EXHIBIT 18

Hollywood Beach and Silver Strand Flood Depth Analysis

Coastal Hazards and Sea Level Rise

Local Coastal Program Amendments

County of Ventura
Planning Commission Hearing
Case No. PL20-0039
Exhibit 18 - Hollywood Beach and Silver Strand Flood Depth Analysis

MEMORANDUM

To:	Aaron Engstrom, County of Ventura Planning Division
From:	Integral Consulting Inc. David Revell, Ph.D., Matthew Jamieson
Date:	Draft submitted: May 19, 2023 Final submitted: January 24, 2025
Subject:	Coastal Hazards and Sea Level Rise Elevation Analysis for Hollywood Beach and Silver Strand: Local Coastal Program Amendments for Ventura County
Project No.:	C3631

Purpose

The purpose of this study is to evaluate future flood depths and support draft policies for updating the design flood elevation development standards for the Existing communities of Silver Strand and Hollywood by the Sea (Hollywood) in the unincorporated portions of Ventura County, CA.

Methodology

Datasets Used

Elevation Datasets

This study relied on the most recent and highest resolution publicly accessible digital elevation models (DEMs) for the region. The DEMs are a "bare ground" elevation, meaning that buildings and vegetation have been filtered from the elevation data. These included:

- 2018 USGS Lidar – Collected May – October 2018.
- 2016 USGS Lidar – Collected April – May 2016.

The vertical accuracy of these elevation models is approximately 4.5-8 inches at a 95% confidence level[1]. While the majority of elevations are within +/- 4 inches,

[1] https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/6259/supplemental/west_coast_2016_el_nino_m6259_lidar_report.pdf.
https://noaa-nos-coastal-lidar-pds.s3.amazonaws.com/laz/geoid18/9003/supplemental/CA_SoCal_Wildfires_2018_D18_Lidar_Project_Report.pdf

a very small number of elevations may differ by as much as 20 inches. For this study, errors in the elevation dataset were filtered, and two surveys were used to reduce the potential for errors in one dataset to bias the results.

Parcel Datasets

This study relied on the same parcel dataset layer as was used in the Ventura County Resilient Coastal Adaptation Project assessment[2] and focused only on parcels in the Hollywood and Silver Strand neighborhoods of Ventura County. The County Assessor's table information reported as a part of this study includes the Assessor's parcel number (APN) and street address.

The parcel dataset underwent a quality assurance check by comparing the street addresses in the Assessor's parcel dataset with those in the County of Ventura address location points dataset, and any errors in the Assessor's parcel dataset street addresses were corrected on parcels with multiple addresses, typically on corner lots with multiple units, or when a lots front multiple streets. In these cases, priority was given to the 'Situs' address listed in the assessor's parcel dataset.

Also note, the following parcel types were omitted from this analysis because they are unlikely to be developed: common parcels, right-of-way easements such as alleys and beach access corridors, and the County-owned parcels on the beach and in and around the harbor navigation channel.

Street Centerlines

This study relied on the street centerlines provided by the County of Ventura ITSD-GIS Open Data Portal. These data included address ranges for each neighborhood block.

Assumptions

- All elevation data are relative to the North American Vertical Datum of 1988 (NAVD88) and reported in feet.

[2] https://vcrma.org/en/vc-resilient-coastal-adaptation-project

- Tidal data are relative to the Santa Monica tide gage station (NOAA Station ID 9410840).
- The flood scenario uses the highest astronomical tide (HAT) or "king tide" from the Santa Monica tide gage, reported as 7.13' (NAVD88).
- The future sea level rise scenario was originally based on the 2018 OPC guidance, then was adjusted to align the 2024 guidance. The analysis for this study aligns with the 2024 intermediate-high scenario, measured as 6.8' by 2120 with a zero baseline beginning in 2000.

The HAT and SLR intermediate scenario yielded a 2120 flood elevation of 14'. *7.13' + 6.8' = 13.93' (rounded up to 14')*

Data Pre-Processing

1) The digital elevation models (DEMs) were analyzed for any errors. These included any elevations that were outside of the normal range of expected values and could have been the result of LiDAR processing errors. Any elevation model errors were given null values.
2) All developable/redevelopable parcels within Hollywood and Silver Stand were selected.
3) All streets within Hollywood and Silver Stand were clipped by the neighborhood boundaries inside the County jurisdiction.

