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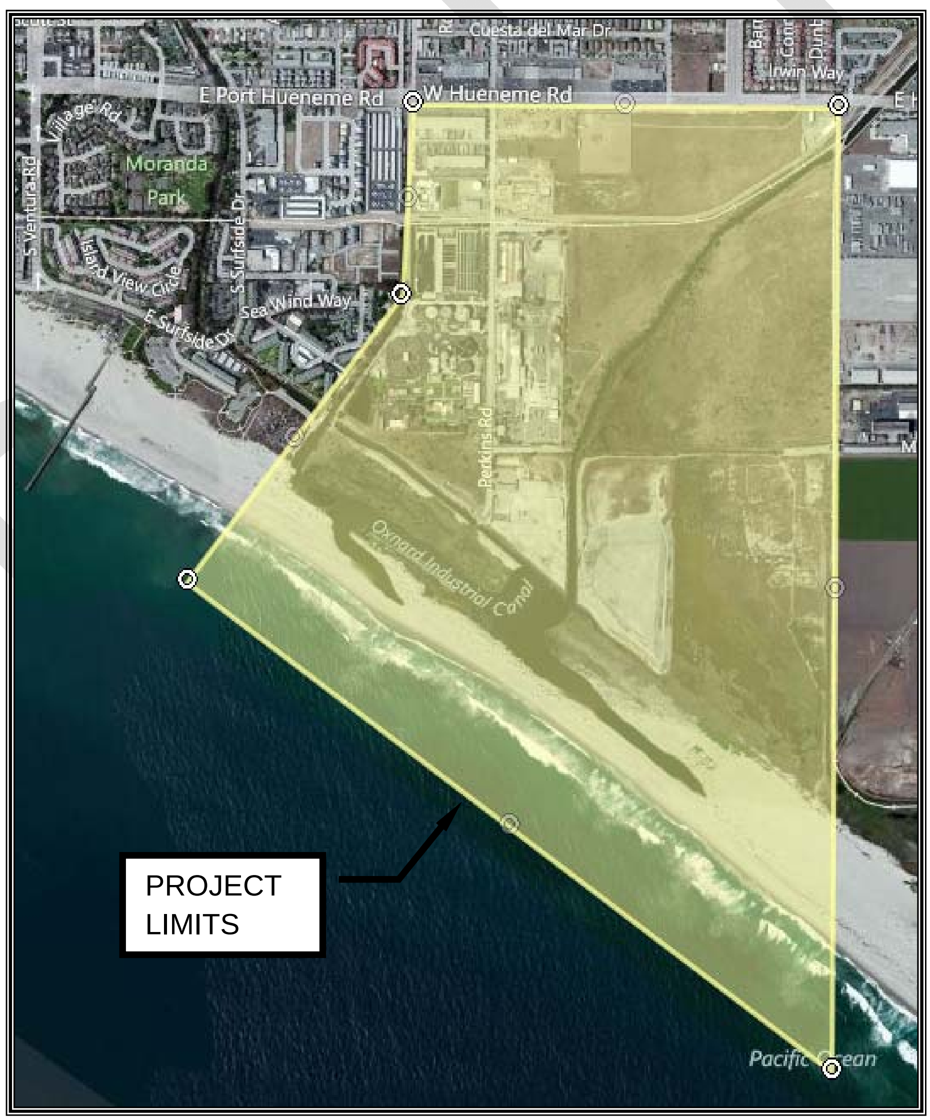
Technical Memo

To: Kirk Norman	
From: Bill Young	**Project:** J Street/Oxnard Drains Numerical Hydraulic Model
CC:	
Date: 9-30-11	**Job No:** 75217

PROJECT LOCATION

The project area encompasses J Street Drain, Oxnard Industrial Drain and Hueneme Drain with the surrounding inland areas, located in the city of Oxnard, California as outlined below.



