



PROPOSAL – EFDC+ Modeling of Corpus Christi Bay

March 9, 2026

To: Nick Winkleman, COO
Corpus Christi Water

From: Jordan Furnans, PhD, PE, PG
Spheros Environmental

CC: Tim Osting, PE
Hazen-Sawyer

Paul Craig, PE
DSI, Inc.

To immediately address concerns regarding the proposed Inner Harbor desalination facility, we propose a modeling effort to simulate operations of the facility and assess the fate and transport of the desalination brine discharge throughout the Corpus Christi Bay System. We propose to utilize the EFDC+ model developed for the Port of Corpus Christi in 2023 as the baseline model, and to implement model improvements to better simulate the hydrodynamics of the Inner Harbor area. The proposed modifications listed below were all discussed at the two public meetings of the Far Field Modeling Advisory Committee as viewed via YouTube. The modifications will include:

- Modification #1. Increasing the model grid resolution (vertical and horizontal) throughout the Inner Harbor
- Modification #2. Creating the ability to dynamically force temperature and salinity concentrations within the EFDC+ model, to create the ability to simulate a potential "feedback" loop between the proposed Inner Harbor Intake and Discharge locations
- Modification #3. Simulating the effects of large ship traffic/wake on brine mixing and salinity distribution
- Modification #4. Expanding the model time domain to include simulations of additional time periods (other than 2010-2011), possibly to include the reported dry years of 2012-2014 subject to data availability.

The modeling work will commence immediately, and we will have results from modifications #1, #3, and #4 prior to the April 28th, 2026 City of Christi City Council Meeting. It will not be possible to implement modification #2 in this short timeframe, yet we will commence on that task and report to the council on the task progress at the April 28th meeting. We will also commence modeling the bay

system over the expanded time horizon available after completing Modification #4, yet may not have simulation results available by the April 28th meeting.

We plan to utilize the EFDC+ model as it is readily available for use, it is capable of being run on standard desktop PCs or laptops, and it has a graphical user interface that allows for easy displays of model outputs. We anticipate using this graphical user interface to immediately address questions raised by both the City Council and by members of the Far Field Advisory Committee. Using EFDC+ is also recommended as our subcontractor DSI, Inc. has developed both the model source code and the GUI, and they can work to efficiently implement coding changes needed to effectuate model modification #2.

We anticipate completing all modifications and modeling tasks by June 30, 2026, yet also being able to complete Modifications #1, #3, and #4 sufficiently by mid April in order to provide the City Council and Far Field Advisory Committee with a detailed briefing at and prior-to the April 28th Council meeting.

This modeling effort will be a collaboration between Spheros Environmental, Hazen-Sawyer, and DSI, Inc. with Spheros Environmental serving as the prime contractor and coordinating all project efforts, including being the main liaison between the modeling team, the City, and the Far Field Advisory Committee. The proposed budgets for completing Modifications #1-#4 by June 30, 2026, completing Modifications #1, #3, and #4 by mid April, and presenting modeling results to the City staff, City Council, and Far Field Advisory Committee at the April 28, 2026 City Council meeting is provided on the following page.

Jordan Furnans, PhD, PE, PG
Principal Engineer
Spheros Environmental.

Project Budget – By Task

Tasks for Spheros Environmental:

Spheros Technical Activities:

- In-Person Meeting 3/12/2026 with City & Far Field Advisory Committee \$3,600
- In-Person Meeting 3/17/2026 with City Council \$3,000
- In-Person Meeting 4/28/2026 – City Council \$3,000
- In-Person Meeting June, 2026 – City Council \$3,000
- Weekly virtual meetings with City Staff and/or Far Field Advisory Committee
 - 2 hrs per meeting (w/ prep time), 1x per week, 6 Weeks until 4/28 \$3,600
 - 1 hr per meeting, 8 weeks May-June 2026 \$2,400
- Modification #1 – Increasing Grid Resolution \$25,000
- Modification #3 – Simulating effects of large ship traffic \$35,000
- Coordination with Hazen-Sawyer on Modification #4 (QA/QC) \$5,000
- Coordination with DSI, Inc. on Modification #2 (QA/QC) \$5,000
- Deliverable Preparation & Reporting \$25,000
- EFDC+/EEMS Software Licenses (10 Bundled licenses for 3 Months) \$7,500

Total Spheros Technical Activities Fee: \$121,100

Project Management @ 10% of Spheros Technical Fee \$12,110

Contract Management & subcontractor oversight – 10% of Subcontractor Fee

- Hazen-Sawyer @ \$75,000 \$7,500
- DSI, Inc @ \$75,000 \$7,500

Total Fee – Spheros \$148,210

Total Fee – Hazen-Sawyer \$75,000

- Modification #4 – Expanding Data Inputs
 - Input data gathering & QA/QC
 - Model Testing
- Modeling QA/QC
- Reporting