Parcel Methods

1) The parcel areas were used to determine a range of ground elevation statistics from the bare earth DEMs, these include the average, minimum, maximum, and range of elevation values for each parcel.
2) This process was run for both the 2018 and 2016 elevation datasets. The 'current ground elevation' determined for each parcel was based on the average of both the 2016 and 2018 elevation datasets. Given the limited data on the foundation for each structure, no attempt was made to determine finished floor elevations or different types of foundations.
3) To determine the 'future flood depth', the 'current ground elevation' was compared with the '2120 flood elevation' of 14'. The difference between them can be considered a potential future flood depth during a king tide with 6.8 feet of sea level rise

4) Once compared, all properties were grouped by half-foot of flood depth ranges. All properties currently higher than 14' were reported as a 0 in the results because they would not be impacted by flooding based on the assumptions for this study.
5) Final results were mapped and reported in both decimal feet and feet/inches and include tables rounded up to both the nearest inch and 0.5 feet (6").

Street Methods

1) The street centerlines were used to determine a range of elevation statistics from the digital elevation models, these include the average, minimum, maximum, and range of elevation values for each street and used to provide insights on policy options.
2) This process was run for both the 2018 and 2016 elevation datasets. The final elevation used for each street centerline was based on the average elevation of the centerline, relying on the average of both the 2016 and 2018 elevation data.
3) To determine the 'future flood depth', the 'current elevation' was compared with the '2120 flood elevation' of 14'.
4) Results are reported by depth of flooding by street segment (aka neighborhood blocks).

Results

Parcels

There are 1,802 parcels in the study area, including 565 in Hollywood (Figure 1) and 1,237 in Silver Stand (Figure 2). Of these parcels, 157 are currently above 14' NAVD88, with 77 in Hollywood (13.6% of all Hollywood parcels) and 80 in Silver Stand (6.5% of all Silver Strand parcels) (Table 1). On average, parcels in Silver Strand are lower in elevation than those in Hollywood, with an average elevation in Silver Strand of 10.75', and an average elevation in Hollywood of 12.94'. In general, the lowest-lying areas are clustered around the harbor mouth in both Silver Strand and Hollywood, and in Silver Strand between Hueneme Ave. and Burbank Ave., and Hollywood Ave. and Sawtelle Ave. (Figure 3).