INTRODUCTION

This Technical Memo presents the two-dimensional inland hydraulic analysis over a domain extending from E. Hueneme Road south to the Pacific Ocean, J Street Drain to the west and Edison rail spur to the east. This hydraulic model consists of numerical analysis to account for physical changes to the beach, different flow rates, and inland flow up to E. Hueneme Road. The model is run to approximate flooding that occurred during the January 17-18, 2010 storm and to simulate the approximate 100 year return period storm. Resulting data will be compared to flooding conditions observed along Perkins Road. The existing pump station at the Southerly end of Perkins Road will be reviewed for potential contributions to the observed flooding. In addition, the appropriately groomed berm height will be determined based on analysis of the results.

PROJECT DESCRIPTION

The purpose of this Memo is to describe the procedure used to develop a model domain to extend from E. Hueneme Road south to the Pacific Ocean. The model extends from J Street Drain to the west to Edison rail spur to the east. The model includes surface water flow from upland areas adjacent to J-Street, Hueneme, and Oxnard Industrial drains, as well as discharge through the lagoon across the beach into the Pacific Ocean. The hydrographs used for the model were supplied by the Ventura County Watershed Protection District (District) and were utilized to simulate approximately the January 17-18, 2010 storm. The storm caused flooding in the Ormond Lagoon area after more than 2 inches of rain fell in 24-hours but the berm did not breach. The 100-year storm event is also included in the model. The data (hydrographs and rainfall) provided by the District also includes Oxnard Industrial Drain (OID), Hueneme Drain, and J Street Drain, and is used to validate the model results.

ANALYSIS

MIKE 21 Release 2011 SP4, developed by DHI was used to build the model domain for the subject project. MIKE 21 Flow Model is a modeling system for 2D free-surface flows and is generally applicable to the simulation of hydraulic and environmental phenomena in lakes, estuaries, bays, coastal areas and seas.

All units for modeling results are presented in the Standard International (SI) system in order to maintain consistency within the MIKE21 code. Units in the MIKE 21 results are all shown in SI to conform to the model standards. Results are converted to English units for the main body of the report.

The following data was used to build the model domain in MIKE 21:

Topography and Bathymetry

Bathymetric data for the domain area being studied was built using topographic aerial survey data collected and supplied by Coast Surveying, Inc in July 2010, which was based on California Coordinate System (CCS27), Zone V, 1927 NAD, and NGVD 29. In addition, as-built plans for Oxnard Industrial Drain (OID), Hueneme Drain, and J Street Drain were used to build the channel sections within the bathymetry file.

Hydrologic Data

The hydrographs for the January 17, 2010 storm and the 100-year events as shown in figures below were supplied by Ventura County Watershed Protection District and were applied as inputs to the inland grid model to simulate storm events.

