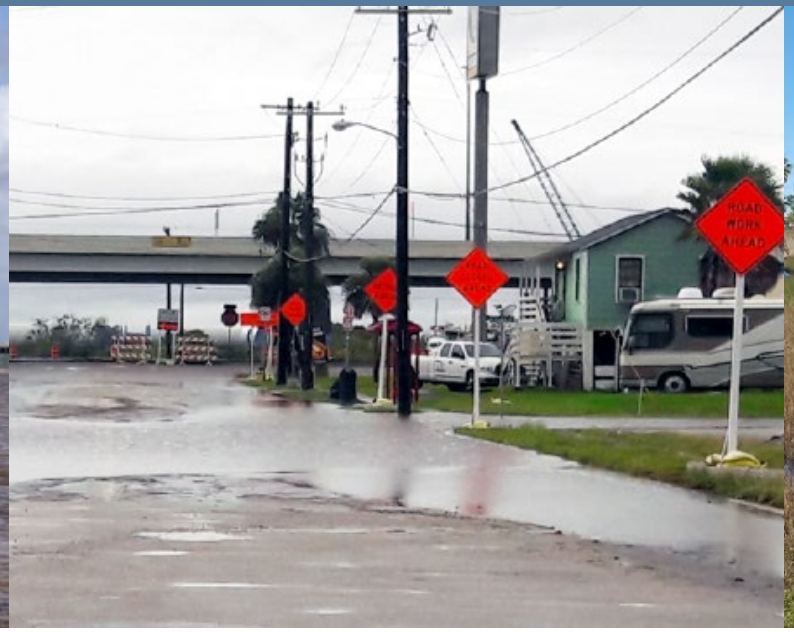

# CORPUS CHRISTI – NORTH BEACH

## Strategic Development Plan – Preferred Drainage Improvement Project Summary

MIG

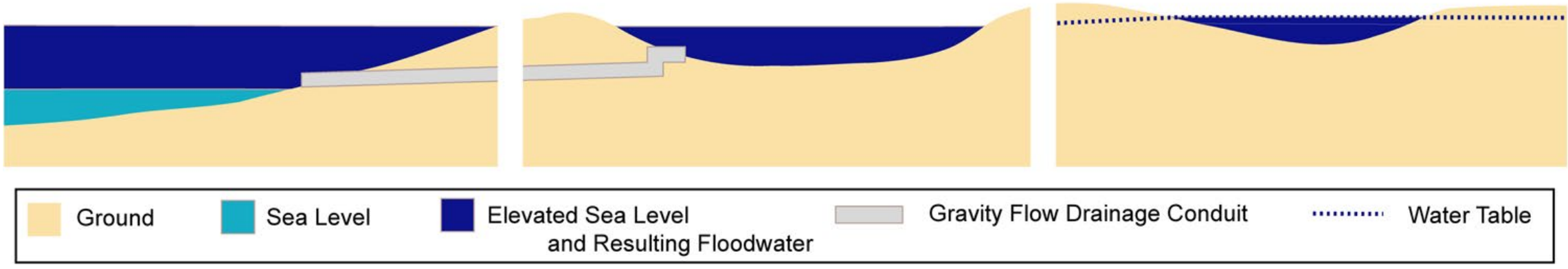
# CHALLENGES – SEA LEVEL

Direct Tidal Flooding



Direct Backflow Flooding

Groundwater Seepage Flooding




Original Image from https://www.nature.com/articles/s41598-020-60762-4/figures/1 - Labels and photo examples have been modified)

# CHALLENGES - RAINFALL

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# Vulnerabilities


- Areas subject to tidal flooding at highest observed tide, elevation 3.5’.
- Additional areas are vulnerable to relative sea level rise and rainfall flooding.

# Vulnerabilities


- Key routes to beach access points and parks are vulnerable.

