SWG-2005-00696
MITIGATION PLAN
BOATING IMPROVEMENT PROJECT
CAPE VELERO ESTATES HOME OWNERS ASSOCIATION
ARANSAS COUNTY, TEXAS

PROJECT IMPACTS SUMMARY

The primary resource impact of the proposed dredging and channel breakwater installation is direct impact to Widgeon grass (***Ruppia maritima***) and minor occurrence of turtle grass (***Thalassia testudinum***), assessed at a total of 4,585 square feet (ft). Both species above will be referenced as "seagrasses" in the following text.

MITIGATION OPTIONS

In accordance with 33 CFR 332, when compensatory mitigation is required to compensate for a project's unavoidable impacts to aquatic resources, the district engineer, when evaluating compensatory mitigation options, will consider what would be environmentally preferable to offset the authorized impacts. In general, the required compensatory mitigation should be located in the same watershed as the impact site, and should be located where it is most likely to successfully replace lost functions and services. The hierarchy of mitigation options to be considered should include:

1. Mitigation bank credits.
2. In-lieu fee program credits.
3. Permittee responsible under a watershed approach.
4. Permittee responsible mitigation through an on-site and in-kind mitigation.
5. Permittee responsible mitigation through an off-site and/or out-of-kind mitigation.

Mitigation Bank Credits and In-Lieu Fee Program Credits

The U.S. Army Corps of Engineers (USACE) - Regulatory In-lieu fee and Bank Information Tracking System (RIBITS) for the Galveston District was checked for approved available mitigation banks or In-lieu fee programs within the greater Aransas Bay watershed (HUC 12100405).

There are no USACE approved mitigation banks or in-lieu fee programs located in HUC 12100405, or any adjacent HUCs.

GAI is aware of the proposed Port Bay Mitigation Bank, but this bank is no longer listed in RIBITS and may have been abandoned by the sponsor. GAI understands this bank sought to develop credits for freshwater and estuarine emergent wetlands, which even if available, would not be appropriate to offset impacts to seagrasses.

Permittee Responsible Mitigation

Permittee responsible mitigation proposals should follow the hierarchy of options in steps 3, 4, and 5 listed above.

Mitigating impacts to seagrasses is problematic since on-site or near-site locations suitable for the establishment of seagrass typically already has seagrass; direct restoration usually conflicts with the proposed project, and creation of suitable submerged grounds for seagrass development typically fails due to lack of one or more of the key growth factors.

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(CONTINUED)

Based upon a review of the compiled research on seagrasses published by the USACE[(1)], the key factors for seagrass growth include:

1. Water clarity; high turbidity and/or high total suspended soils (TSS) reduces water clarity and light penetration through the water column and lowers seagrass photosynthesis rates.

2. Salinity; estuarine and marine seagrass grow better at 25 to 40 parts per thousand (ppt) concentration.

3. Temperature; seagrass grows best in warmer water temperatures just like terrestrial plants.

4. Carbon dioxide (CO^2) concentration; higher atmospheric CO^2 increases the CO^2 concentration in water which boosts seagrass photosynthesis rates.

5. Sediment grain size and type; which affects rooting, rhizome extension, and nutrient availability.

6. Sediment organic matter concentrations. High levels of dead and decaying organic matter can smother live seagrass.

Mitigation of seagrass impacts through creation, requires excavation to sustained inundation of intertidal fringe wetlands, exposed mud or sand flats, or uplands adjacent to estuarine waters. The key growth factor that results in failure of creation efforts is the sterility of sediments at the final excavation depth, and sediment type. It's impossible to fertilize submerged sediments, as a result, it can take years of conditioning through natural processes to establish a nutrient load sufficient for seagrass survival. Secondly, the sediment type at final depth will affect seagrass establishment and survival. High sand sediment concentrations aid rhizome establishment and extension, but do not hold sufficient nutrients. Inversely, high clay content sediments typically have better capability for nutrient exchange but impede seagrass establishment and rhizome extension.

Mitigation of seagrass impacts through restoration or enhancement requires altering existing negative conditions. The improvement of conditions for one or more of the key growth factors results in expansion of existing seagrass beds and colonization of previously non-vegetated submerged bottoms.

