the area covered by maintenance dredging. This area will be referred to as “Southwest Pass or SWP” in this EDR and the localized, in practice, use of MLG will be referred to as MLG^{SWP} .

1.1 Definition / Description of Datums referenced in this report

The North American Vertical Datum of 1988 (NAVD88) is a geodetic datum that is defined and maintained by the National Geodetic Survey (NGS). This datum is typically used for surveying (in addition to design and construction) and can be related to other datums as needed, to ensure project datums are referenced as required.

Mean Lower Low Water (MLLW) is a tidal datum that is defined and maintained by the National Oceanic and Atmospheric Administration (NOAA). This tidal datum is defined as the average of the lowest of the two daily low water heights observed over the National Tidal Datum Epoch (which spans a 19 year period).

Mean Low Gulf (MLG) is a legacy terrestrial datum that was originally defined relative to local mean sea level as observed at the Biloxi gage in 1899 in the Gulf of Mexico. It has been used as

a navigation (and construction) reference datum in coastal waterways such as the Gulf Intracoastal Waterway (GIWW) and the coastal portion of the Mississippi River navigation channel (Reference 2). MLG was intended to represent the low water level of the Gulf of Mexico, and was defined by District memorandum in 1944 as being 0.78 feet below local mean sea level as it was understood at that time.

The origin of the 0.78 foot offset between MLG and LMSL is not known precisely; however, this value is half the tidal range at the Biloxi (Cadet Point) Tidegauge (NOAA gage 8743735)¹. Therefore, MLG as defined is equal to Mean Low Water (MLW) at Biloxi. Mean Low Water is the average of all low tides, whereas Mean Lower Low Water is the average of only the lower of the two daily low tides. The Gulf of Mexico has diurnal tides (one low tide per day), so the difference between MLW and MLLW is academic. At Biloxi, the two are approximately one-tenth of one foot apart, which is beyond the precision of either dredging or hydrographic surveying. Consequently, it seems very likely that MLG was intended to represent the average low tide condition in the Gulf of Mexico, so that a given draft in MLG would be, on average, navigable during low tide.

Mean Lower Low Water is presently 0.46 ft. below local mean sea level at Pilottown, LA, and 0.6 ft. below local mean sea level at Pilot's Station East (at the mouth of Southwest Pass).² Therefore, in theory, MLG and MLLW are essentially equal as they are within 0.2 - 0.4 ft, as related to MSL.

The intent and application of MLLW and MLG were and are, also in theory, defined to represent the same water condition; as a tidal datum of a lowest daily water level that will be typically observed for that location.

However, MLG was and is not currently maintained under the rigors to be viable as a current tidal datum. Its update is not under the auspices of any agency or authority. In practice, it has become a localized reference, or in this case, a series of local staff gages referenced with MLG, and in this report, the localized reference is referred to in this document as MLG^{SWP}. Alternatively, MLG^{SWP} represents the use of MLG, in practice. This report is not defining a new datum or new epoch to MLG via ^{SWP} superscript.

1.2 Gaging Network Usage along Southwest Pass

The Survey Section Stream Gaging Unit (SGU) has maintained a series of gages along Southwest Pass, which were set and maintained to NGVD29. For ease of use another series of gages were set to the MLG datum by applying the commonly used 0.78 ft. offset. Over the years the SGU gages were surveyed and moved as necessary to allow them to properly reference NGVD29. The MLG gages were not moved as necessary in order to maintain the 0.78 ft offsets.

¹ The published tidal datums can be found on NOAA's webpage for each gaging station. Biloxi (Cadet Point): <https://tidesandcurrents.noaa.gov/datums.html?id=8743735>

² Pilottown: <https://tidesandcurrents.noaa.gov/datums.html?id=8760922>
Pilot's Station East: <https://tidesandcurrents.noaa.gov/datums.html?id=8760721>.

This offset was always referenced back to the NGVD29, 1976 epoch. It is unknown why this particular epoch was chosen or why an epoch was chosen at all. This practice essentially disassociated MLG with the local water surface which made it inappropriate for use in navigation.

In 2009 surveys were performed as part of the Comprehensive Evaluation of Project Datums (CEPD) effort to establish the relationship between MLG, MLLW, and NAVD88 for this area. This required surveying the SGU gages, the MLG gages, and NOAA gages in the vicinity. The datum relationships were defined and were documented via the CEPD reporting database. In 2013, NGS published an update to NAVD88 (the 2009.55 epoch) and a new geoid model (GEOID12A). These updates significantly changed the resulting NAVD88 elevations in this area by greater than 1 foot, so new gage surveys were required to reestablish datum relationships on both sets of gages.

In 2014 and 2015, several surveys were performed to update the datum relationships (MLG, MLLW, NAVD88), which again required surveying the SGU gages, the MLG gages, and the NOAA gages. These surveys resulted in revised datum relationships. SGU recommended and established consensus for resetting the SGU gages to NAVD88, removing the MLG gages and maintaining the local MLG references by establishing offset values to the SGU gages.

In 2015, the SGU gages and the MLG gages along South West Pass were removed and the current six SGU gages were set to the most up to date NAVD88 reference, NAVD88 (2009.55) (See Map 2). MLG and MLLW offset values were determined for each gage and were supplied for use on the navigation project. These references are currently included in the Southwest Pass navigation specifications to define MLG for this contract area.

