Statement of Work For

Technical Assistance to EPA Region 6 at the San Jacinto River Waste Pits Superfund Site

1.0 PURPOSE. To provide technical support to Environmental Protection Agency (EPA), including preparing an independent assessment of a Potentially Responsible Party's (PRP's) designs and submittals regarding the San Jacinto River Waste Pits Superfund Site (Site). In general, this work will include an assessment of the design and evaluation of the remediation alternatives presented in the Feasibility Study, as well as an identification of any other remedial action alternatives or technologies that may be appropriate for the Site. In addition, the technical assistance will include a) an assessment of hydraulic conditions in and around the San Jacinto River, b) an evaluation of the numerical models used by the PRPs for the Site, and c) use of surface water hydrologic, hydrodynamic, and sediment transport models appropriate for the Site in performing the assessment. An existing multi-site Interagency Agreement [DW-96-95854901-0] between the EPA and the United States Army Corps of Engineers (USACE) will be used to issue a Work Authorization to the Mississippi Valley Division of the USACE to perform the tasks described in this Statement of Work (SOW).

2.0 BACKGROUND. The Site consists of several waste ponds, or impoundments, approximately 14 acres in size, built in the mid-1960s for the disposal of paper mill wastes as well as the surrounding areas containing sediments and soils potentially contaminated by the waste materials that had been disposed of in these impoundments. The impoundments are located immediately north and south of the I-10 bridge and on the western bank of the San Jacinto River in Harris County, Texas (see Figure 1).

Large scale groundwater extraction has resulted in regional subsidence of land in proximity to the Site that has caused the exposure of the contents of the northern impoundments to surface waters. A time-critical removal action was completed in 2011 to stabilize the pulp waste material in the northern impoundments and the sediments within the impoundments to prevent further release of dioxins, furans, and other chemicals of concern into the environment. The removal consisted of placement of a temporary armor rock cap over a geotextile bedding layer and an impermeable geomembrane in some areas. The total area of the temporary armor cap is 15.7 acres. The cap was designed to withstand a 100-year storm event.

The southern impoundments are located south of I-10 and west of Market Street, where various marine and shipping companies have operations (see Figure 1). The area around the former southern impoundments is an upland area that is not currently in contact with surface water.

The members of the Project Delivery Team (PDT) listed in Section 2.2 below have provided technical assistance to the Site's Remedial Project Manager (RPM) for the past

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three years that consisted of 1) an evaluation of modeling performed by the PRP's modeling contractor, and 2) an evaluation of the design of the temporary armor cap.

Figure 1 San Jacinto River Waste Pits Superfund Site

2.1 Project POCs.

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Marvene Seaman, CEHNC-EMS, 402-697-2425, Marvene.L.Seaman@usace.army.mil

2.2 Project Delivery Team.

Technical POC: Earl Hayter CEERD-EPW, Research Civil Engineer, 864-656-5942. Earl.Hayter@usace.army.mil ; Paul Schroeder CEERD-EPE, Susan Bailey CEERD-EPE, Thomas Borrowman CEERD-EPE, and Carlos Ruiz CEERD-EPW.

Financial POC: Carolyn Pettway CEERD-EVB, 601-634-3734, Carolyn.A.Pettway@usace.army.mil

3.0 SCOPE OF WORK. This section outlines the tasks that the PDT will perform to accomplish the requirements described in EPA's Work Authorization. The initials of the member of the PDT that will be the PI for each requirement is given as well.

Requirement 1: Site Visit and Planning Meeting

Select members of the PDT will travel to meet with the EPA RPM for planning purposes, and to inspect the Site and to become familiar with the surrounding waters and watershed.

Requirement 2: Perform an assessment of the San Jacinto River flow/hydraulic conditions and river bed scour in and around the Site for severe storms, hurricanes, storm surge, etc., using surface water hydrology model(s) appropriate for the Site. In the assessment include an evaluation of potential river bed scour/erosion in light of the historical scour reports for the Banana Bend area and for the San Jacinto River south of the I-10 Bridge. PI: EH

The hydrodynamic and sediment transport model developed by AnchorQEA (AQ) will be modified to perform this task. Specifically, the grid will be 1) expanded to include the 100-year floodplain of the modeled water bodies, and 2) refined in proximity of the site and the I-10 bridge. These changes are necessary to more accurately simulate bed scour within the site and in the vicinity of the bridge during two select storm events. One event will be a hurricane, and the other event will be due to an extreme runoff event (possibly the October 1994 flood). Results from these simulations will be evaluated with available data to assess the model's ability to accurately simulate these events.

Requirement 3: Perform an evaluation of the models and grid cell sizes used by the PRPs for the Site, and include a discussion of any uncertainties in the model results. The evaluation should include a review the model assumptions regarding bed shear stress, water velocities, and scour. PI: EH

This evaluation will include a comparison of predicted velocities and bed shear stresses at select locations within the Site during different flow conditions using AQ's model and the refined model described in Requirement 2. The evaluation will also include an assessment of the uncertainties resulting from the coarser grid in AQ's model, and a discussion of the assumptions that AQ made in their model framework.

