Appendix F. Baseline topographic transects survey report



## Sears Point Pre-Construction Levee Transect Survey – May 2021

### **Technical Memorandum**

To: Julian Meisler, Sonoma Land TrustFrom: Dan Gillenwater and Stuart SiegelDate: September 22, 2021

The Sears Point Levee Adaptive Management Project (project) on the San Pablo Bay National Wildlife Refuge in Sonoma County, CA is undergoing construction in the fall of 2021. Prior to construction, a topographic survey of the levee was required to document baseline conditions prior to project implementation. These baseline data are needed to confirm site conditions immediately prior to construction and to serve as the basis for comparison to as-built conditions and post-project conditions for assessing change over time and attainment of project goals and objectives. The pre-construction levee topographic surveys consisted of two independent efforts: (1) a land-based survey of pre-established topographic transect alignments, and (2) an unmanned aerial vehicle (drone)-based photogrammetry survey of the entire levee alignment. This memorandum describes the methods and results of the land-based transect survey effort.

Ducks Unlimited (DU) established a series of topographic transect alignemnts along the north and west levees at the Sears Point Restoration Project site to track levee erosion and subsidence over time. These transects extend 75 – 100 ft from the levee crest out onto the adjacent mudflats, to an elevation of approximately mid-tide level (3.3 ft NAVD88<sup>1</sup>). Twenty-six of these transects fall within the adaptive management project area: 19 along the north levee and 7 along the west levee (Figure 1). These 26 transects were resurveyed on May 6, 2021 in the current effort.

## Methods

The topographic transect survey was performed by Dr. Daniel Harris of San Francisco State University using an Emlid RS2 real-time kinematic (RTK) global positioning system (GPS) unit. The Emlid RS2 was set up to receive real-time position corrections from the California Real Time Network (CRTN)<sup>2</sup> via a cellular link. Quality control for the survey was provided by checking in to NGS benchmark JT9545 located near the intersection of Hwy 37 and Hwy 121, approximately one mile from the project site (Figure 2), at the beginning and end of the survey.

The transect endpoints were loaded in to the Emlid RS2 unit to allow point-to-point navigation along the original transect alignments during the survey. Dr. Harris resurveyed all 26 of the DU transects, collecting data points at all notable grade breaks and at a maximum spacing of 15 ft.

<sup>&</sup>lt;sup>1</sup> North American Vertical Datum of 1988

<sup>&</sup>lt;sup>2</sup> <u>http://sopac-csrc.ucsd.edu/index.php/crtn/</u>

## Results

The elevation outputs from the Emlid RS2 for this survey were in ellipsoidal height. The check-in and check-out ellipsoidal height elevations for local benchmark JT9545 are provided below in Table 1. As shown in Table 1, the quality control data indicate excellent survey precision (0.01 ft). The Emlid RS2 survey elevations were then converted from ellipsoidal height into the NAVD88 vertical datum based on the established NAVD88 elevation of JT9545 (Table 2).

### Table 1. Quality Control Survey Results

Point	Elevation (ft above ellipsoid)		Difforence (ft)
	Check-In	Check-Out	Difference (it)
JT9545	-91.40	-91.39	0.01

### Table 2. Ellipsoid Height to NAVD88 Conversion

Point	Elevation		Conversion
	Ft Above Ellipsoid	Ft NAVD88	Value (ft)
JT9545	-91.40	13.98	105.38

The topographic survey point coverage is displayed in Figure 3. Plots of the May 2021 data for the north levee topographic transects are provided in Figure 4, while plots of the May 2021 data for the west levee transects are provided in Figure 5.



Data sources: Air photo (PAS, 2019; NAIP, 2012); Transects (DU, 2017);





Sears Point Levee Adaptive Management

Figure 1

2021 Pre-Construction Topographic Transect Locations and Priority

# Appendix F Benchmark is in a metal vault at the end of Hwy 121 the fenceline along the north side of the access road, before the railroad crossing **BM JT9545** Inset Frame HWY Access Rd JT9545 N: 1,817,256.38 ft HWY 37 E: 6,432,961.46 ft Elv: 13.98 ft NAVD88 - Refuge HQ Reclama

Data sources: Air photo (PAS, 2019; NAIP, 2012);





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Figure 2

### Location of NGS Benchmark JT9545



Data sources: Air photo (PAS, 2019; NAIP, 2012); Topo (SE, 2021);





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Figure 3

2021 Pre-Construction Topographic Transect Survey Coverage

#### Appendix F



### Figure 4





### Appendix F



Distance from Levee Crest (ft)

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Figure 5

2021 West Levee Topographic Transect Plots