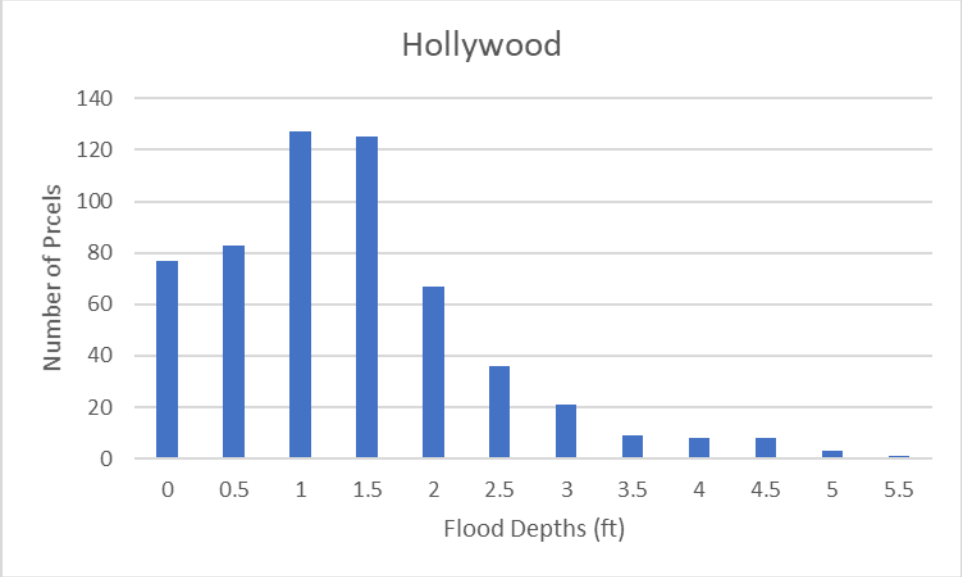


Figure 1. Histogram of Future (year 2120) Flood Depths by Parcels for Hollywood

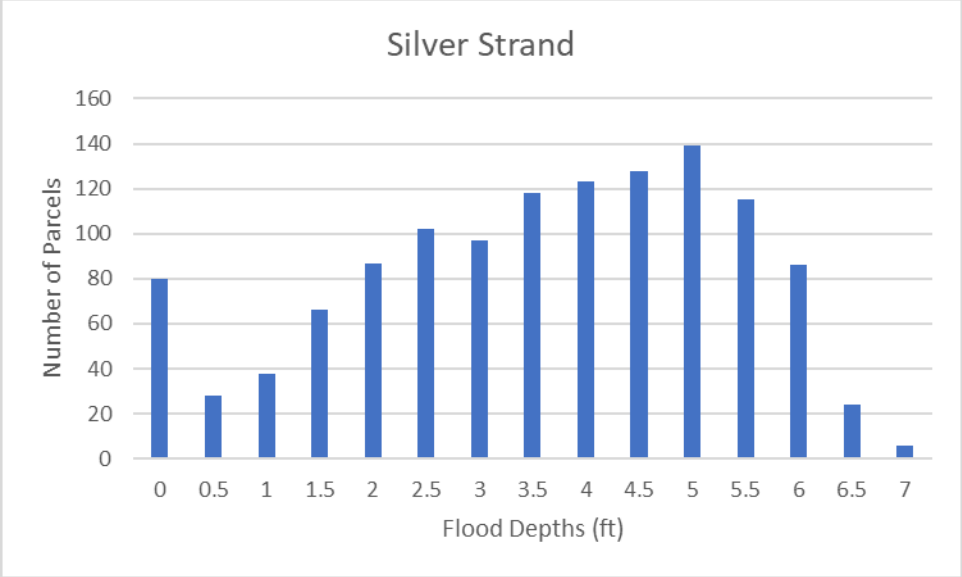


Figure 2. Histogram of Future (year 2120) Flood Depths by Parcels for Silver Strand

Table 1. Future (year 2120) Flood Depths by Parcel for the Study Area

Future Flood Depths (ft)	Number of Parcels	Percentage of Parcels in Study Area
0	157	8.7%
0.5	111	6.2%
1	165	9.2%
1.5	191	10.6%
2	154	8.5%
2.5	138	7.7%
3	118	6.5%
3.5	127	7.0%
4	131	7.3%
4.5	136	7.5%
5	142	7.9%
5.5	116	6.4%
6	86	4.8%
6.5	24	1.3%
7	6	0.3%

Streets

The study area encompasses 52 streets, 15 in Hollywood, and 37 in Silver Strand. The average future flood depth for Hollywood is 2.4', and the average for Silver Strand is 4.1'. Generally, the street centerlines are ~1' lower than the average parcel elevations (Table 2).

Table 2. Future (year 2120) Flood Depths by Street in the Study Area

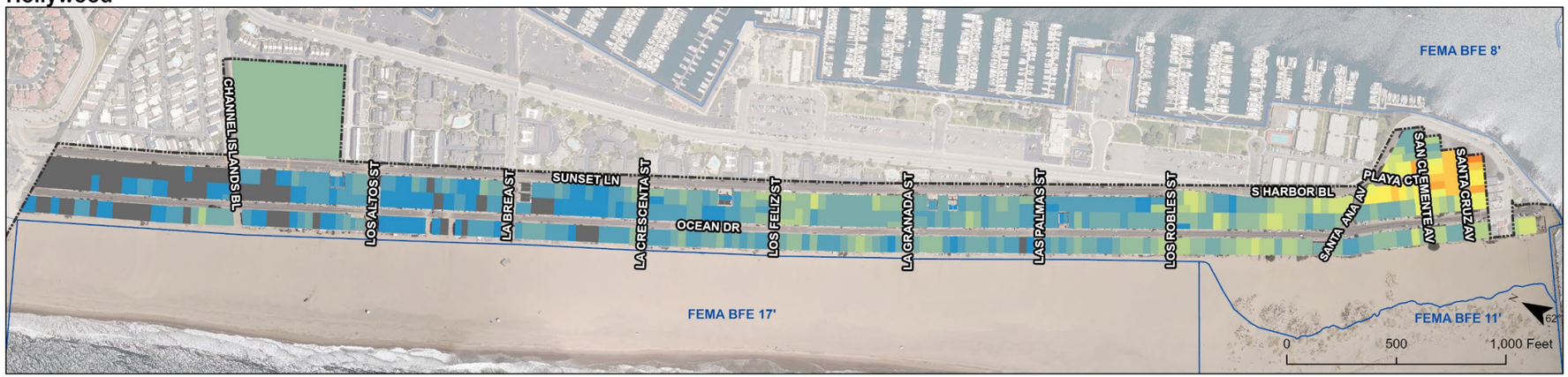
Street	Average Future Flood Depth (ft)
All Hollywood Streets Average	**2.4**
ALBACORE WY	3.9
CHANNEL ISLANDS BL	2.1
E SIERRA DR	2.5
LA BREA ST	1.6
LA CRESCENTA ST	1.8
LA GRANADA ST	2.4
LAS PALMAS ST	1.9
LOS ALTOS ST	1.3
LOS FELIZ ST	2.5
LOS ROBLES ST	2.7
OCEAN DR	1.8
PLAYA CT	5.0
S HARBOR BL	3.6
SAN CLEMENTE AV	3.5
SANTA ANA AV	2.7
SANTA CRUZ AV	4.5
SUNSET LN	1.7