Existing Roadway Flooding Vulnerability

Higher Vulnerability

Lower Vulnerability

# A Layered Solution

**A. DUNES (COASTAL BARRIER)**

**B. SEAWALL (COASTAL BARRIER)**

**C. TIDE GATES/VALVES (BACKFLOW)**

**D. ELEVATE INFRASTRUCTURE**

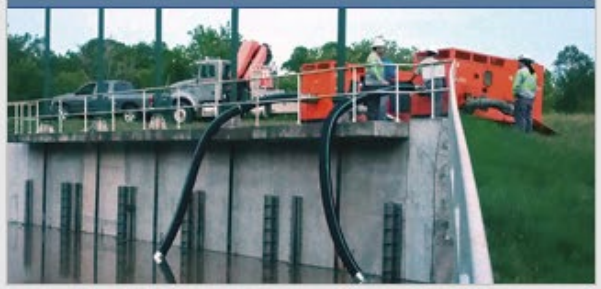
**E. ELEVATE PARCELS**

**F. OPEN CHANNEL CONVEYANCE**

**G. IMPROVE PIPED CONVEYANCE**

**H. SEDIMENT MONITORING + CLEANING**

**I. STORMWATER PUMPS**



# Intervention Effectiveness

| Intervention(s) | Direct Tidal Flooding | Backflow Flooding | Groundwater Seepage Flooding | Rainfall Induced Flooding |
|---|---|---|---|---|
| A. Dunes | ✪✪✪✪ | | | |
| B. Seawall | ✪✪✪✪ | | ✪✪✪ | |
| C. Tide Gates/Valves | | ✪✪✪✪ | | |
| D. Elevate Infrastructure | ✪✪✪ | ✪✪✪ | ✪✪✪ | ✪✪ |
| E. Elevate Parcels | ✪✪✪ | ✪✪✪ | ✪✪✪ | ✪✪ |
| F. Open Channel Convey. | | | | ✪✪ |
| G. Imp. Closed Convey. | | | | ✪✪ |
| H. Sed. Monitoring + Clean. | | | | ✪ |
| I. Stormwater Pumps | | | ✪✪✪ | ✪✪✪ |
| #1. Stormwater Convey. + Ditch Imp. "Option 1" G+H | | | | ✪✪✪ |
| #2. Linear Park "Option 2" A+D+E+F+G+H | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ |
| #3. Nav. Canal "Option 3A" A+D+E+F+G+H | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ |
| #4. Nav. Canal "Option 3B" A+D+E+F+G+H | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ |
| #5. Storm Drains w/ Elev. A+D+E+G+H | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ |
| #6. Storm Drains w/o Elev. + Pumps A/B+C+G+H+I | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ |

# Decision Criteria

| | Priority 1 | | Priority 2 | | Priority 3 | | |
|---|---|---|---|---|---|---|---|
| | Cost | Maintenance Cost | Accelerated Delivery Timeframe | Economic Dev. Commerce | Natural Systems Ecology | Local Oriented Amenity /Recreation /Openspace | Access/ Connectivity |
| #2. Linear Park "Option 2" A+D+E+F+G+H | $$ | $$ | ✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪ |
| #3. Nav. Canal "Option 3A" A+D+E+F+G+H | $$$$ | $$$ | ✪ | ✪✪✪✪✪ | ✪✪ | ✪✪✪✪ | ✪✪ |
| #4. Nav. Canal "Option 3B" A+D+E+F+G+H | $$$$ | $$$ | ✪ | ✪✪✪✪✪ | ✪✪ | ✪✪✪✪ | ✪✪ |
| #5. Storm Drains w/ Elev. A+D+E+G+H | $$$ | $$$$ | ✪✪✪ | ✪✪✪✪ | ✪ | ✪ | ✪✪✪✪✪ |
| #6. Storm Drains w/o Elev. + Pumps A/B+C+G+H+I | $$$ | $$$$$ | ✪✪✪✪ | ✪✪✪✪ | ✪ | ✪ | ✪✪✪✪✪ |