2. Pertinent Data

Physical Features	Mississippi River, Venice, Louisiana to the Gulf of Mexico (Vicinity of Southwest Pass), Louisiana
Project Purpose	For federal navigation projects where the MLLW depth differs from the depths stated in the project authorization, an Engineering Documentation Report (EDR) shall be prepared and posted on a navigation home page for each district (memo “Navigation Projects Compliance with Vertical Datum Guidance”, dated October 24, 2014).
MLG ^{SWP} to MLLW conversion	0' MLG ^{SWP} = 3.5 ft. below MLLW
Controlling elevations	NA
Project Cost	NA
Benefit-to-cost ratio	NA

3. Project Authorization

This project was authorized as follows:

“The project was authorized by the Supplement Appropriation Act of 1985, (Public Law 99-88 dated 15 August 1985). The Water Resources Development Act (WRDA) of 1986, (Public Law 99-662) provides for innovative cost sharing between the Federal Government and non-Federal interests for construction and maintenance of the project.” (References 3 and 9).

PROJECT:

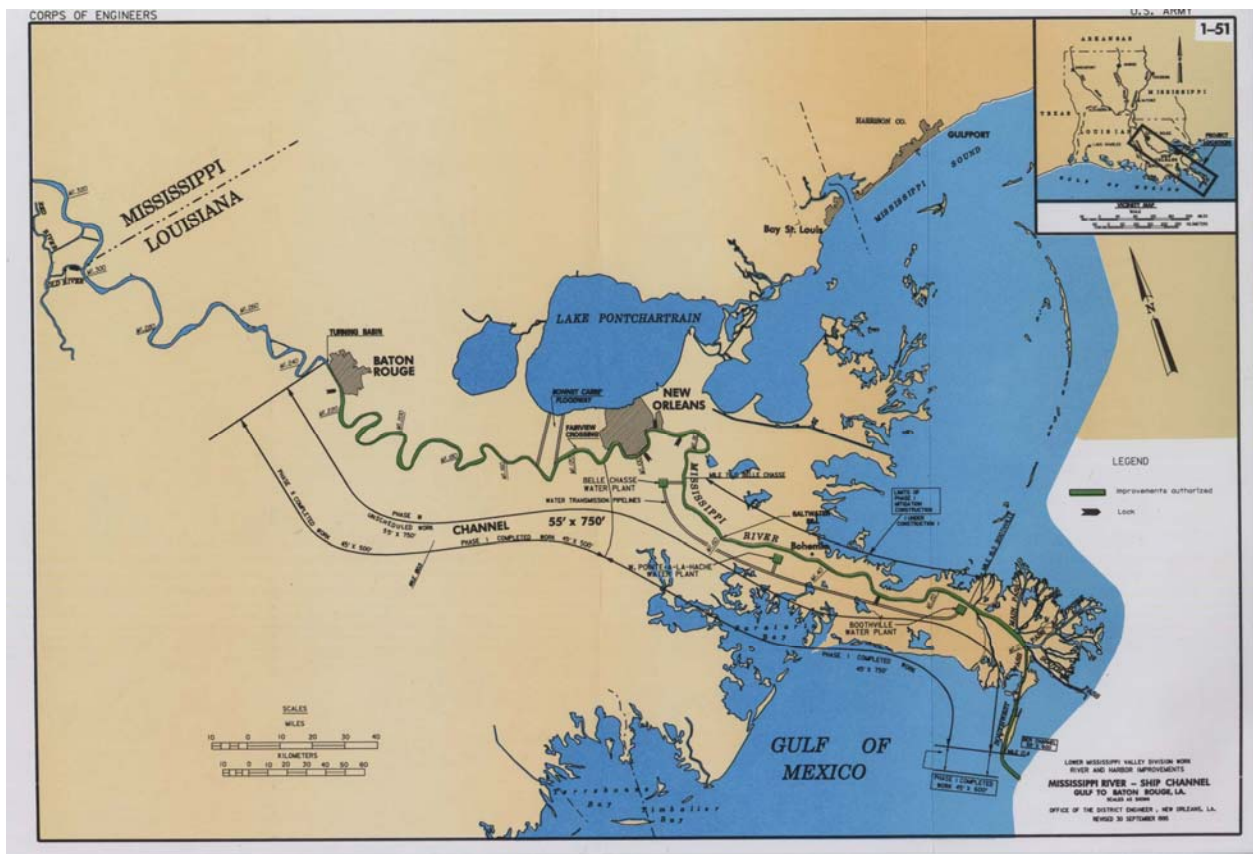
“The Mississippi River Ship Channel, Gulf to Baton Rouge, La., project will provide more efficient deep draft navigation access to the New Orleans and Baton Rouge reaches of the Mississippi River via Southwest Pass by enlarging the existing channel to a project depth of 55 feet, enlarging the adjacent channel along the left descending bank in New Orleans Harbor to a 40 foot depth, constructing a turning basin at Baton Rouge, constructing training works in the passes to reduce maintenance dredging and constructing saltwater intrusion mitigation features which are required as a result of deepening the channel.” (References 3 and 9).

