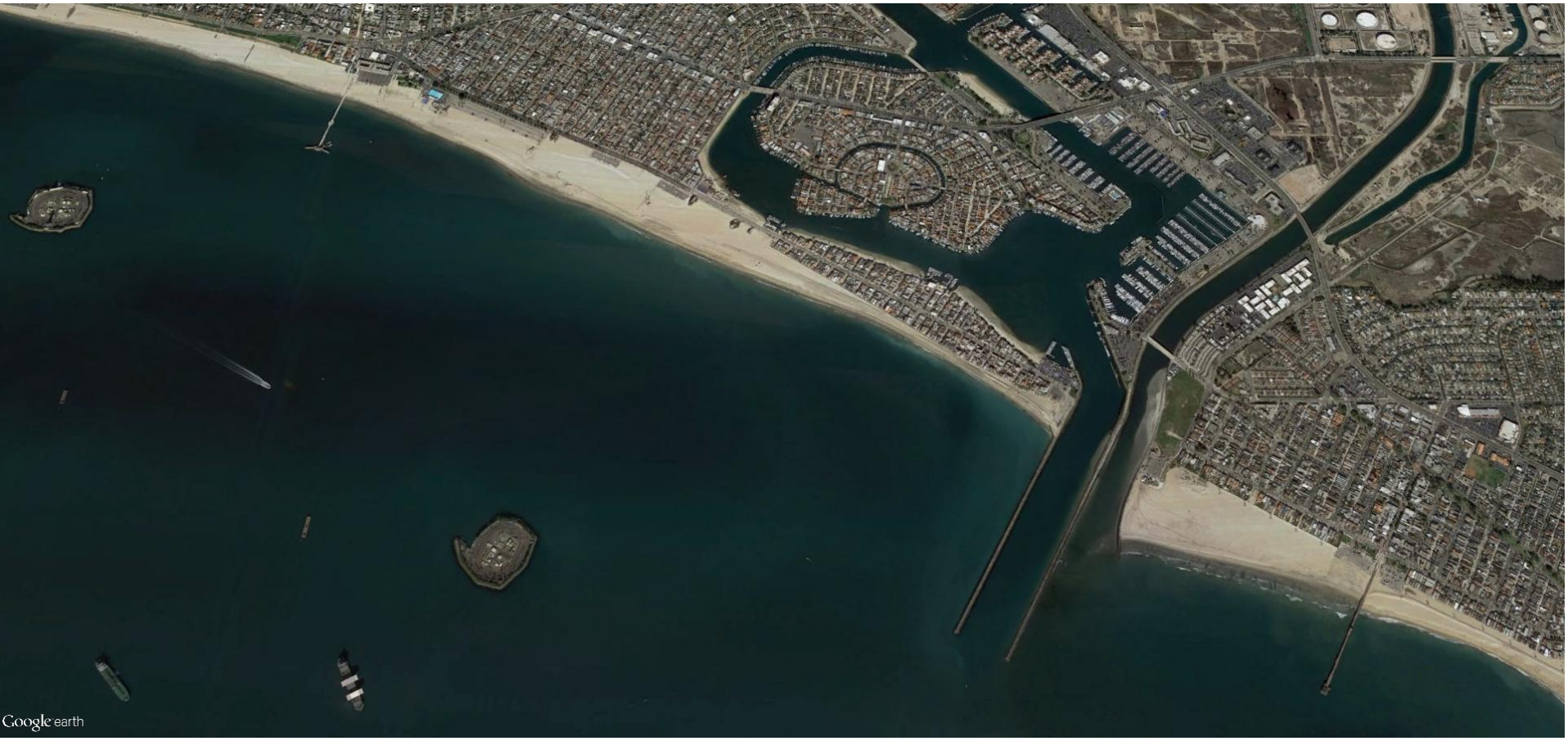
Peninsula Beach Sand Management Equipment Test Update