PROPOSED MITIGATION LOCATION AND CONDITIONS

The project's proposed mitigation is through restoration and enhancement. The location is on-site, immediately west of the proposed boat channel into Port Bay. Figure 1 (attached) illustrates the proposed location relative to the community boating improvement project.

The proposed location has ongoing scour of the bay bottom and erosion of emergent wetlands which results in high turbidity, high TSS, and smothering of existing seagrass on the bay bottom.

Figure 2 (attached) illustrates the transition and changes to this area from 1995 to 2022. As shown on this illustration, the increase in open water, shoreline retreat, and loss of emergent wetland appears to be accelerating. The amount of wetland loss and shoreline retreat from 1995 to 2011, a 16-year period, is substantially less than from 2011 to 2022, an 11-year period. This presence of seagrasses in this area

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(CONTINUED)

varies, but typically a zone of unvegetated bay bottom exists at the wetland shoreline interface where wave reflection and scour has the greatest affect.

PROPOSED MITIGATION ACTION

As compensatory mitigation for the unavoidable impacts to submerged grasses the permittee proposes to install a 275-ft long by 8-ft wide reef ball breakwater. The primary objective of this breakwater is to dissipate wave energy. Dissipating the wave energy from the prevailing wind direction should minimize or stop scour of the bay bottom and wave erosion of the wetland shoreline downwind. The potential improvement in water clarity should allow for propagation or expansion of submerged grasses within shallow waters behind the breakwater and within the wetland complex. Secondly, the breakwater should slow or stop the continuing loss of the emergent wetland and potentially allow for some recovery.

As shown on Figure 1, the intent is to install the reef balls where areas of bare bay bottom interfaces with existing submerged aquatic vegetation at a general off set of 50-ft from the shoreline. The installation will be a double row of 36-inch diameter reef balls installed on a staggered 3-ft edge to edge placement. The area behind the breakwater covers approximately 5,000 square ft (0.11 AC) of bay bottom fronting the wetland shoreline.

Timing of Mitigation Installation

The reef ball mitigation structure will be installed concurrently with the dredging of the boat channel into Port Bay. The perimeter of the installation area will be established by wading the shallow waters to verify bottom conditions and set survey stakes. The reef balls will be delivered using the small barges used during the dredging and the amphibious excavator will be used to offload and set the reef balls in place.