LOCAL COOPERATION:

The Louisiana Department of Transportation and Development (LaDOTD) is the non-Federal sponsor for this project. Local Cooperation Agreements (LCA) between the Government and the State of Louisiana were executed for each phase constructed.

CURRENT DEPTH:

The SWP portion of the project is currently maintained to (-) 45 ft. MLG^{SWP} (Reference 9).



MAP 1- Mississippi River- Ship Channel, Gulf to Baton Rouge, LA, revised 30 September 1995.

4. Previous Investigations

USACE HQ issued guidance in April 2007³ mandating that all districts perform an assessment called CEPD, to ensure projects are referenced to the proper nationally recognized vertical datums. The guidance implemented the lessons learned from the Interagency Performance Evaluation Task Force (IPET) study conducted after Hurricane Katrina. This guidance specified that all flood risk management, hurricane risk management, shore protection, and navigation projects be included in this datum evaluation. This guidance and subsequent datum policy outlined the requirement for coastal navigation projects to be defined relative to the National Water Level Observation Network (NWLON) tidal datum (i.e. MLLW), which must be referenced to the latest official tidal datum epoch. The datum policies also require that projects located in high subsidence areas be reevaluated at least every five years in order to maintain relationships defined to the currently published datum/epoch.

The CEPD analysis and report were completed for this project in 2011, but new epochs were published for MLLW and NAVD88 requiring updated analysis in 2015. NOAA has typically updated tidal datum elevations for the nation to new National Tidal Datum Epoch (NTDE) time periods every 20-25 years. In 1998, NOAA recognized the need for a modified procedure that utilized more frequent time period updates, for determination of tidal datums for regions with anomalously high rates of local relative sea level change such as Southeast Louisiana. NGS also periodically publishes epoch updates for NAVD88 to account for local subsidence.

5. Project Description

The datum relationships provided in this report were determined in order to bring the “Mississippi River Ship Channel, Gulf to Baton Rouge” project into compliance with the requirements outlined in ER 1110-2-8160, Policies For Referencing Project Elevation Grades To Nationwide Vertical Datums, and EM 1110-2-6056, Standards and Procedures for Referencing Project Elevation Grades to Nationwide Vertical Datums. These policy documents define the requirement for referencing datums on coastal navigation projects. The following EM excerpt addresses the requirement to establish the relationship to MLLW for projects that are defined to a legacy datum, such as MLG (page 4-2):

"USACE projects that are still defined relative to non-standard or undefined legacy datums (e.g., Mean Low Gulf (MLG), Gulf Mean Tide, MSL, NGVD, MLW, COEMLW, etc.) should have technically valid transforms to the NOAA MLLW chart/tidal datum for the area. In isolated cases, the legacy datum may be retained as the reference grade provided its relationship to NOAA MLLW datum is accurately defined based on current gage data at the project site. In such projects, depth data furnished to NOAA and other project users must indicate the primary reference gage, along with the tidal datum epoch period and the relationship between the legacy datum, NOAA MLLW, and NAVD88. Legacy "Low Water" datums must be periodically updated

³ EC 1110-2-6065, Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects. This was later updated with EC 1110-2-6070, and eventually EM 1110-2-6056.

for sea level change and regional subsidence using similar computational techniques established by NOAA for coastal waters.” (Reference 11)

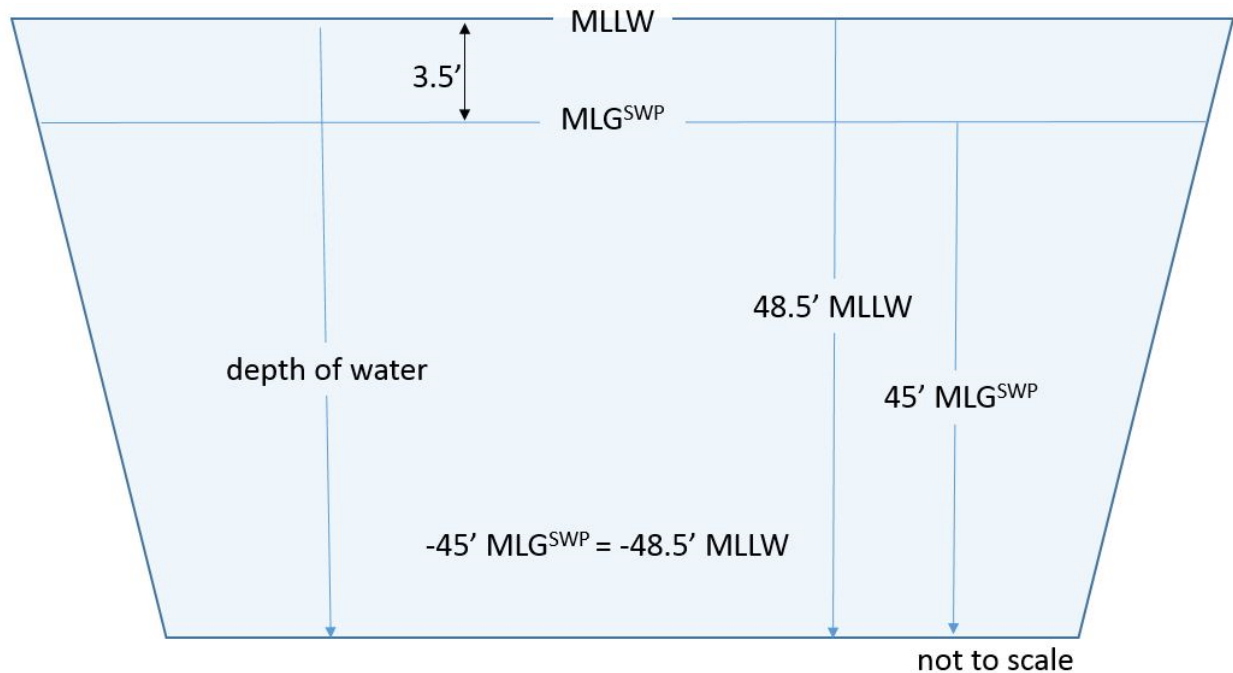
The relationships have been defined between the legacy project datum (MLG), and MLLW and NAVD88 as described in the EM. These datum relationships were used to define a MLLW-MLG calibration for SWP, which will be used to relate the currently maintained / reported MLG elevations to MLLW depths. This is only applicable where the project is considered tidally influenced. For ease of use this relationship will be used south of river mile 13.4 AHP and continuing down SWP, as this is the area requiring maintenance dredging.