Presented to Marine Advisory Committee

Presented by Steve Cappellino

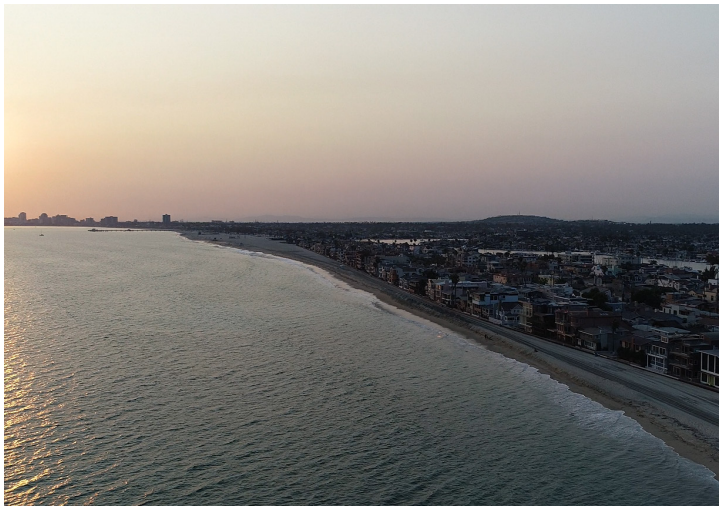
November 12, 2020

Review of the Issue



Erosion by Jetty

Beach Width between 57th and 72nd



Beach Width Near 54th Plaza

Looking East towards Jetty

Alternatives Considered

- Existing practices – relocate sand from west beach using front-loaders and trucks to east beach
