

North Padre Island Water Exchange Erosion Evaluation

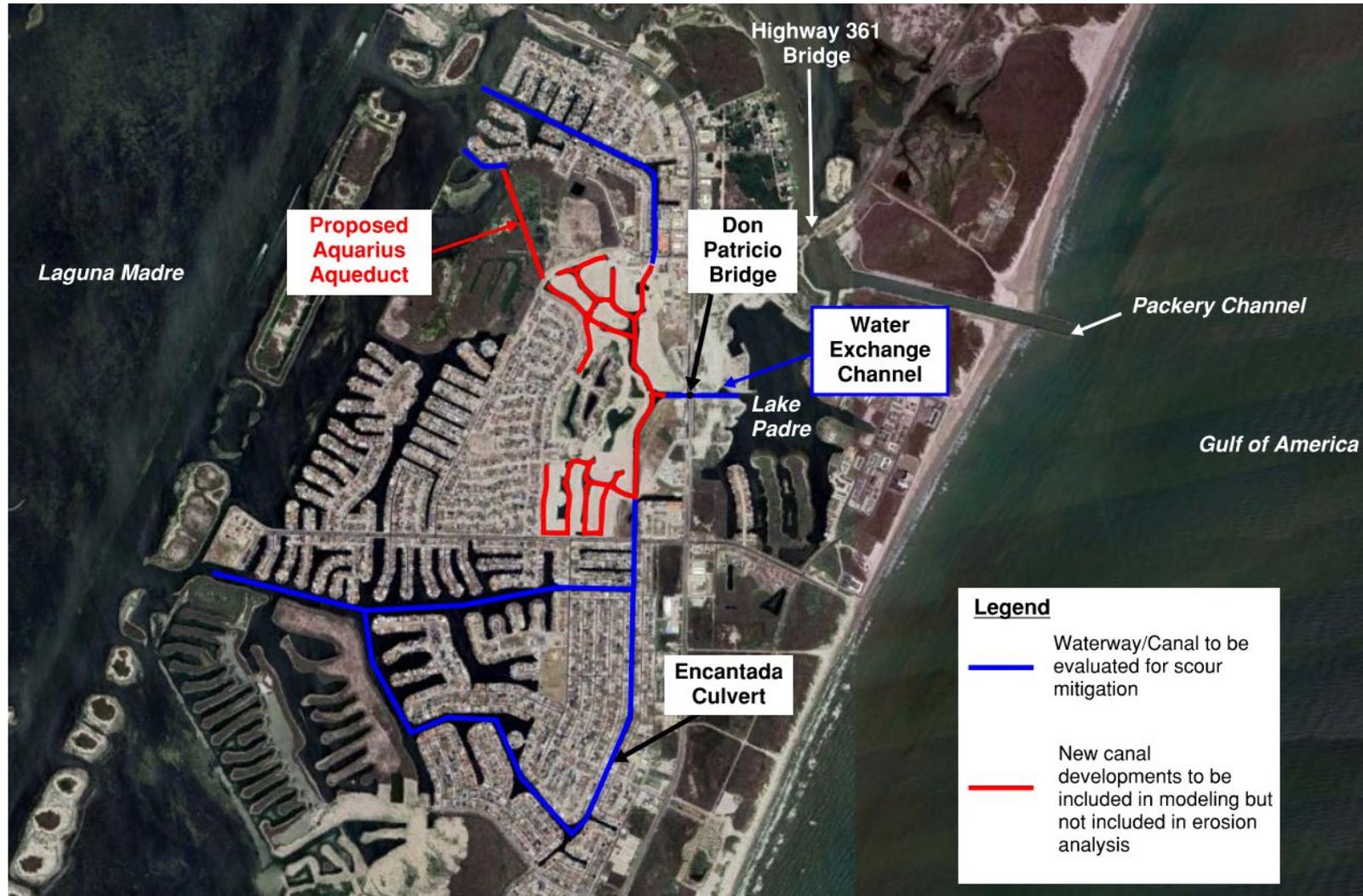
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Evaluation Goals

- Evaluate concepts to reduce erosion once the earthen dam is removed
 - Consider overall system
 - Evaluate four concepts
 - Assess hydrodynamics for impacts of new bridges and culverts
- Develop concepts that are feasible and meet the needs of the residents and waterway
- Determine concept level opinions of cost
- Provide the City and stakeholders formal information for determining path forward

Evaluation Area



Scope Outline

- Site visit
- Coastal Analysis
 - Water levels
 - Relative Sea Level Rise
 - Existing modeling report reviews
 - Coastal Modeling
- Concept Development
 - Gate Structure
 - Bulkhead Replacement
 - Riprap Scour Mitigation
 - Flow Constriction
- Concept Evaluation
 - Vessel Navigation
 - Operation
 - Maintenance
 - Regulatory Assessment
 - Cost
 - Construction Impacts
 - Function
- Deliverables
 - Technical Memorandum
 - Concept Drawings

Hydrodynamic Modeling

- Two Existing Models – initial reviews show disagreement
 - Developer's model
 - PIPOA model
- HDR will review the model files (if made available) and see if appropriate to modify and utilize
 - If needed HDR will develop independent model
- Modeling goal is to use latest modeling practices and observations (visual and video) to develop reasonable model for study
- Model will be used to assess impacts of additional bridges/culverts and to evaluate concepts

Concept 1 – Gate Structure

- Structure that can be opened during normal tidal conditions and closed during high flow conditions
- Must be able to resist forces from both directions (flood and ebb)
- Operation must not require heavy machinery
- Location not yet determined

Concept 2 – Bulkhead Replacement

- Develop concept for new bulkhead installation in areas of anticipated scour/erosion
- Concept will be developed to accommodate increased scour/erosion

Concept 3 - Riprap

- Place riprap at the base of the bulkheads to protect the foundation sand/silt

Concept 4 – Flow Constriction

- Evaluate where the flow can be further constricted to limit water exchange during all conditions
 - Goal is to divert larger portion of the flow under Highway 361

Decision Matrix

- Example decision matrix – will be developed specific to this project

CONCEPT	Evaluation Criterion and Importance (Weighting) Factor								Composite Score
	Initial Capital Cost	Public Access to Bay	Regulatory Constraints	Protection to Park from Erosion	Resiliency	Environmental Benefits	Long-Term Maintenance Cost	Constructability	
	<i>Importance (Weighting) Factor --></i>	<i>15%</i>	<i>40%</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>	<i>5%</i>	<i>5%</i>	
Concept 1 -- Sand Beach Fill w/ Vegetated Revetment	2	5	2	5	4	4	4	3	3.95
Concept 2 -- Cobble Beach Fill w/ Vegetated Revetment	1	4	2	5	5	2	5	3	3.45
Concept 3 -- Living Shoreline w/ Vegetated Revetment	3	3	4	4	3	5	4	2	3.30
Concept 4 -- Bulkhead Retaining Wall w/ Cobble Beach	4	1	5	5	4	1	3	4	2.80
Concept 5 -- Vegetated Revetment (Stand-Alone)	5	1	5	3	3	2	3	5	2.75

Notes:

1. Concept with highest score or rating is deemed the most favorable option.
2. Cost comparison ranking guidance: 1 = least favorable, 5 = most favorable.
3. Resiliency based on overall longevity and performance of system, and ability to withstand storms with little or no maintenance.

Questions