Street	Average Future Flood Depth (ft)
All Silver Strand Streets Average	**4.1**
ANACAPA AV	3.5
BARDSDALE AV	2.7
BURBANK AV	4.1
CAHUENGA DR	2.4
CAMARILLO AV	5.2
CHICO CT	6.9
EAGLE ROCK AV	3.5
FILLMORE AV	4.1
GLENDALE AV	4.5
HIGHLAND DR	5.0
HOLLYWOOD AV	4.3
HOLLYWOOD BL	2.5
HUENEME AV	3.9
ISLAND VIEW AV	2.2
LAKE SHORE DR	4.9
LAUREL CT	5.8
LOS ANGELES AV	5.5
MALIBU AV	3.6
MELROSE DR	4.6
MOORPARK AV	4.6
OCEAN DR	4.4
OJAI AV	3.7
OXNARD AV	4.1
PANAMA DR	5.8
PASADENA AV	3.8
PIRU AV	4.5

ROOSEVELT BL	4.5
ROSSMORE DR	4.4
SAN FERNANDO AV	3.0
SAN NICOLAS AV	4.1
SANTA MONICA AV	5.9
SANTA MONICA DR	4.1
SANTA PAULA AV	4.0
SANTA ROSA AV	5.4
SAWTELLE AV	3.3
SIMI AV	4.2
SUNSET DR	5.3
TUJUNGA AV	2.4
VAN NUYS AV	5.2
VENTURA AV	4.6

FUTURE FLOOD DEPTHS BY PARCEL FOR HOLLYWOOD AND SILVER STRAND
VENTURA COUNTY, CA

Hollywood



Silver Strand

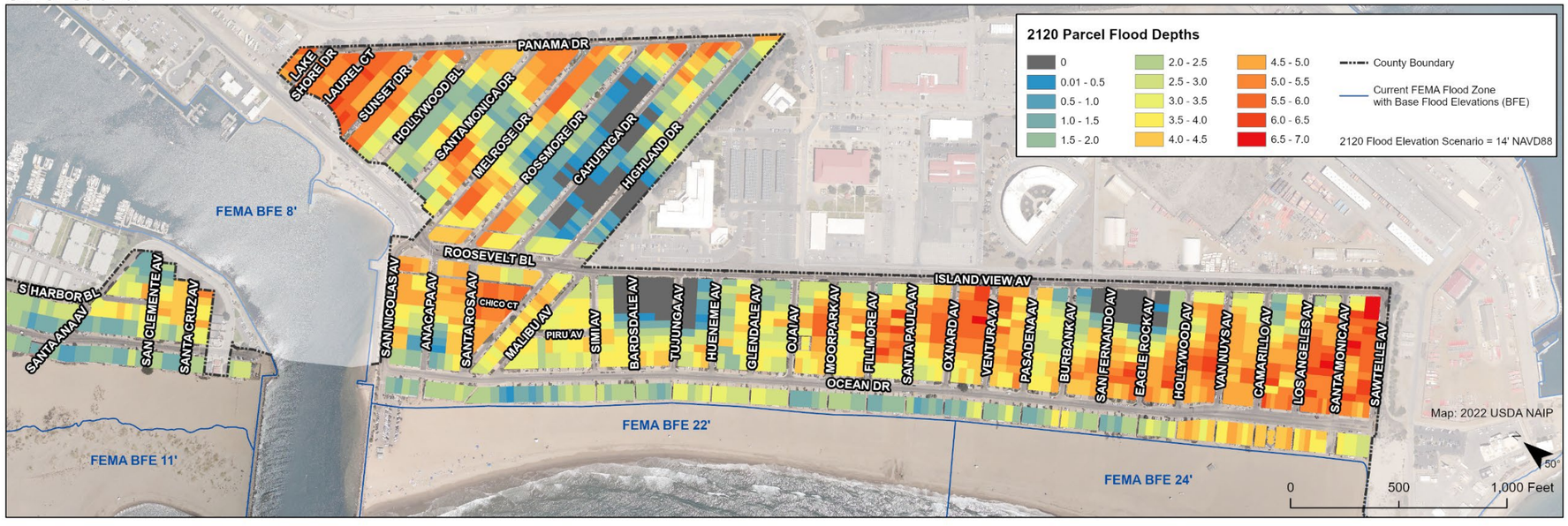


Figure 3. Future Flood Depths by Parcel for Hollywood and Silver Strand

Data Dictionary

This section provides a description of the columns in the table deliverable.