- Alternative 1 – same approach as existing except relocate sand using hydraulic system instead of trucks
- Alternative 2 – same approach as Alternative 1 except first create wider beach using sediment dredged from Alamitos Bay entrance channel
- Alternative 3 – same approach as Alternative 2 except add physical structure to reduce shoreline erosion

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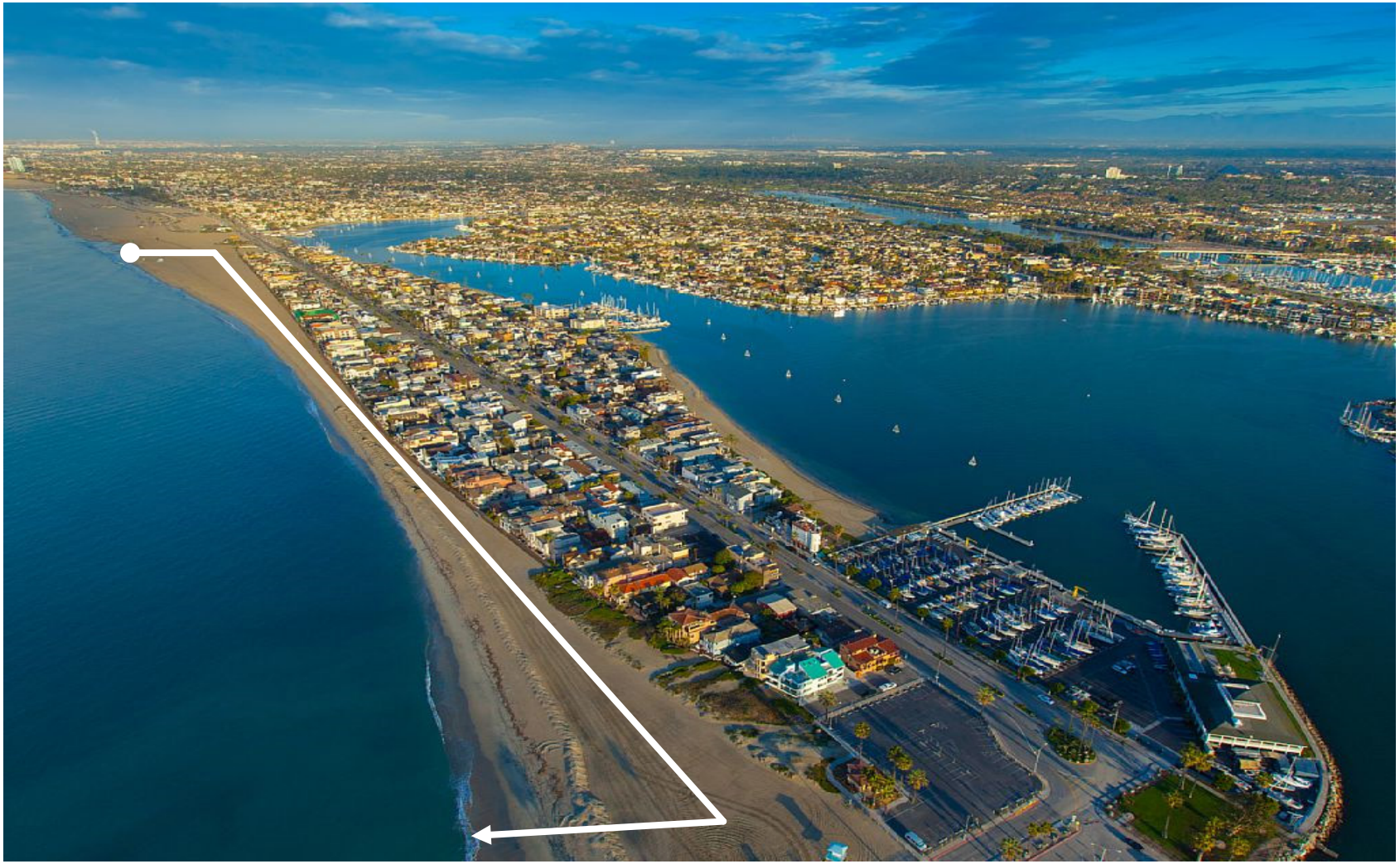
Hydraulic Backpassing with Initial Beach Fill