Requirement 4: Provide an uncertainty analysis of the model assumptions (flow rates, boundary representation, sediment transport, sedimentation rates, initial bed properties, etc.). Uncertainties should be clearly identified and assessed including sediment loads at the upstream Lake Houston Dam. PI: EH

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This evaluation will be performed using AQ's models. First, the uncertainties will be listed, and then the likely impact of these uncertainties on model results will be described. Last, an extensive sensitivity analysis will be performed on the five parameters that have the highest uncertainty.

Requirement 5: Perform a technical review of the design and construction of the entire existing cap as it is currently configured. Identify any recommended enhancements to the cap. PI: PS

This review will evaluate the physical and chemical stability of the cap.

Requirement 6: Assess the ability of the existing cap to prevent migration of dioxin, including diffusion and/or colloidal transport, through the cap with and without the geomembrane/geotextile present. PI: PS

This evaluation will assess the long-term dissolved and colloidal contaminant flux and potential impacts on the water column and ecological resources. In addition, the potential for loss of sediment beneath the armor cap will be assessed considering the ability of the cap to serve as a filter, and to restrict resuspension and bioturbation.

Requirement 7: Assess the long-term reliability (500 years) of the cap under the potential conditions within the San Jacinto River, including severe storms, hurricanes, storm surge, subsidence, etc. Include in the assessment an evaluation of the potential for cap failure that may result from waves, prop wash, toe scour and cap undermining, rock particle erosion, substrate material erosion, stream instability, and other potential failure mechanisms. Reliability will be based on the ability of the cap to prevent any release of contaminated material from the Site. Also discuss any uncertainty regarding the long-term reliability and effectiveness of the existing cap. PI: EH

This task will be performed by developing a highly refined sub-grid model of just the cap and surrounding waters. This model will be run under a wide range of hydrodynamic conditions in an attempt to simulate the listed hydrologic/hydraulic events. Results from these model runs will be evaluated to assess the long-term reliability of the cap. Not certain at this time how subsidence will be evaluated.

Requirement 8: Assess the risk of a release from the containment alternative (3N) occurring over the long term (500 years) within the San Jacinto River environment in response to severe storms, hurricanes, storm surge, increased flood severity related to future development, etc. PI: EH

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This task will be performed in conjunction with Requirement 7. Specifically, the likelihood of release of contaminant from the containment alternative (3N) will be assessed using the results from the model runs to be performed for Requirement 7.

Requirement 9: Identify and document cases, if any, of armor breaches or armored confined disposal facility breaches that may have relevance to the San Jacinto site evaluation. PI: PS

A literature review will be conducted to identify locations where armor has been used on caps and confined disposal facilities and to determine any problems in the design, construction and performance of the armor

Requirement 10: As part of the cap reliability evaluation, assess the potential impacts to the cap of any barge strikes/accidents from the nearby barge traffic. PI: PS

An assessment of the potential sediment losses from a barge strike will be perform and the short-term and long-term impacts potential impacts on the water column and ecological resources will be evaluated.

Requirement 11: Assess the potential amount or range of sediment re-suspension and residuals under the various remedial alternatives including capping, solidification, and removal. PI: PS

The potential losses from resuspension and erosion of residuals from active remediation for each remediation alternatives in accordance with the techniques provided in the USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (2008).

Requirement 12: Identify and evaluate techniques, approaches, Best Management Practices (BMPs), temporary barriers, operational controls, and/or engineering controls (i.e., silt curtains, sheet piles, berms, earth cofferdams, etc.) to minimize the amount of sediment re-suspension and sediment residuals concentrations during and after dredging/removal. Prepare a new full removal alternative that incorporates the relevant techniques identified as appropriate. PI: PS

The controls and BMPs will be identified and evaluated to limit potential losses from resuspension and erosion of residuals from active remediation for each remediation alternatives in accordance with the techniques provided in the USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (2008). Enhancements to the full removal alternative will be provided.

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Requirement 13: Identify what institutional/engineering controls should be incorporated into the remedial alternatives for the TCRA area and surrounding waters and lands. PI: PS

Institutional and engineering controls applied for caps at other contaminated sediments sites will be reviewed for application at the TCRA area as well as the rest of the site north of I10.

Requirement 14: Assess the validity of statements made in the Feasibility Study that the remedial alternative with removal, solidification, and placing wastes again beneath the TCRA cap has great uncertainty as to implementation and that such management of the waste will result in significant releases. PI: PS

The feasibility of the removal, solidification and containment alternatives will be review for reliability, implementability, and constructability as well as short-term effectiveness.

Requirement 15: Provide a model evaluation of the full removal Alternative 6N identified in the Feasibility Study as well any new alternative(s) developed under Task 12 (Identify and evaluate techniques …) above. Include modelling of sediment re-suspension and residuals. PI: EH

This evaluation will be performed using the refined model to be developed under Requirement 2. The model will be modified to represent the full removal Alternative 6N and run for the same series of flow conditions used to evaluate AQ's model as well as that for the cap under Requirement 7. If needed, other new alternatives developed under Requirement 12 will be evaluated as well.