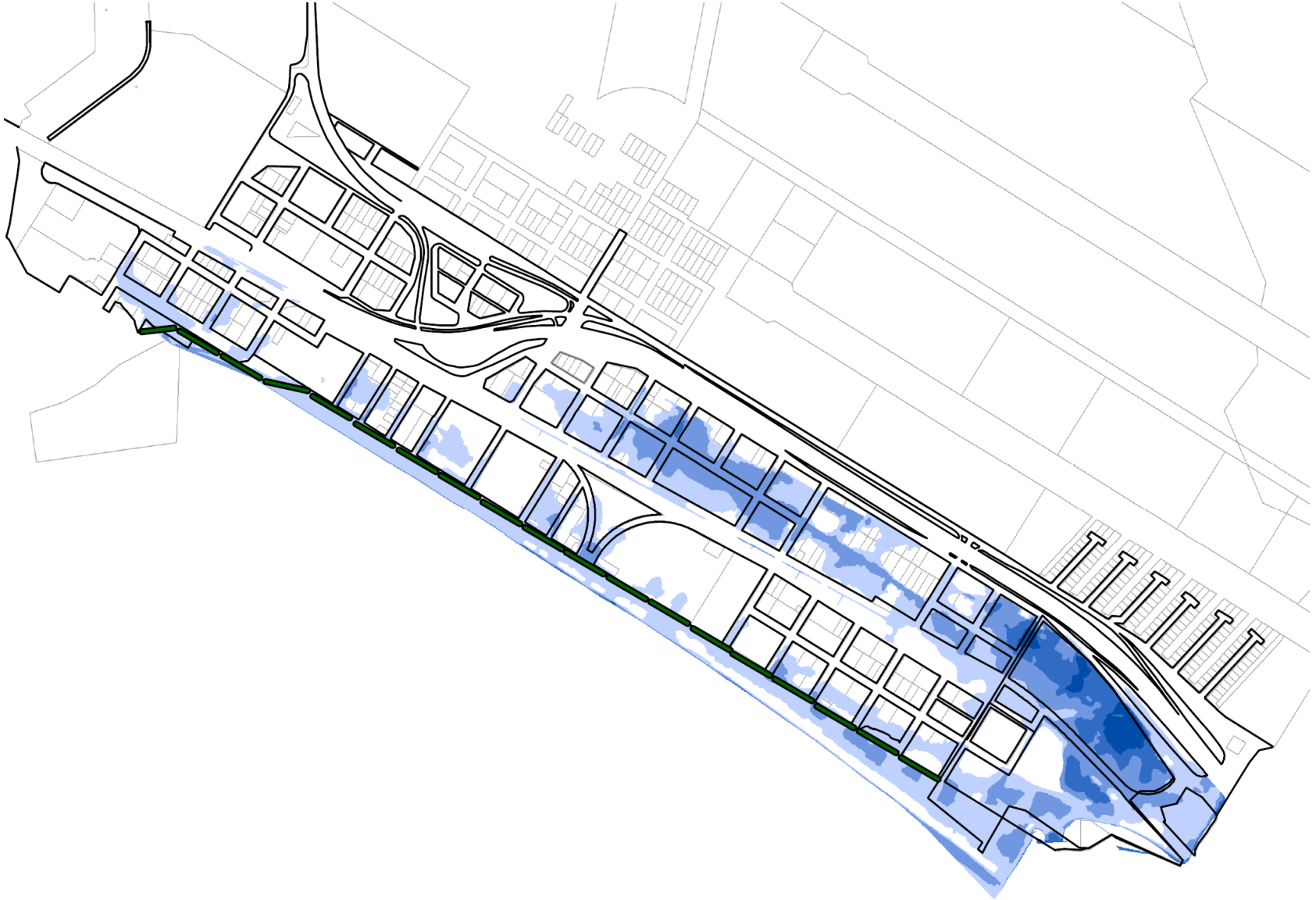
* Delivery Timeframe category considers how quickly improvements can be implemented, including consideration of reliance on Public-Private agreements and interagency agreements.