Total Fee – DSI, Inc \$75,000

- Modification #2 – Dynamic Simulation Coding
 - Code Development
 - Model Testing
- Modeling QA/QC of Modification #2
- Reporting

Total project costs: **\$298,210**

Assumptions

In developing this scope and budget, Spheros has made the following assumptions:

1. Spheros will be under contract and receive the notice to proceed on or before 3/17/2026.
2. If execution of contract is not feasible within that timeline, then the City will back date the contract to 3/11/2026 such that Spheros' preparation and participation in the 3/12/2026 meeting is covered by the contract terms. Any subsequent tasks associated with the performance of the scope of work outlined herein will not occur until Spheros receives a fully executed contract and a notice to proceed from the City. All timelines outlined in the scope will be delayed proportional to the time of notice to proceed.
3. Spheros will be able to execute agreements with subcontractors (DSI, Inc. and Hazen and Sawyer) within the timeframes in (1) and (2) above.
4. Spheros will be the primary point of contact for the City. Spheros will bring subconsultants as necessary to various City and Far-Field Committee meetings.
5. Each in-person meeting with the City will be no longer than 4 hours. The City will reimburse all travel and per-diem expenses at prevailing GSA rates.
6. The City will coordinate with the far-field advisory committee when organizing all in-person and weekly meetings, and provide post-meeting follow up activities to the committee as necessary. Spheros team will participate in these meetings, prepare and present any relevant technical materials related to modeling, and provide any material it presents at the meeting to City after the meetings. The City will prepare and distribute meeting summaries.
7. EFDC+ will be the modeling platform. EFDC+ and EEMS software licenses can be readily obtained, and cost for the licenses will be borne by the City as part of this contract with Spheros.
8. A new model of Corpus Christi Bay will not be necessary. The existing EFDC+ model of Corpus Christi Bay developed by Port of Corpus Christi can be used for this application with the modifications proposed in this scope.
9. Modeling will occur at Spheros' modeling workstations.
10. The increased grid resolution will not result in unreasonably large computer simulation times that would preclude completion of modeling work within the proposed schedule.
11. For Modifications #1 and #2, no new boundary conditions or bathymetry data are needed beyond those already compiled for Port of Corpus Christi's 2023 model.
12. For Modifications #3 and #4, data are readily available for developing the model inputs.
13. For Modifications #2 and #4, Spheros will conduct no more than 4 hour-long coordination meetings with the corresponding subconsultant. Spheros will provide general oversight on subcontractor activities. Subcontractors will complete the scope proposed herein within the allocated budget and timelines.
14. Model will be validated to previously compiled data from the 2023 study conducted by Spheros (then LRE Water) for the Port of Corpus Christi. Quality controlled water level, salinity, and ADCP data will be provided by the City or can be downloaded from existing publicly available sources as comma or tab-delimited ASCII text files with complete metadata such that these files are readily readable by a commonly used scripting language such as Python.

15. Model calibration will be for 2023 and will be limited to minor adjustments to reflect the updated grid resolution and comparisons to ADCP measurements where available. Extensive grid refinements will not be necessary during calibration.
16. When extending the model for other years in Modification #4, a separate validation effort will not be conducted by Spheros, will be partially performed by Hazen-Sawyer.
17. Three modeling scenarios are envisioned: (a) a baseline scenario without effect of ship traffic and without the proposed Inner Harbor desalination plant discharge; (b) the baseline scenario with the proposed Inner Harbor desalination plant discharge, and (c) a scenario including the Inner Harbor desalination plant discharge and the wake effect of large ship traffic.
18. Brine discharge location simulated in the model is fixed. Mechanical effluent mixing options such as diffusers will not be simulated.
19. Results presented for the April 28th City Council meeting will be preliminary, and may not be for the full simulation period.
20. Model results presented will include comparisons to water velocities (if ADCP data are available) and observed salinities (where readily available within Corpus Christi Bay). Model scenario results will be presented as time series and vertical profiles of salinity in the vicinity of the discharge, and map views of salinity at select snapshots in time within Corpus Christi Bay.
21. Final deliverable will be the following:
 - a. A short draft technical report summarizing the model development, 2023 validation and application by the end of June 2026, and a final report within 2 weeks of receipt of comments from the City.
 - b. Final set of model input and output files for the results presented in the technical report.
22. The City and Far-field Committee will provide one round of comments on the draft technical report within 2 weeks of receipt of the draft report. Spheros will address the comments in a final report. Extensive revisions will not be necessary in the preparation of the final report.