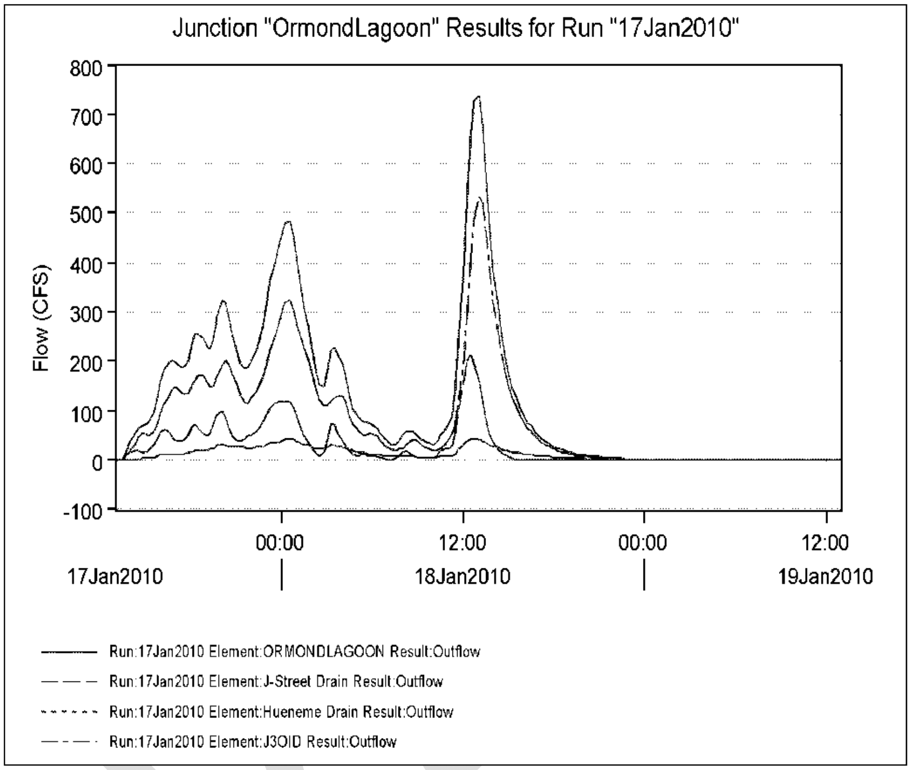


Figure 1: Hydrograph for the January 17-18, 2010 event

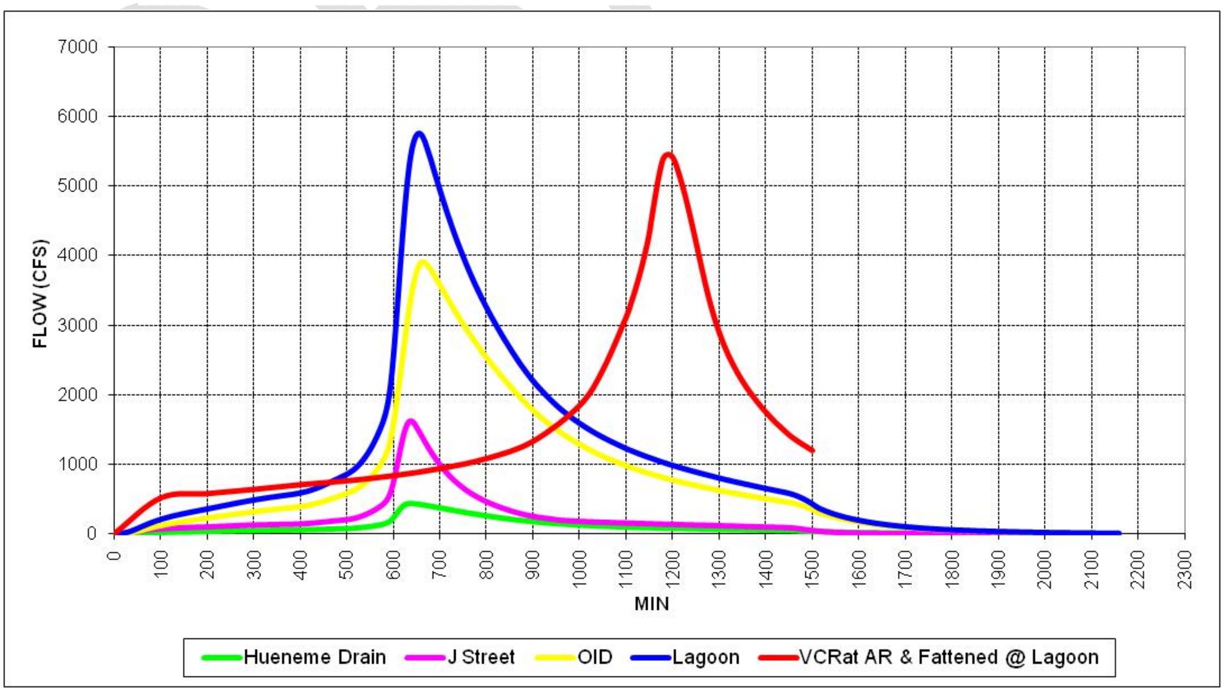


Figure 2: Hydrograph for the January 2010 100-year event

Bed Friction

The values used for the resistance, or bed frictions (Manning's n-values) are: 0.03 - 0.04 for open areas and 0.0125 - 0.025 for hardscaped areas.

Initial Surface Elevation

The model was calibrated to an elevation of 8.5 feet on Perkins Road, as was measured when the January 17-18, 2010 event occurred. The initial surface elevation was adjusted until the desired elevation was reached on Perkins Road.