# Decision Criteria

| | Cost | Maintenance Cost | Accelerated Delivery Timeframe | Economic Dev. Commerce | Natural Systems Ecology | Local Oriented Amenity /Recreation /Openspace | Access/ Connectivity |
|---|---|---|---|---|---|---|---|
| #2. Linear Park "Option 2" A+D+E+F+G+H | $$ | $$ | ✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪✪ | ✪✪✪✪ |
| #3. Nav. Canal "Option 3A" A+D+E+F+G+H | $$$$ | $$$ | ✪ | ✪✪✪✪✪ | ✪✪ | ✪✪✪✪ | ✪✪ |
| #4. Nav. Canal "Option 3B" A+D+E+F+G+H | $$$$ | $$$ | ✪ | ✪✪✪✪✪ | ✪✪ | ✪✪✪✪ | ✪✪ |
| #5. Storm Drains w/ Elev. A+D+E+G+H | $$$ | $$$$ | ✪✪✪ | ✪✪✪✪ | ✪ | ✪ | ✪✪✪✪✪ |
| #6. Storm Drains w/o Elev. + Pumps A/B+C+G+H+I | $$$ | $$$$$ | ✪✪✪✪ | ✪✪✪✪ | ✪ | ✪ | ✪✪✪✪✪ |

* Delivery Timeframe category considers how quickly improvements can be implemented, including consideration of reliance on Public-Private agreements and interagency agreements.

# Recommendation: Coastal Barriers (Dunes)



- Prevents direct seawater flow over land.
- Reduces tidal flooding.

# Recommendation: Elevate Key Access Routes

- Prioritize improvements on along key access routes.
- Reduces tidal flooding.

# Recommendation: Upgrade Stormwater Conveyance w/ Linear Park Canal

- Reduces rainfall flooding.

# Recommendation: Backflow Prevention (Lower Elev. Potential)

- Elevation of private properties and some streets may not be feasible in some areas.
- Mobile or permanent pump systems would be required to manage rainfall during higher tides.

# Recommendation: Backflow Prevention (Higher Elev. Potential)

- Phase additional infrastructure elevation with adjacent private property elevation.
- Short-term improvements include installing backflow prevention and eliminating low points of existing streets.

# Implementation


- Confirm desired level of protection
- Identify long-term revitalization plan and multimodal transportation needs
- Implement short term elevation and conveyance design and phasing
- Develop long term plan for low lying areas
- Implement Sediment Monitoring and Cleaning Program

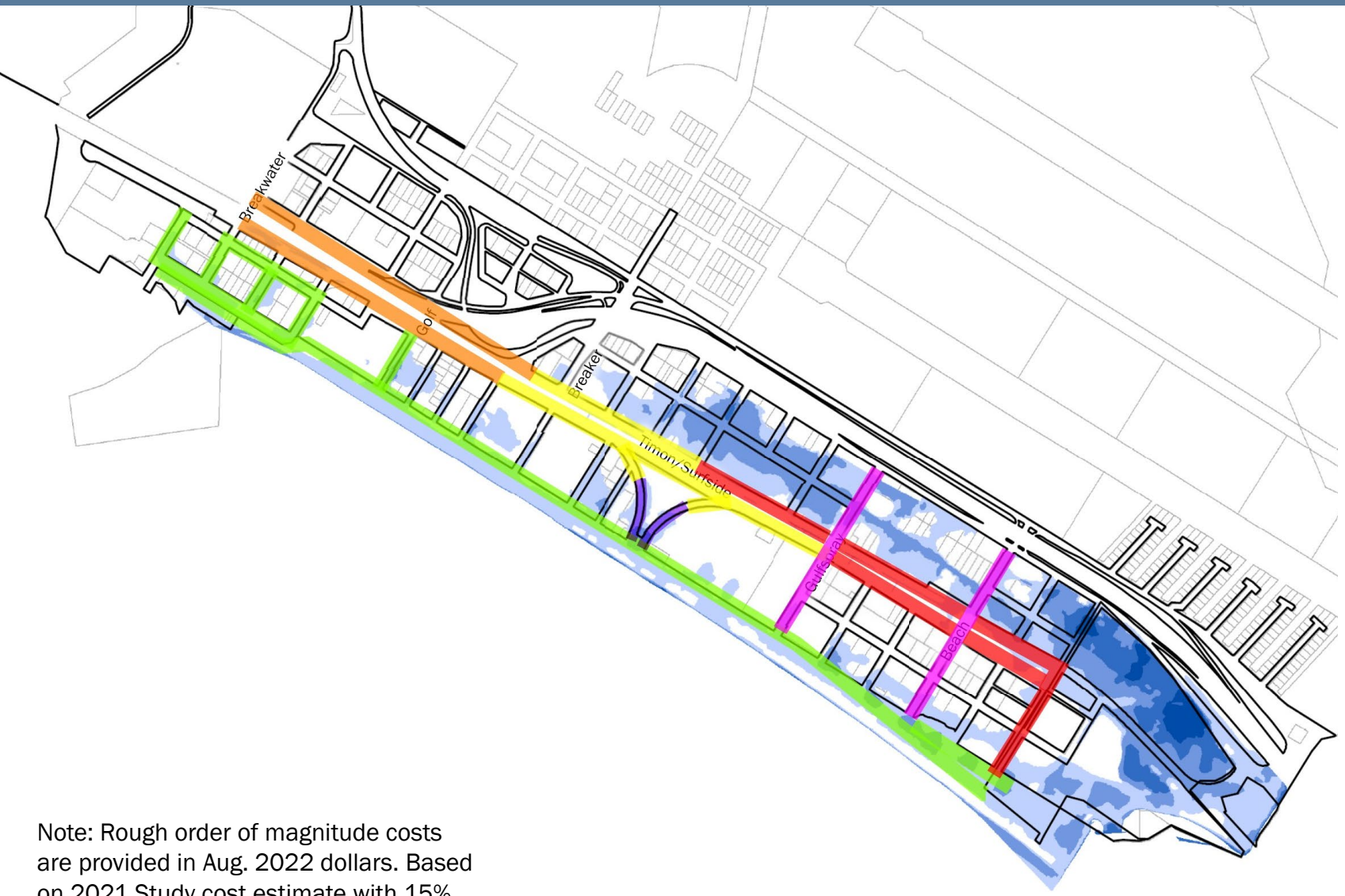
*All steps include communication with public and stakeholders