- Start with wider beach using entrance channel sand or other available sand
- Construct 200-foot-wide beach with gentle (20:1) slope similar to western end of beach
- Erosion and westward sand transport will continue
- Maintain outer edge of beach slope using hydraulic pump
- Provides shoreline protection and restores beneficial uses to beach

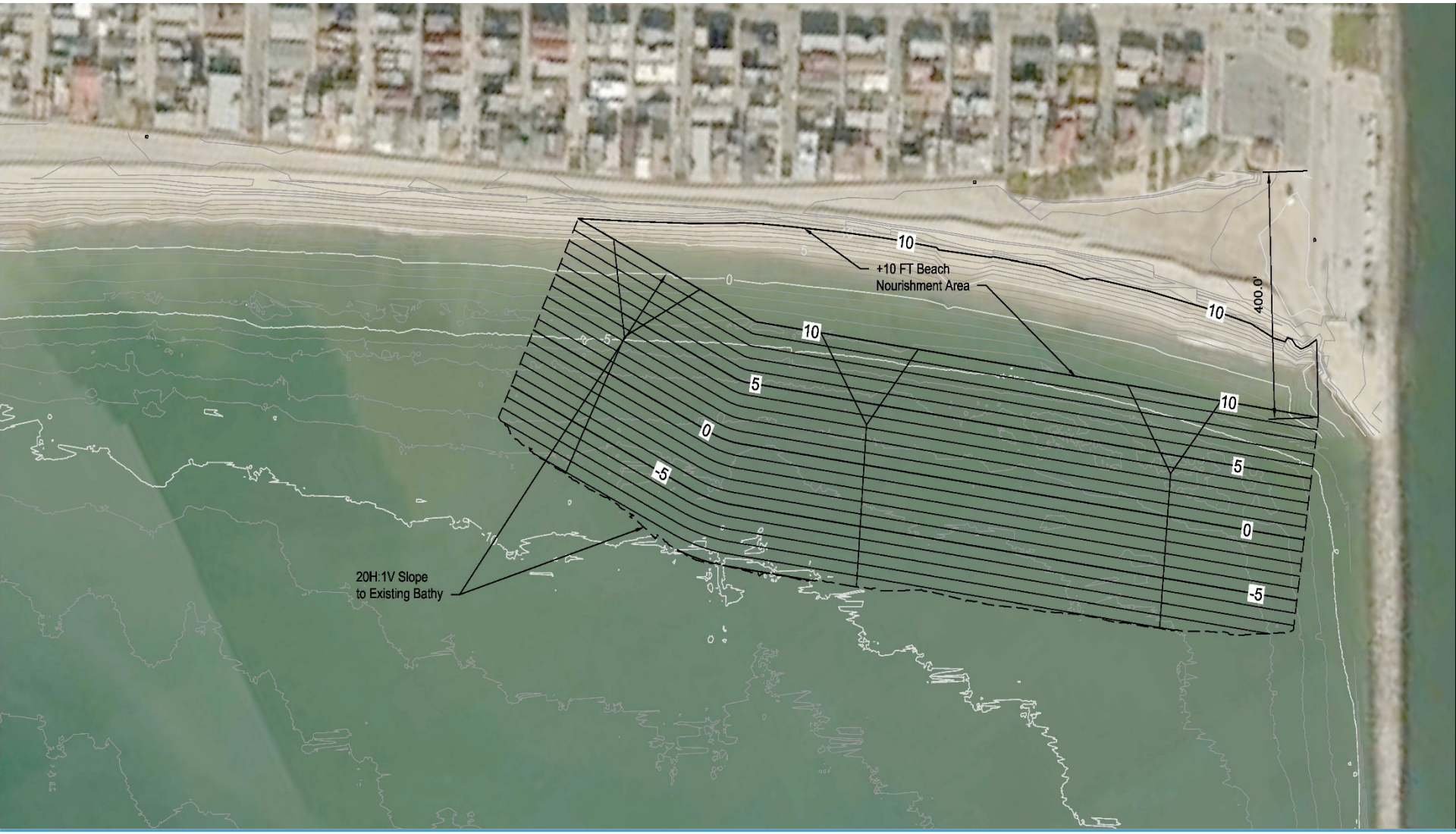
Hydraulic Backpassing

- Use hydraulic pump to transport sand to placement area
- Eliminates truck traffic and noise
- Commercially available equipment
- Can be rapidly deployed when needed
- More cost effective after initial capital investment