Analysis of the January 2010 event yielded results that described the flooding pattern that occurred due to this storm event and the berm not breaching. The calibrated initial surface elevation from this event was used to run the 100-year event, and determine the groomed lagoon elevation that will be required in order to minimize impacts to the area.

RESULTS

Based on the input parameters discussed above, the following information describes and graphically presents the resulting data of the MIKE 21 model. Figure 3 represents the

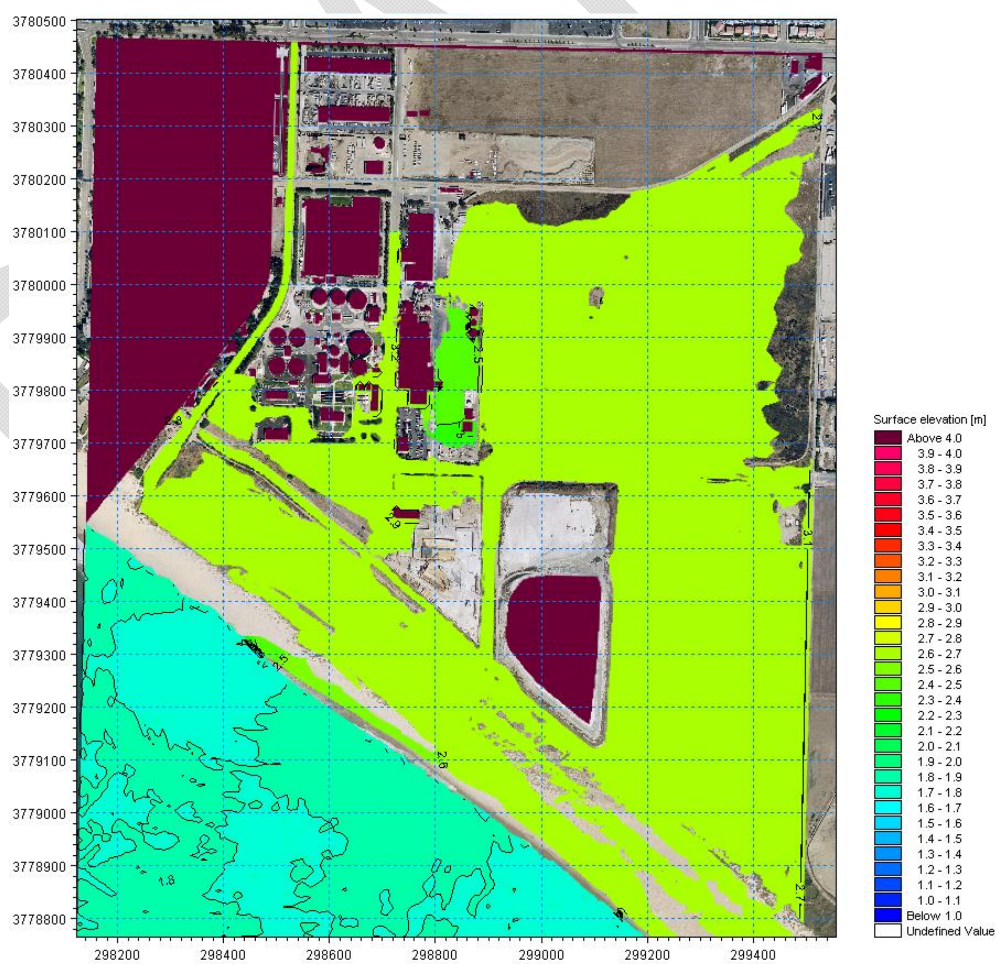


Figure 3: Peak flow during the January 17-18, 2010, with berm closed

results of the model run with conditions as experienced during peak flooding on January 18, 2010. The depth and extent of flooding is comparable to flooding conditions observed in the area on January 18, 2010. As evident from Figure 3 above, the inland flooding around the wastewater treatment plant and the paper plant, as well as on Perkins Road was very similar in pattern to what was actually observed during that storm event.