The Low Water Reference Plane (LWRP) shall be referenced above river mile 104.5 AHP for maintenance dredging on the river crossings.

6. Changes

For Southwest Pass, a MLLW- MLG^{SWP} calibration value has been defined as:

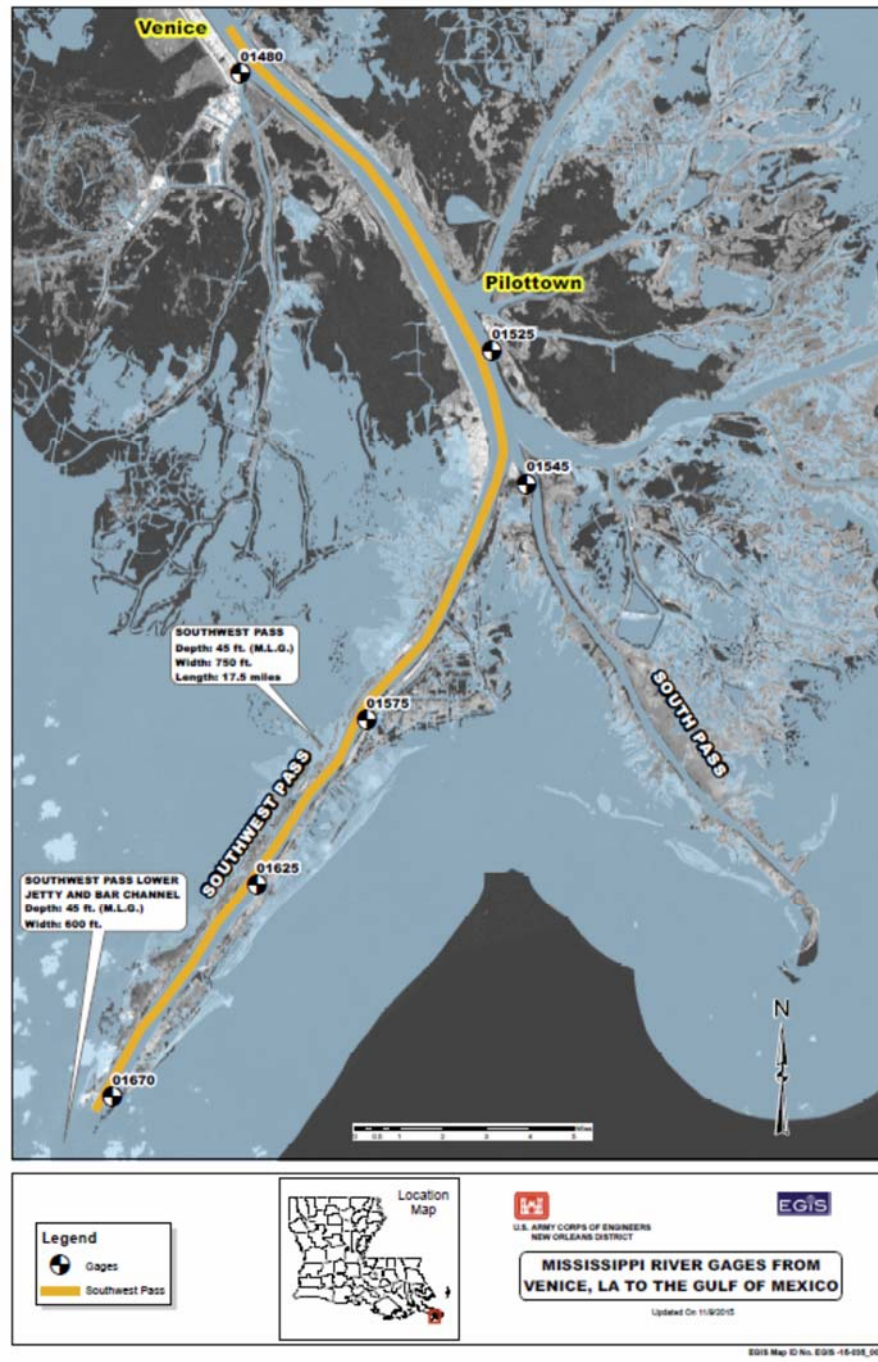
$$0.0 \text{ ft MLLW} = 3.5 \text{ ft MLG}^{\text{SWP}}$$



This calibration value will be used to define MLG for this area, by directly referencing MLLW and applying this calibration value to determine MLG^{SWP}. This calibration has been determined by referencing the modified tidal datum epoch of 2007-2011, but this same calibration will be held with future updates to MLLW. This is discussed further in Section 7.