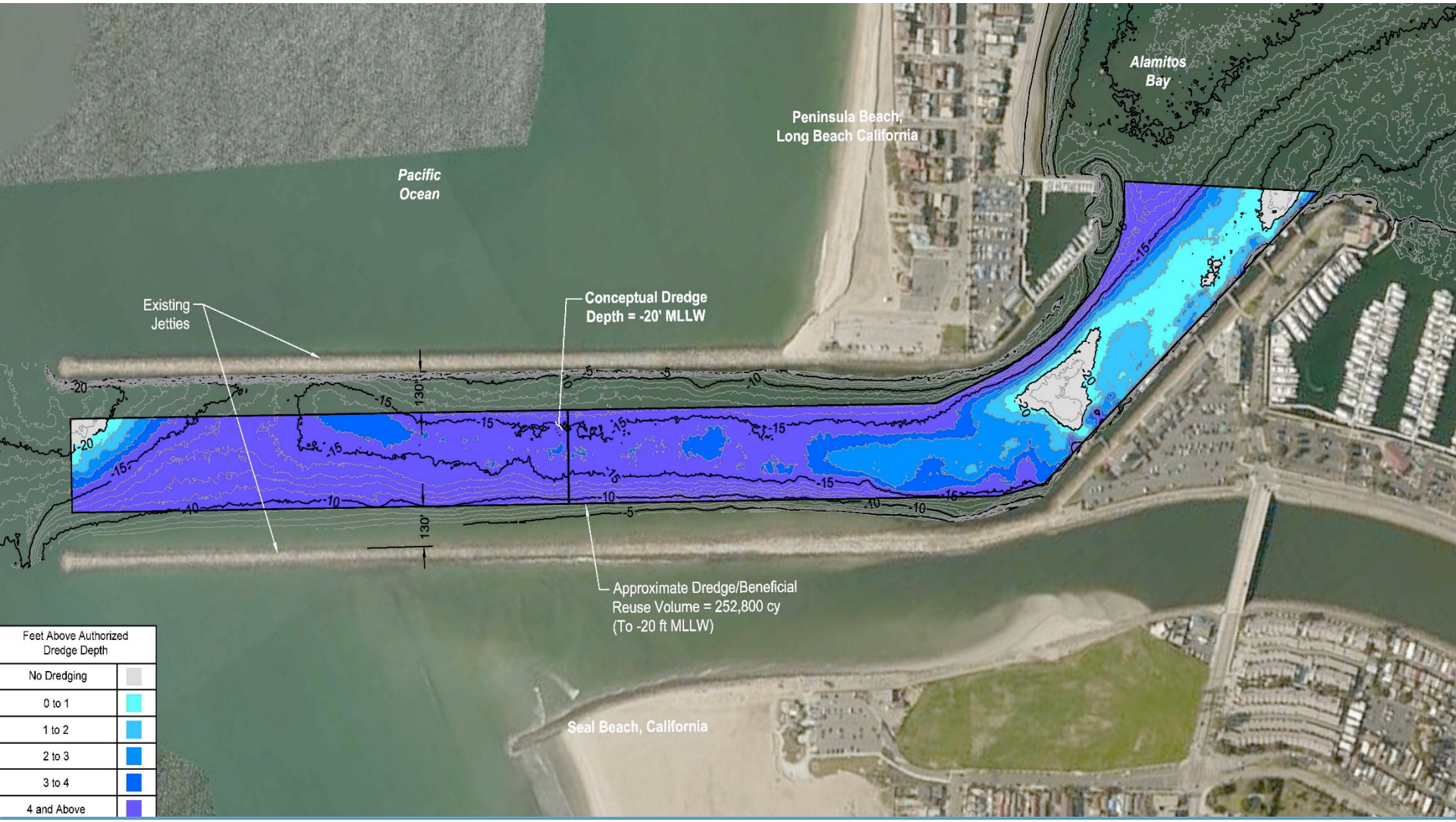
Hydraulic Backpassing



Target Beach Fill Area



Available Sediment for Beach Fill



Hydraulic Pumping Pilot Study
February – March 2020

Pilot Study Goals

- Test equipment effectiveness and determine improvements for possible full-scale use
- Evaluate how material settles at placement area
- Evaluate operating costs and staffing/equipment needs for potential full-scale use
- Document results with site surveys, field observations and aerial photography

Pilot Study Overview

- Conducted in February and March 2020
- Staff included City beach maintenance, Anchor QEA (environmental compliance), Associated Pacific Constructors, Inc. (marine contractor), Dragflow (pump manufacturer), City Marine Patrol, and City Lifeguards
- Harvest area was located between 54th and 55th Places
- Various lengths for discharge were tested
- 10-inch dredge pipeline was located along the northeastern side of the current berm
- Two access points for vehicles and public

Pilot Study Overview

SOURCE: Aerial from Bing Maps 2017. Bathymetry from Gahagan & Bryant Associates, Inc., survey dated May and November 2013.
HORIZONTAL DATUM: California State Plane, Zone 5, NAD83, U.S. Feet
VERTICAL DATUM: Mean Lower Low Water (MLLW)

LEGEND:

- -10 Existing Contours
- Dredge Pipe Work Area
- Pedestrian Beach Access
- Fencing (Typical)
- Sign (Typical)
- Buried Section of Dredge Pipe

NOTES:

1. Area for sand harvesting and pumping. Equipment in Sand Harvest Area includes mobile water pump, excavator with attached Dragflow pump, mini excavator, and end dump. Recommend City to designate area off limits to the public.
2. Pipe to be buried to ensure public and vehicular access.

0 400 Feet

Excavator with Dragflow Pump

Dragflow Pump (HY85/160B)