# Linear Open Space + Open Channel

Emerging Design Guidelines

- Pedestrian connectivity to the beach
- Overall multi-modal connectivity
- Interest and attraction at varying tidal levels
- Accommodation for kayaking and paddle boats
- Areas that could allow future expansion into canal
- Water quality

# Prioritization




$4.5M Elevate. In-progress.

$2.5M Elevate.

$5M Elevate and reconstruct. Limited conveyance improvements.

$10M Elevate. Major conveyance improvements, portion of linear open-space, new south-end outfall. Backflow prevention.

$5M Elevate. Connect linear open-space.

$16M Permanent or mobile pump station locations. Piped conveyance. Coastal barrier (dunes).

- Not Shown - Future Phases. Elevation and/or additional pump station locations.

Note: Rough order of magnitude costs are provided in Aug. 2022 dollars. Based on 2021 Study cost estimate with 15% cost escalation since Feb. 2021.

# Initial Funding Plan

## Available Budget: $9.55M (Bond 2018 + ARPA + FY23 General Fund)*

**First Priority (Gulfspray and Beach)**

- Elevate Beach Ave and Gulfspray. Elevate beach access parking and provide pedestrian access to beachwalk.

**Second Priority (Design and Partial Construction of Linear Open Space Channel)**

- Elevate Timon and Surfside, Eco Park and Dolphin Park access (Sandbar Avenue).
- Limited conveyance improvements along elevated streets.
- Install new north-end outfall and portion of linear open-space open channel.
- Confirm compatibility with future linear open-space open channel.

*Available Budget:

| | |
|---|---|
| ARPA | $5.00M |
| Bond 2018 - Beach Avenue | $1.00M |
| Bond 2018 - Gulfspray Pedestrian Access | $0.30M |
| Bond 2018 - NB Primary Access Project | $1.25M |
| FY 2023 General Fund | $2.00M |

# Recommendation

- Use a layered solution across the North Beach peninsula
- Approve Linear Park (Option 2) and Storm Drains w/o Elevation (Option 6)
- Install Coastal Barriers (Dunes)
- Elevate Key Access Routes
- Upgrade Stormwater Conveyance w/ Linear Park Canal
- Exercise Backflow Prevention
- Next Step: Hire an engineering firm to design the linear park and reconstruct North Beach roadways utilizing available funds