7. Current Engineering Studies, Investigations, and Design

The following map shows the gages for Mississippi River from Venice, LA to the Gulf of Mexico:



MAP 2- Mississippi River gages from Venice, LA to the Gulf of Mexico (Updated 11/9/2015).

The datum analysis performed in 2015 for SWP resulted in the determination of NAVD88 (2009.55/OPUS), MLLW (2007-2011) and MLG^{SWP} relationships. These relationships were used to define the MLLW- MLG^{SWP} calibration for SWP, and the current relationships between these datums and NAVD88.

The MLLW and NAVD88 datum relationships will have to be periodically updated to incorporate future sea level rise and local subsidence, as well as other factors that may affect these datums (i.e. geoid models, epoch updates).

Of note, these periodic updates will not change the MLLW- MLG^{SWP} calibration value. This value will remain constant, which will allow dredging templates to rise over time along with MLLW (due to sea level rise).

After the datum analysis was completed in 2015 all gages along SWP that are maintained by the USACE MVN Stream Gaging Unit were reset to NAVD88 (2009.55/OPUS). Gage correction values were defined for each gage to adjust gage readings to MLLW (2007-2011) and MLG^{SWP} . These corrections will be considered valid until a new datum analysis for future MLLW adjustments is performed.

The MLLW-NAVD88 relationships were determined at two tide stations published by the National Oceanic and Atmospheric Administration (NOAA):

- Pilottown (Station 8760721), and
- Pilots Station East (Station 8760922).

These stations are located near USACE gages 01525 and 01670, respectively, so these relationships are referenced at the USACE gages. These MLLW – NAVD88 relationships are referenced to the 2007-2011 modified tidal datum epoch.

The MLG^{SWP} – NAVD88 relationships were determined based on surveys of staff gages that were previously set to MLG^{SWP} .

7.1. Datum offsets for Mississippi River gages from Venice, LA to the Gulf of Mexico

Table 1 provides the datum offsets at the gages that are currently used by USACE MVN Operations Division to maintain the Mississippi River from Venice, LA to the Gulf of Mexico. All gages were set to NAVD88 (2009.55) in 2015, except for USACE gage 01625 which is referenced to NAVD88 (OPUS) using GEOID12A.

TABLE 1- Datum Offsets for Mississippi River gages from Venice, LA to the Gulf of Mexico

Gage ID	Gage Name	Datum Offset
01480	Mississippi River at Venice	0' NAVD88 = (-) 0.30' MLLW = 3.20' MLG ^{SWP}
01525	Mississippi River at Pilottown	0' NAVD88 = (-) 0.30' MLLW = 3.20' MLG ^{SWP}
01545	Mississippi River at Head of Passes	0' NAVD88 = (-) 0.18' MLLW = 3.32' MLG ^{SWP}
01575	Southwest Pass at Mile 7.5	0' NAVD88 = 0.17' MLLW = 3.67' MLG ^{SWP}
01625	Southwest Pass at Light 14	0' NAVD88 = 0.39' MLLW = 3.89' MLG ^{SWP}
01670	Southwest Pass at East Jetty	0' NAVD88 = 0.68' MLLW = 4.18' MLG ^{SWP}

NOTES:

1. MLLW is referenced to the 2007-2011 modified tidal datum epoch.
2. NAVD88 is referenced to NAVD88 (2009.55) at all locations, except for USACE gage 01625 which is referenced to NAVD88 (OPUS 2014) using GEOID12A.

7.2. Gage Datum Offsets

Table 2 provides the gage datum offsets for the gages currently used by USACE MVN Operations Division to maintain the Mississippi River from Venice, LA to the Gulf of Mexico. All gage readings are referenced to NAVD88, but the datum offsets provided in this table can be used to adjust these gage readings to MLG^{SWP} or MLLW (2007-2011).