Long Reach Excavator

Additional Equipment

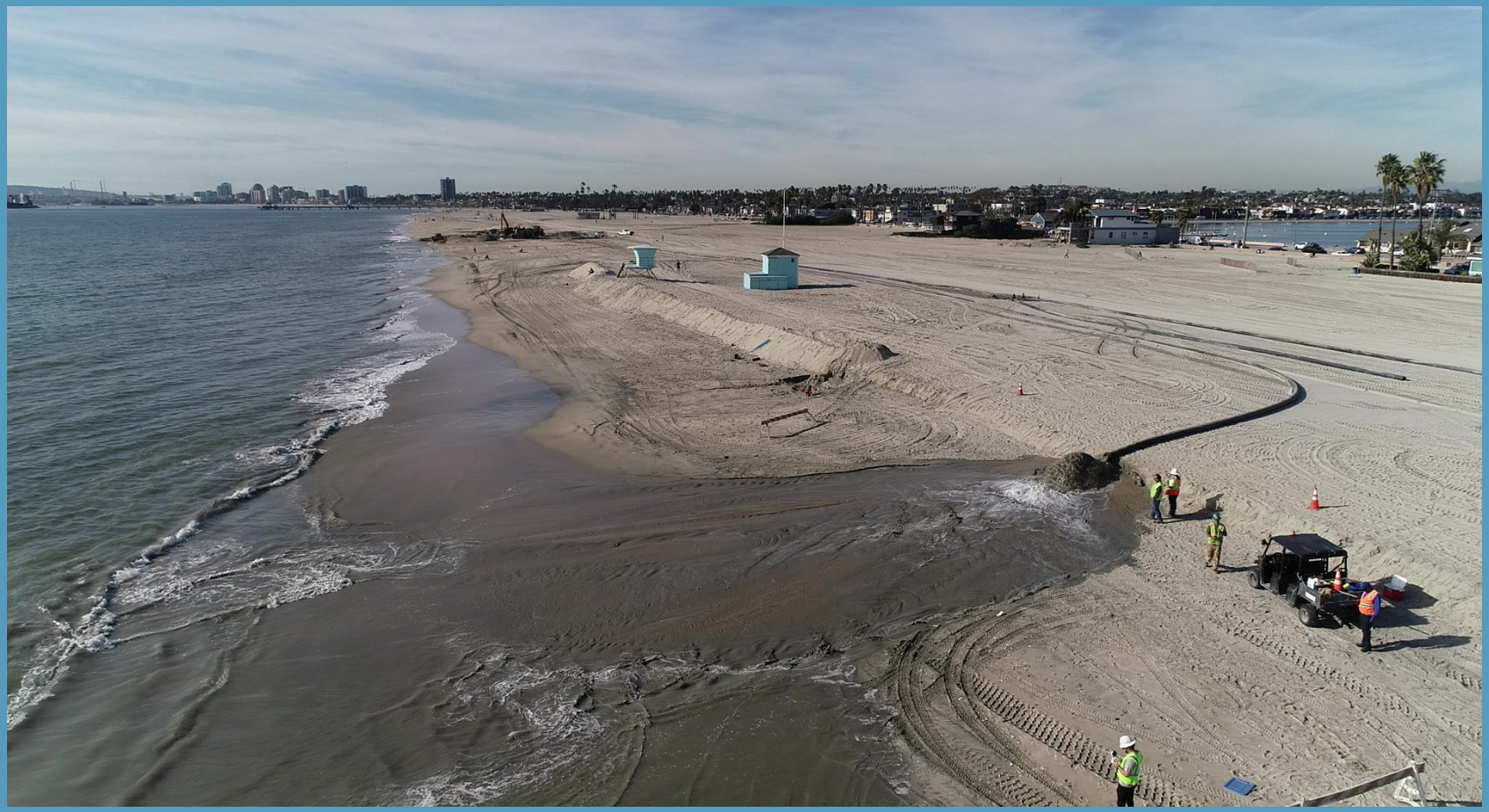
Dredge Pipe

Harvest Area

Harvest Area

Harvest Area

Discharge (approx. 1,000 feet from Harvest Area)



Discharge (approx. 1,800 feet from Harvest Area)

Discharge Near Alamitos Jetty (Approx. 5,000 feet)

What Worked

- Pump was able to deliver the desired high solids flow at significant distances down the beach
- Once running properly with sufficient water and feed stock, the pump appeared to be easy for the operator to manage for extended periods of time (e.g., 4 hours)
- Harvest area set up appeared to work when optimal tidal conditions were present
- No observed water quality impacts

What didn't Work

- Relying on a rental excavator for the Dragflow pump resulted in additional costs and delays while trying to program the equipment computers to allow for proper pump operation
- Extremely low and high tides were a challenge for maintaining the harvest area
- It was difficult to maintain a constant feed of optimal material into the line and avoid rapid changes in grain size, which is difficult to keep in suspension, and prevent pipe clogs