Requirement 16: Evaluate floodplain management and impact considerations of construction in the floodplain and floodwaters pathway and how that would impact flood control, water flow issues and obstructions in navigable waters. This includes impact on changes to potential flooding and any offsets that are needed due to displacement of the water caused by construction in the floodway (height or overall footprint) including effect at the current temporary TCRA cap and any potential future remedial measures. PI: EH

The RPM will have to provide drawings and plans for possible construction projects in the floodplain and floodwaters pathway. These will be used by ERDC to assess the impacts of possible construction or changes in floodplain management on flood control and on possible changes in the hydrodynamic forces that act on the cap.

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Requirement 17: Project the long-term (500 years) effects of the capping alternative (3N) compared to the full removal alternative (6N) on water quality. PI: PS

This evaluation will assess the long-term dissolved and colloidal contaminant flux and potential impacts on the water column and ecological resources for capping the contaminated sediment and covering the dredging residuals. In addition, the potential for loss of sediment beneath the armor cap will be assessed considering the potential for deposition to enhance the armor cap performance by its ability to serve as a filter, and to restrict resuspension and bioturbation.

Requirement 18: Assess the potential impacts to fish, shellfish, and crabs from sediment re-suspension as a result of dredging in the near term and for the long term. PI: PS

This evaluation will assess the bioaccumulation in fish, shellfish and crabs from the surficial sediment and water column contamination during dredging and its recovery following dredging.

Requirement 19: Assess the potential for release of material from the waste pits caused by a storm occurring during a removal/dredging operation; and identify and evaluate measures for mitigating/reducing any such releases. PI: EH

This task will determine what protective measures, e.g., sheet piles, should be constructed, if any, to prevent release of material from the waste pits during a removal/dredging operation caused by a 10-year storm.

Requirement 20: Review and evaluate the long-term impacts and long-term risk of potential releases of contaminated sediment during dredging/removal operations. PI: PS

This evaluation will assess the bioaccumulation in fish, shellfish and crabs from the surficial sediment and water column contamination during dredging and its recovery following dredging.

Requirement 21: Assess the potential amount or range of sediment re-suspension under the various remedial alternatives and technologies. PI: PS/EH

The potential losses from resuspension and erosion of residuals from active remediation for each remediation alternatives in accordance with the techniques

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provided in the USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (2008), considering the site hydrodynamics.

Requirement 22: Estimate the rate of natural attenuation in sediment concentrations/residuals and recommend a monitoring program to evaluate the progress. Discuss the uncertainty regarding the rate of natural attenuation. PI: EH

The rate of natural attenuation via net sedimentation will be estimated using the refined sediment transport model to be developed for Requirement 2. A limited sensitivity analysis will be performed to estimate the uncertainty in this rate, and a field program to evaluate this process will be described as well.

Requirement 23: Communicate at least weekly with the EPA Remedial Project Manager (RPM) regarding progress and issues identified during the report review. Maintain all technical and financial records associated with this Work Authorization. Prepare and submit monthly progress reports and invoices to document monthly and cumulative cost, performance status, and technical progress. PI: EH

A time for the weekly call with the RPM will be scheduled during the first week of this project. Reports, invoices, records, etc. will be processed as specified.

4.0 DELIVERABLES.

4.1 Progress reports and invoices will be submitted to the EPA RPM for each month no later the 15th day of the following month.

4.2 A report will be submitted to the EPA RPM for Tasks 2 through 6 within 10 weeks of initiation of this Work Authorization.

4.3 A report will be submitted to the EPA RPM for Tasks 7 through 14 within 15 weeks of initiation of this Work Authorization.

4.4 A report will be submitted to the EPA RPM for Tasks 15 through 22 within 20 weeks of initiation of this Work Authorization.

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5.0 COST.

Requirement	Cost ($K)
1	13
2	25
3	10
4	5
5	12
6	6
7	10
8	3
9	4
10	4
11	6
12	12
13	4
14	6
15	20
16	10
17	10
18	6
19	5
20	7
21	7
22	5
23	5
Total	196

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6.0 APPROXIMATE SCHEDULE. A monthly schedule based on date of receipt of funds is shown in the following table.

	Months From Start of Project					
Requirement	**1**	**2**	**3**	**4**	**5**	**6**
1	X					
2	X	X	X			
3	X	X	X			
4	X	X	X			
5	X	X				
6		X	X			
7		X	X	X		
8				X		
9		X				
10		X				
11		X				
12			X			
13			X			
14			X			
15			X	X		
16				X		
17				X		
18				X		
19					X	X
20					X	
21					X	
22					X	X
23	X	X	X	X	X	X

7.0 SPONSOR RESPONSIBILITIES. EPA is responsible for providing AnchorQEA's modeling system (including computer codes and input files) to ERDC. The work on Requirements 2-4 cannot begin until this is delivered.

8.0 TECHNOLOGY/ FOCUS AREA. ERDC-EL, Environmental Processes and Engineering.

9.0 SECURITY. Information produced in this study is unclassified.