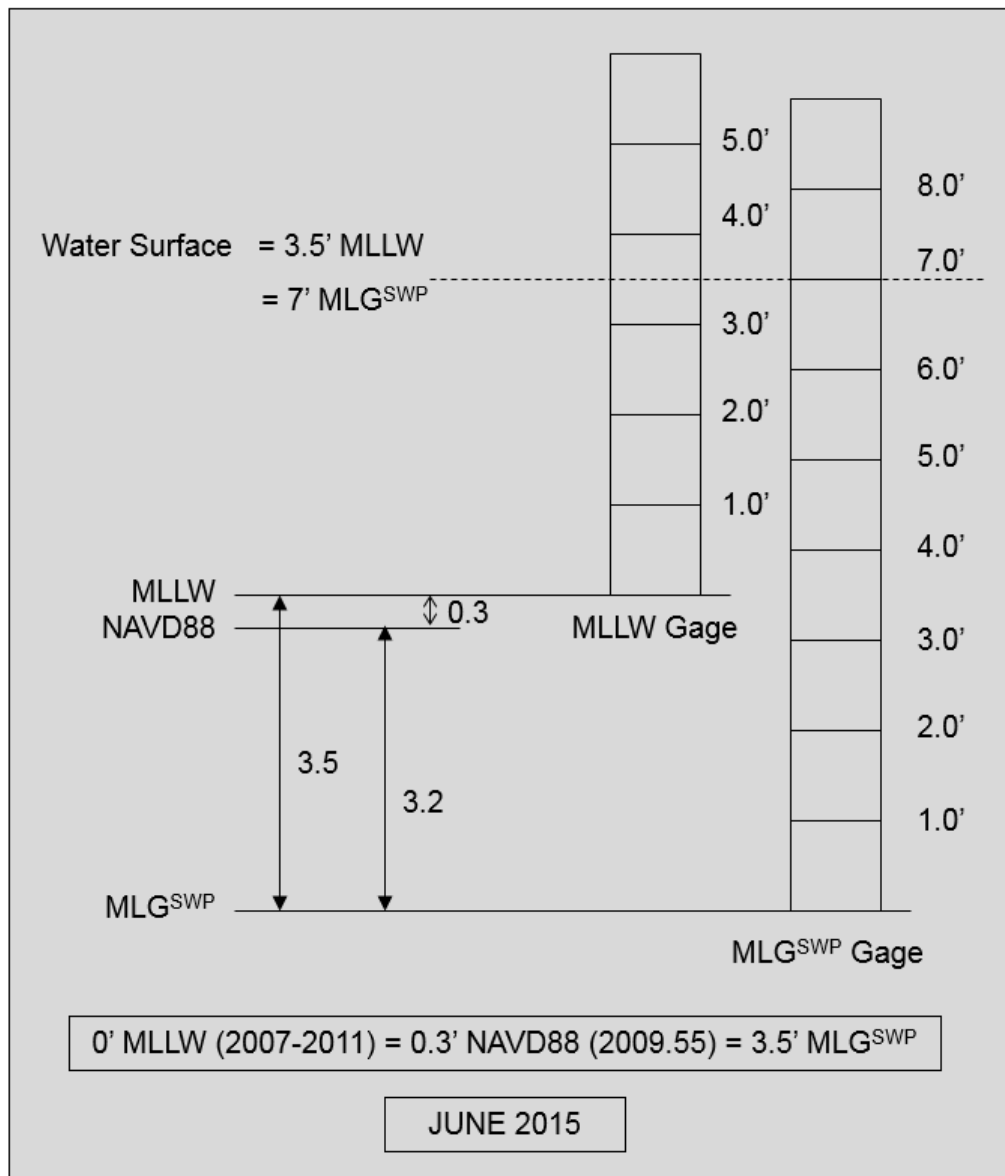
TABLE 2- Datum Offsets for Mississippi River gages from Venice, LA to the Gulf of Mexico

Gage ID	Gage Name	Gage Datum Offsets		Latitude	Longitude
		Gage Datum / MLG ^{SWP}	Gage Datum / MLLW		
01480	Mississippi River at Venice	3.20	-0.30	29 16 19.7	89 21 07.6
01525	Mississippi River at Pilottown	3.20	-0.30	29 10 42.9	89 15 31.8
01545	Mississippi River at Head of Passes	3.32	-0.18	29 08 37.0	89 15 07.0
01575	Southwest Pass at Mile 7.5	3.67	0.17	29 03 41.5	89 18 39.4
01625	Southwest Pass at Light 14	3.89	0.39	29 00 08.0	89 21 04.9
01670	Southwest Pass at East Jetty	4.18	0.68	28 55 56.4	89 24 26.2

7.3. Datum offsets for gage 01480

Figure 1 shows the datum relationships that were determined for USACE gage 01480. The NAVD88- MLG^{SWP} and NAVD88-MLLW relationships are valid as of the date of this report.