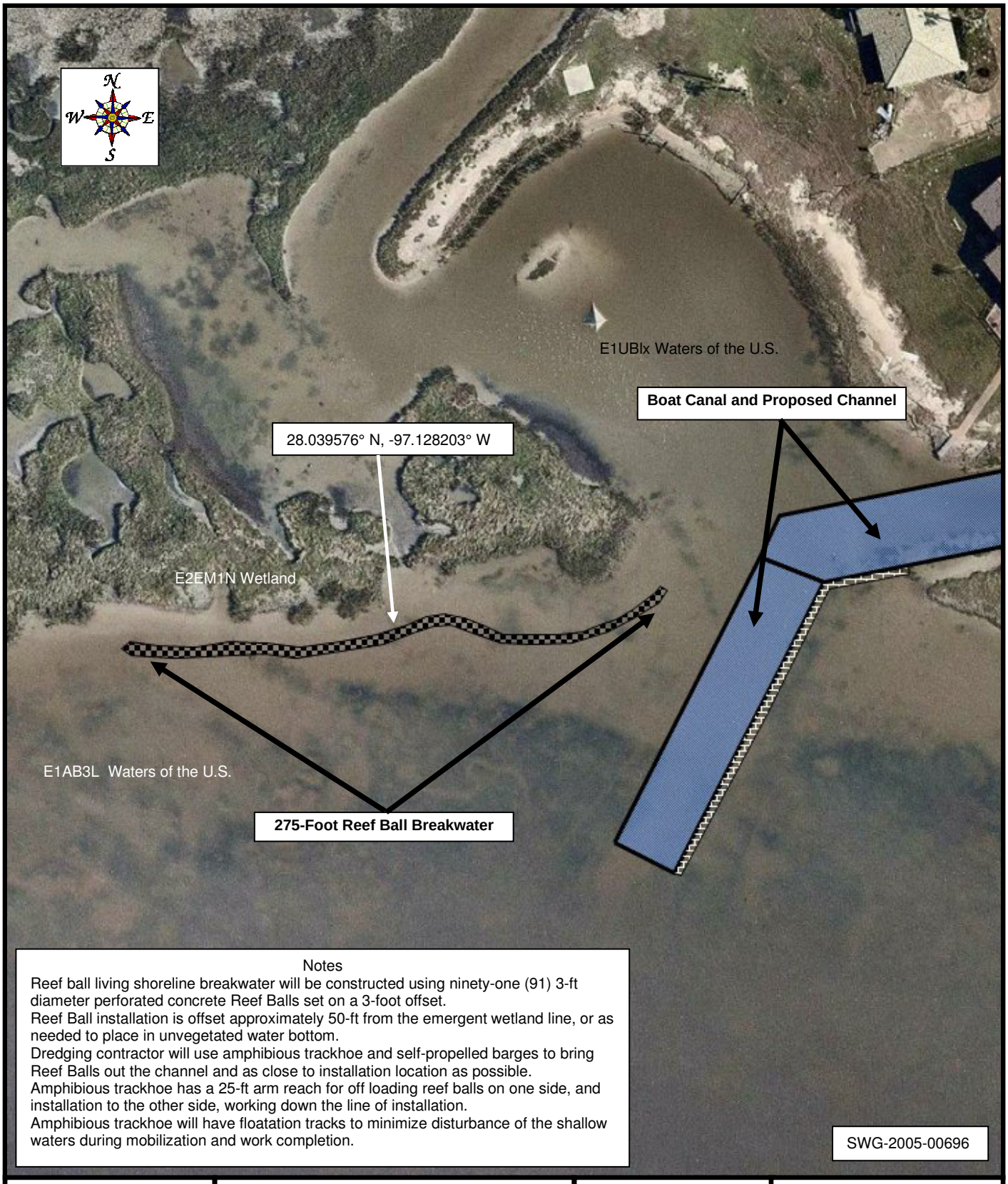
PERFORMANCE STANDARDS AND PERFORMANCE PERIOD

The proposed mitigation performance standard is to document a long-term increase of 5,000 square ft of submerged grass coverage in the shallow waters north and northwest of the reef ball breakwater. The pre-breakwater extent of existing submerged grasses and emergent wetland will be documented by drone photography. Post-installation monitoring of success and extent of submerged grass coverage will be documented by drone photography.

The project proponent/responsible party cannot control all the aspects and conditions leading to successful establishment of submerged grasses. Drought, excessive rainfall, tropical storm tidal surge or direct impacts may alter the seasonal growing conditions for submerged grasses; therefore, the responsible party is requesting a 5-year performance period with submittal of annual monitoring reports.

REFERENCES

(1) United States Army Corps of Engineers - Environmental Factors Affecting Coastal and Estuarine Submerged Aquatic Vegetation (SAV): U.S. Army Research and Development Center; EL SR-21-6, September 2021



Notes

Reef ball living shoreline breakwater will be constructed using ninety-one (91) 3-ft diameter perforated concrete Reef Balls set on a 3-foot offset.
Reef Ball installation is offset approximately 50-ft from the emergent wetland line, or as needed to place in unvegetated water bottom.
Dredging contractor will use amphibious trackhoe and self-propelled barges to bring Reef Balls out the channel and as close to installation location as possible.
Amphibious trackhoe has a 25-ft arm reach for off loading reef balls on one side, and installation to the other side, working down the line of installation.
Amphibious trackhoe will have floatation tracks to minimize disturbance of the shallow waters during mobilization and work completion.