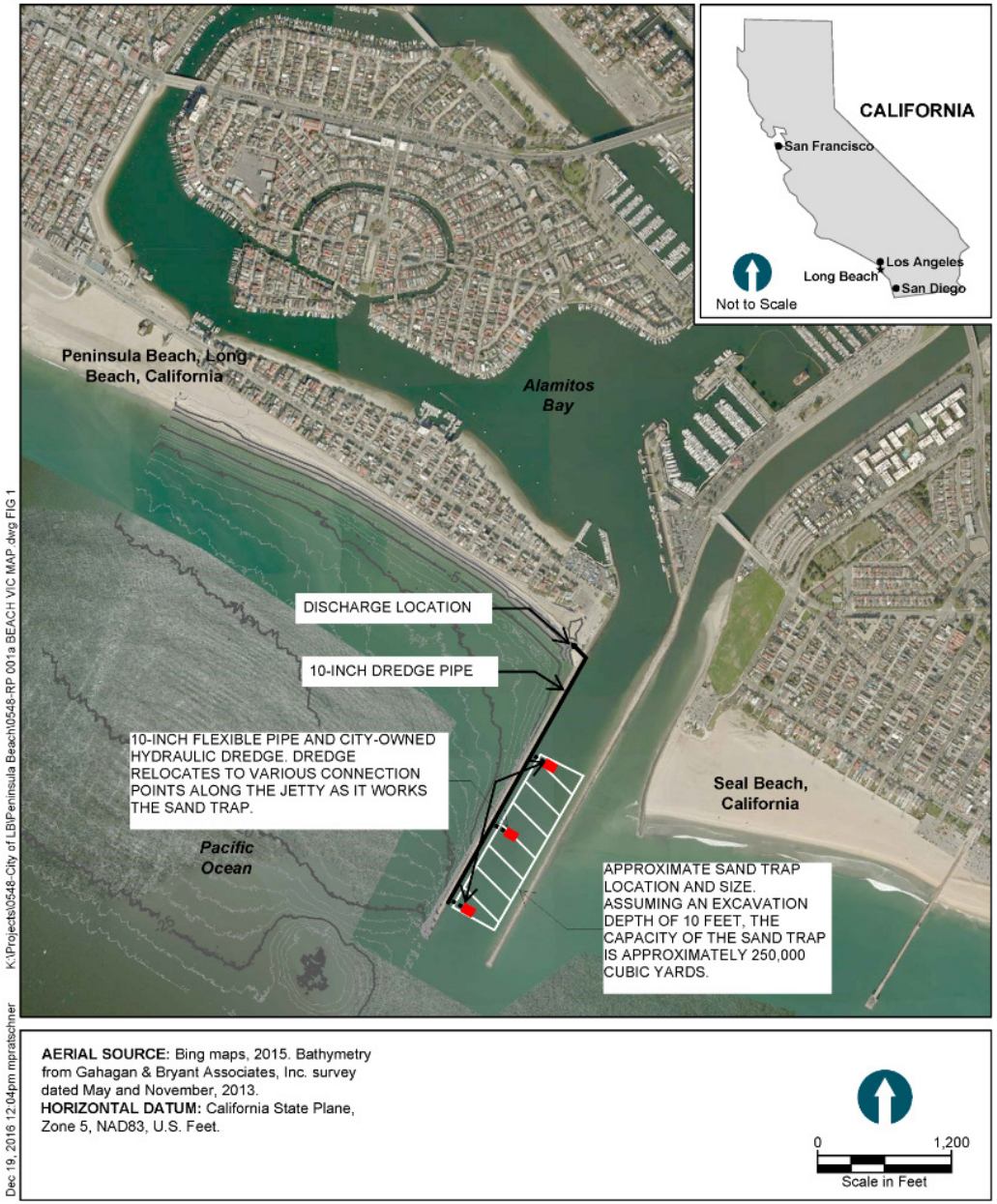
Challenges for Full-Scale with Beach Dredging

- High staff and and equipment requirements – higher costs
- Security (marine patrol, overnight security, and lifeguards) are required
- Tides negatively impacted production
- Avoiding a clog in the pipe is a real challenge
- Public safety
- Rental equipment
- Maintenance issues while working close to the shore (e.g. dozers)
- Would not be able to replace use of trucks in the event of an approaching storm

Alternate Approach

- Mount pump to a small A-frame barge or flat deck barge and use long-reach excavator
- Harvest bedded sediment vs. dry sand
- Dredge entrance channel
- Create sand trap to minimize future dredging need

- Shorter pump distance
- Eliminates water supply issues
- Minimizes impacts to residents
- Less City resources to implement
- Provides dual benefits of entrance channel dredging and sand supply



Questions/Discussion