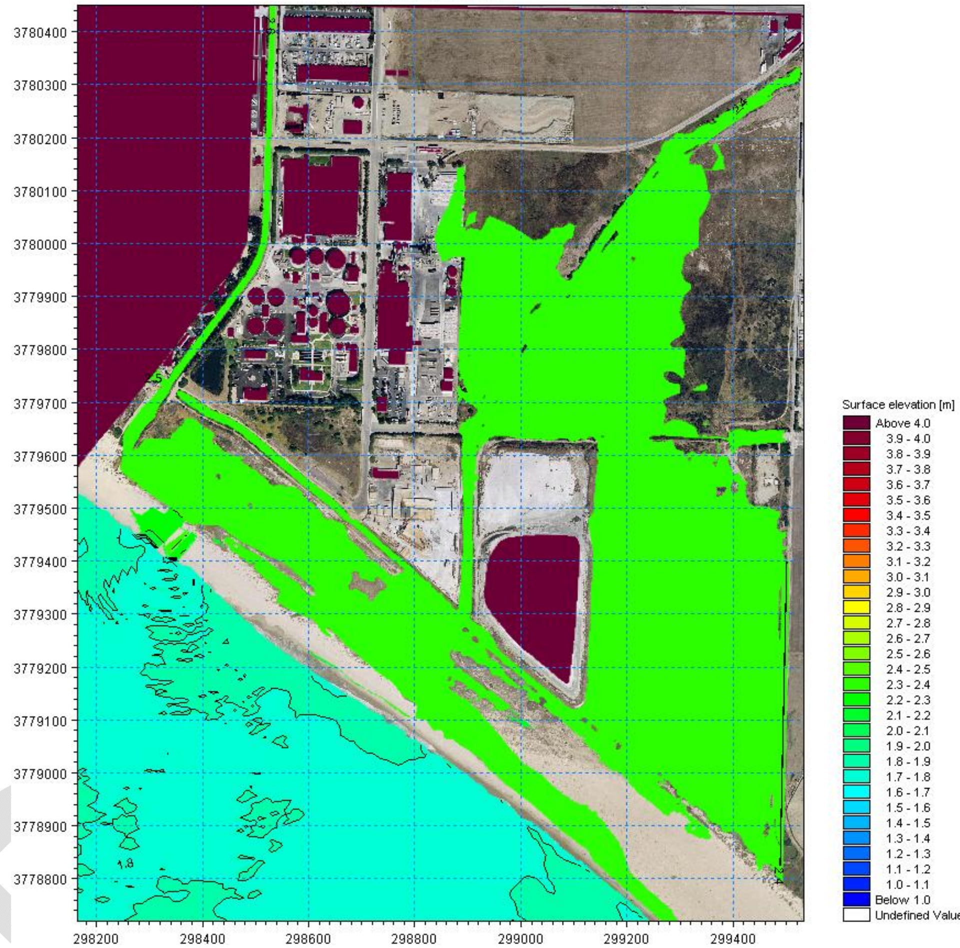


Figure 4: Peak flow during the January 17-18, 2010 storm, with berm groomed to elevation 6.5'

Figure 4 shows the reduced flooding that would have occurred if the berm were groomed to elevation 6.5 feet NGVD at the peak flow (approximately 20 hours into the storm event) without full breaching of the berm. Upon inspection of the two results (Figures 3 and 4), the inland flooding around the wastewater treatment plant and the paper plant, as well as surrounding areas was significantly minimized when the berm was groomed to elevation 6.5 feet (1.98 meters) for the January 17, 2010 storm event. In addition, Perkins Road appears to be dry as shown in Figure 4, when the berm is groomed.

In order to minimize the impacts of a 100-year flood storm event, the berm elevation is recommended to be groomed at elevation 6.5 feet NGVD, based on the analysis of the results.