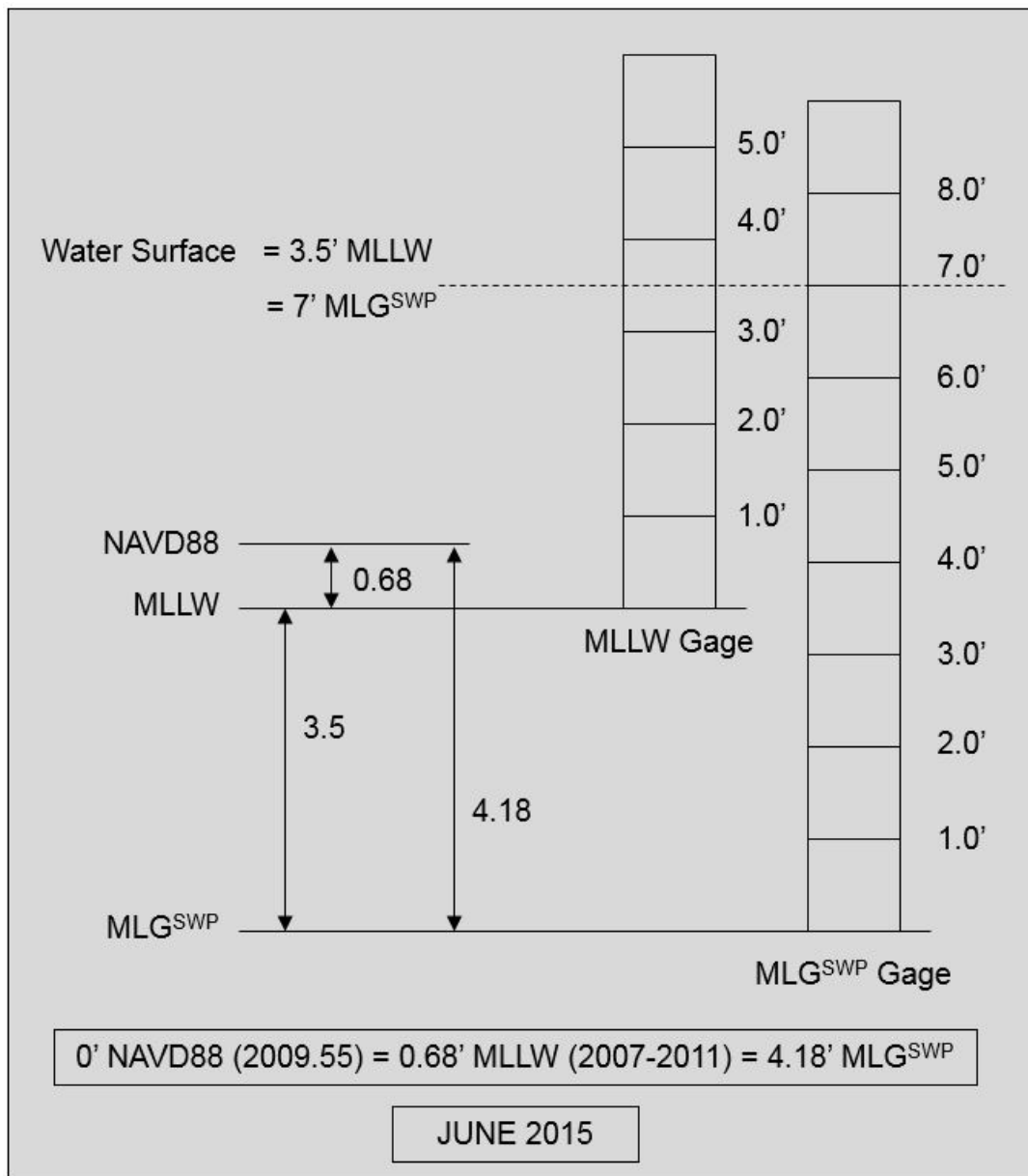
FIGURE 1
Datum Offsets for USACE Gage 01480
(Applied to a water surface reading)



7.4. Datum offsets for gage 01670

Figure 2 shows the SWP datum relationships that were determined for USACE gage 01670. The NAVD88-MLG^{SWP} and NAVD88-MLLW relationships are valid as of the date of this report.

FIGURE 2
Datum Offsets for USACE Gage 01670
(Applied to a water surface reading)



7.5. Calibration and sample calculation

In theory MLG and MLLW are essentially equal as related to LMSL, but the following relationship has been defined to document current practice for the Mississippi River from Venice, LA to the Gulf of Mexico as a MLLW- MLG^{SWP} calibration value, or in-practice usage:

$$0.0 \text{ ft MLLW} = 3.5 \text{ ft MLG}^{\text{SWP}}$$

This calibration value will be considered absolute and documents current practices. It will not be redefined for Mississippi River gages from Venice, LA to the Gulf of Mexico. Use of this relationship will be a no-impact change to current dredging practices, as this has been determined using the current relationship to MLG^{SWP}. However, the relationship between MLLW and NAVD88 will need to be periodically updated to incorporate the future sea level rise and local subsidence.

Dredging design templates and other associated documents are now updated to directly reference MLLW depths, and the relationship to MLG^{SWP} will be included as a note. Providing the MLG relationship will allow users to relate these project documents back to authorization language as needed.

For example, referring back to Figure 1 for gage 01480, if the project is currently maintained to a depth of (-)45ft MLG^{SWP}, this would now be described as a depth of (-)48.5ft MLLW (2007-2011), with (2007-2011) identifying the corresponding period of NOAA tidal datum update.