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Cape Velero Estates Home Owners Association

Proposed Submerged Grass Mitigation Boating Improvement Project Aransas County, Texas

Source: Terrain Navigator Satellite Photography, 2019
Scale: 1:1000

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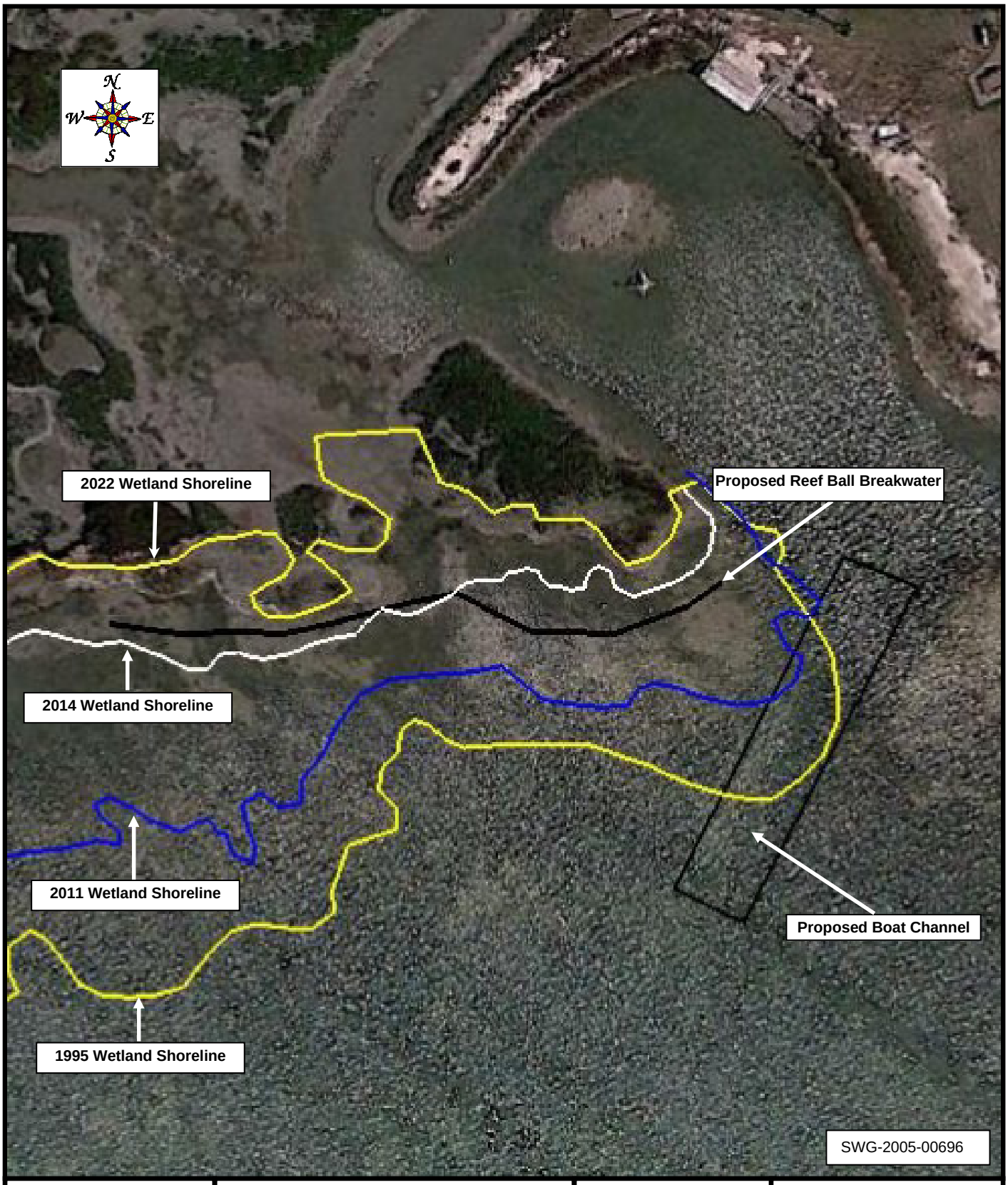
FIGURE 1

DATE:04/20/2023

GAI Project Number: 221132



Cape Velero Estates Home Owners Association

Mitigation Location Historical Conditions
Boating Improvement Project
Aransas County, Texas

Source: Terrain Navigator Satellite Photography, 2019
Scale: 1:564

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FIGURE 2

DATE: 04/20/2023

GAI Project Number: 221132