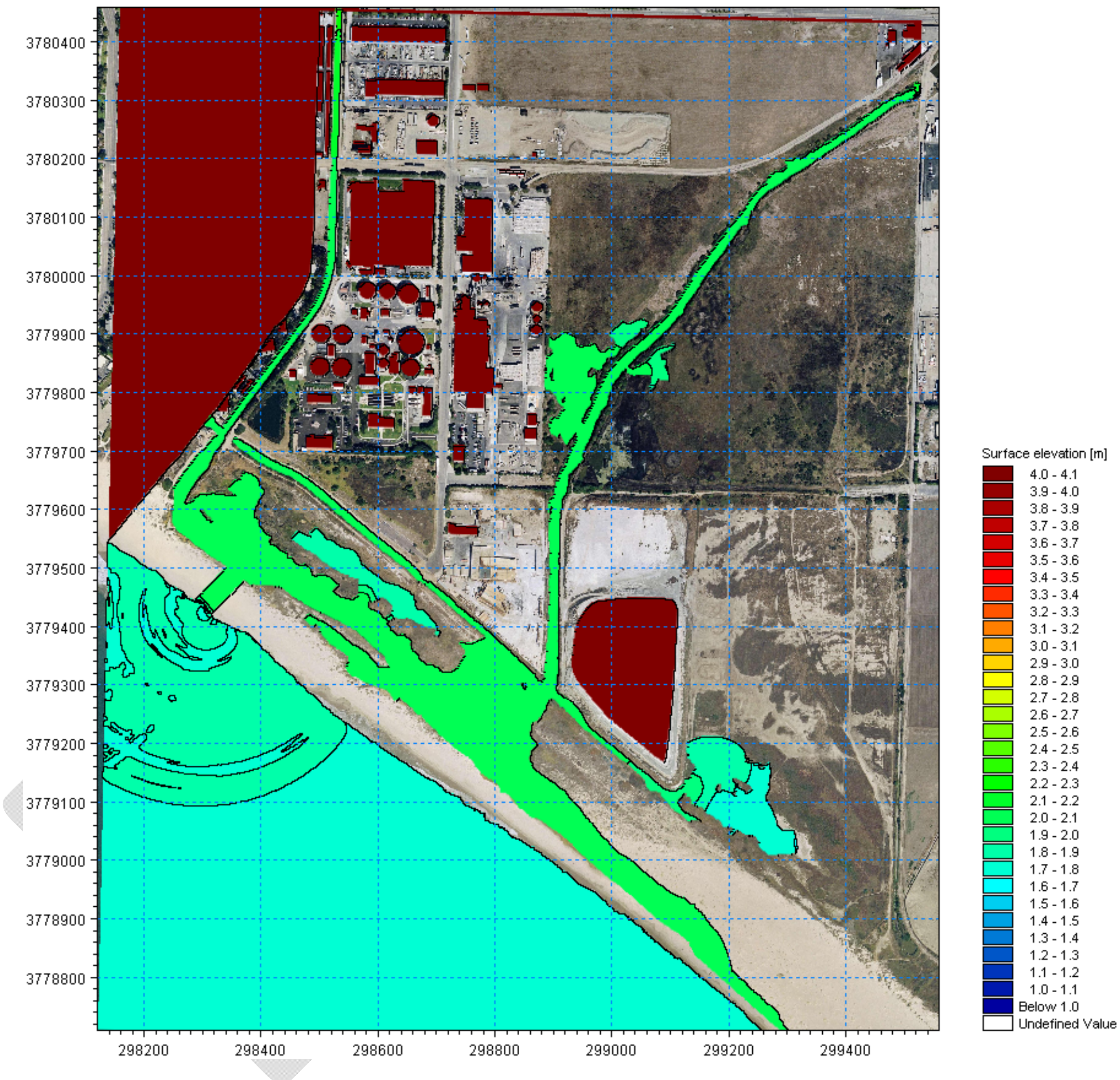


Figure 5: 100-Year Storm event with berm groomed to elevation 6.5’

Figure 5 presents the results of the Mike 21 model analysis for a 100-year storm with the berm groomed at elevation 6.5 feet NGVD. Figure 5 is a screen capture of the model flooding approximately 3 hours into the storm event when the berm first breaches naturally. The subsequent results of this breach will erode the sand berm in this area allowing the lagoon to become tidal. Under tidal conditions the lagoon water surface can quickly rise and fall with the ocean water surface.