Parcels

OBJECTID
A unique ID used by ArcGIS
APN
From County Assessors
APN_SUFFIX
From County Assessors
APN10
From County Assessors
SITUS_NR
From County Assessors
SITUS_DIRECTION
From County Assessors
SITUS_STREET
From County Assessors
SITUS_TYPE
From County Assessors
SITUS_COMBINED
A concatenation of SITUS_STREET and SITUS_TYPE
SITUS_UNIT
From County Assessors
SITUS_FULL
From County Assessors
FIRST_ROW
Indicates that the parcel is located along the first row of oceanfront homes
FEMA_VE_BFE
Indicates the FEMA VE (wave run-up velocity) base flood elevation in feet (Panel and effective date?)
HAT_PLS_SLR
The future flood scenario elevation (highest astronomical tide + future SLR elevation)
NEIGHBORHOOD
Hollywood or Silver Strand
MEAN_2016_2018_EL_FT
Average parcel ground elevation from the USGS 2016 and 2018 digital elevation models
EL_DIF_DECIMAL
Flood depth - the difference between the average parcel elevation and the future flood scenario elevation

EL_DIF_UP_ONE_IN_REPORT_FT_IN
Flood depth - The difference between the average parcel elevation and the future flood scenario elevation rounded up to the nearest inch and reported in ft/in (‘/”)
EL_DIF_UP_HALF_FOOT_DECIMAL
Flood depth - The difference between the average parcel elevation and the future flood scenario elevation rounded up to the nearest half foot and reported as a decimal
EL_DIF_UP_HALF_FOOT_REPORT_FT_IN
Flood depth - The difference between the average parcel elevation and the future flood scenario elevation rounded up to the nearest half foot and reported in ft/in (‘/”)

Streets

OBJECTID
A unique ID used by ArcGIS
CID
From County Street Centerline Data
L_ADD_FROM
From County Street Centerline Data
L_ADD_TO
From County Street Centerline Data
R_ADD_FROM
From County Street Centerline Data
R_ADD_TO
From County Street Centerline Data
LRANGE
From County Street Centerline Data
RRANGE
From County Street Centerline Data
ADDRESS_RA
From County Street Centerline Data
PRE_DIR
From County Street Centerline Data
STR_NAME
From County Street Centerline Data
STR_NAME_A
From County Street Centerline Data
STR_SUF
From County Street Centerline Data
FULL_NAME

From County Street Centerline Data
ROAD_TYPE
From County Street Centerline Data
DESCRIPTIO
From County Street Centerline Data
LEFTJURISD
From County Street Centerline Data
RIGHTJURIS
From County Street Centerline Data
BAR_F_T
From County Street Centerline Data
BAR_T_F
From County Street Centerline Data
ZIP_CODE
From County Street Centerline Data
CITY_NAME
From County Street Centerline Data
COUNTY_NAM
From County Street Centerline Data
COMMUNITY_
From County Street Centerline Data
COMMUNITY
From County Street Centerline Data
L_ZIP R_ZIP L_CITY
From County Street Centerline Data
R_CITY
From County Street Centerline Data
Shape_Length
Length of the street centerline segment in feet
MEAN_2016_2018_EL_FT
Average street centerline segment elevation from the USGS 2016 and 2018 digital elevation models
EL_DIF_DECIMAL
Flood depth average - The difference between the average street centerline segment elevation and the future flood scenario elevation (14') reported as a decimal
MEAN_MIN_2018_2018_FT
Minimum flood depth - The minimum street centerline segment elevation from the mean of the USGS 2016 and 2018 digital elevation models
MEAN_MAX_2018_2018_FT

The maximum flood depth - The maximum street centerline segment elevation from the mean of the USGS 2016 and 2018 digital elevation models

MEAN_RANGE_2016_2018_FT

The range of flood depths - Represented as a number between the min and the max (see above) of flood depths for each street centerline segment.