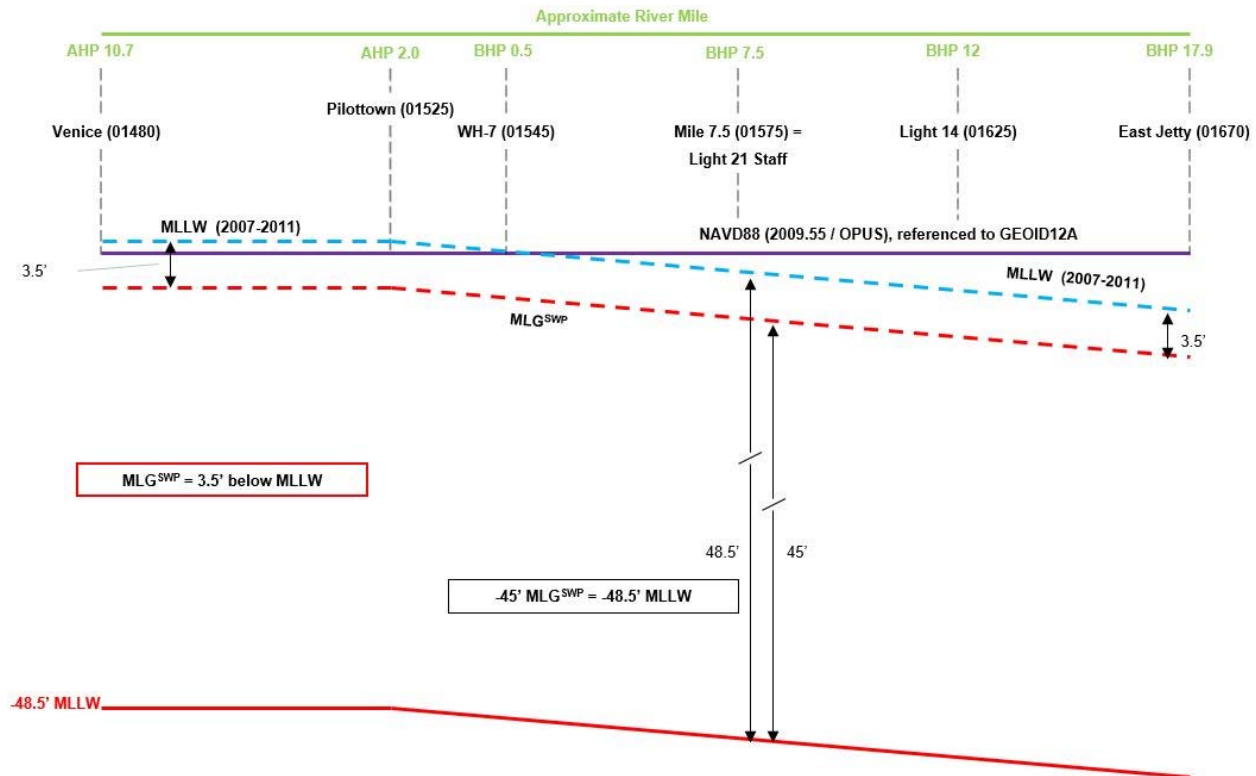
7.6. Documents to be updated as a result of the calibration

Project documents that must be updated to reflect the MLLW values are:

- Dredging templates
- Plans and Specifications
- Channel Condition survey data posted on web page

7.7. Datum Offset Chart

The following chart shows the MLG^{SWP} /MLLW/NAVD datum offsets for Mississippi River gages from Venice, LA to the Gulf of Mexico:



Due to regional subsidence and global sea-level rise, the elevations of the referenced benchmarks and the tidal datum values at the referenced gages (as well as the datum relationships) are time dependent and subject to change. Therefore, the information contained in this report shall be updated on a regular basis and/or as new information becomes available.

7.8. Future updates to MLLW/NAVD88

The MLLW-NAVD88 datum offsets defined in this report are time dependent and will have to be regularly verified / updated. EM 1110-2-6065 indicates that the periodic reassessments of controlling elevations and datum relationships should be performed at least every five years. These reassessments will not change the MLLW-MLG calibration value, only the MLLW-NAVD88 relationships that will be used to define MLLW for the Mississippi River from Venice, LA to the Gulf of Mexico. It is anticipated that NOAA will publish a modified tidal datum epoch (2012-2016) in FY18, which would require that the MLLW-NAVD88 relationship be updated and the corresponding relationship to MLG be updated accordingly using the calibration value.

8. Cost Estimate

N/A

9. Economic Analysis

N/A

10. Cost Allocation and Cost Sharing

N/A

11. Environmental Documentation and Coordination

N/A

12. Review process

This document underwent a Quality Assurance review that included individuals from the New Orleans District Corps of Engineers for the following disciplines: geospatial, civil, operations, and project management. In addition, the document was reviewed by a standard Independent Technical Review process. The ATR review was performed by an independent team from the U.S. Army Geospatial Center, Survey Engineering and Mapping (CEAGC-GSC), North Carolina. Appendix A includes the Independent Technical Review (ATR) Certification.

Review may be found in Dr. Checks:

Project: (ED-OD-01) Engineering Documentation Reports

Review: South West Pass

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All related supporting documentation may be found in ProjectWise:

pw:\\MVN-APPW02.mvn.ds.usace.army.mil:CEMVN01\Documents\Civil Works\Mississippi River - Baton Rouge to the Gulf of Mexico\South West Pass\Engineering Documentation Report

[Engineering Documentation Report](#)

<pw://MVN-APPW02.mvn.ds.usace.army.mil:CEMVN01/Documents/P%7ba7d3f0a0-4e62-429a-8f3c-15b3f89fa597%7d/>



APPENDIX I

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H-1.0 APPENDIX F - REFERENCES

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