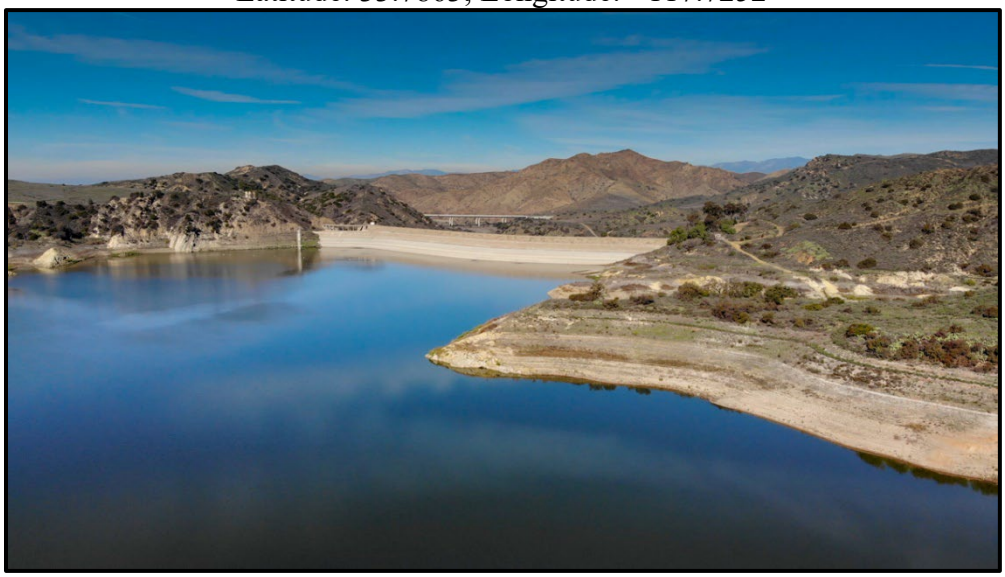
Emergency Action Plan (EAP)

For

Santiago Creek Dam
Orange County, California

5305 E Santiago Canyon Road
Orange, CA 92869
Latitude: 33.7863; Longitude: -117.7252



Dam Owners:

Irvine Ranch Water District

DSOD South Region

DSOD Dam No. 75.000

National Inventory of Dams (NID) No. CA00298

Federal Energy Regulatory Commission (FERC) No. N/A

Public Copy

HAZARD
EH
CLASSIFICATION

Date Prepared: October 24, 2025
Prepared By: Stetson Engineers Inc. (760) 730-0701

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

Dam Contact Information

Santiago Creek Dam
5305 E Santiago Canyon Road
Orange, CA 92869
(33.7863, -117.7252)

24-Hour Emergency Contact:
Jose Zepeda, IRWD Director of Water and Recycling Operations

Dam Owner:
Irvine Ranch Water District
Contact: Paul Cook, P.E., General Manager

Dam Operator:
Bryan Clinton, IRWD Operations Manager

Dam Safety Engineer:
Jacob Moeder, IRWD Engineering Manager

EAP Coordinator:
Steve Choi, IRWD Director of Safety and Security

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Key Dam Information

Dam Description

Height:	136 feet	DSOD #:	75.000
Year Built:	1933	NID #:	CA00298
Dam Operator:	IRWD	Hazard Classification:	Extremely High
Dam Owner:	IRWD	Property Owner:	County of Orange and IRWD

Potential Impacted Area

The Santiago Creek Dam is located at the northwest end of Irvine Lake on unincorporated land in Orange County, CA. The terrain downstream of the dam is hilly and steep, with elevations ranging from 780 feet at the reservoir to sea level. The potential inundation area extends down to sea level at the Pacific Ocean. If the Santiago Creek Dam were to fail, the following jurisdictions could be affected:

County of Orange (unincorporated areas)*	City of Tustin	City of Irvine
City of Orange	City of Westminster	City of Newport Beach
City of Villa Park	City of Fountain Valley	City of Seal Beach
City of Garden Grove	City of Costa Mesa	
City of Santa Ana	City of Huntington Beach	

*including Community of North Tustin

Directions to Santiago Creek Dam

In order to access the Santiago Creek Dam from the south, take CA-261 N to E Santiago Canyon Road, turn northwest onto E Santiago Canyon Road, and follow it for approximately one mile until Jamboree Road. Head north on Jamboree Road and turn right on Irvine Park Lane. Continue east on Irvine Park Lane as it turns into Peters Canyon Road and continue east on Peters Canyon Road until it reaches Santiago Creek Dam (see EAP Section 7 for alternate access route information).

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PART I: EAP INFORMATION

Section 1: Introduction

1.1 Background

Irvine Ranch Water District (IRWD) is an independent special district that serves 447,000 residential customers in central Orange County, CA. IRWD owns and operates five jurisdictional dams, one of which is the Santiago Creek Dam at Irvine Lake. Santiago Creek Dam is owned by IRWD. The dam is located in an unincorporated area of Orange County, California. The spillway is not considered a critical appurtenant structure (CAS) by California's Division of Safety of Dams (DSOD) but was included in DSOD's 2017 list of spillways for re-evaluation. The drainage area upstream of the dam is 63.2 square miles. Irvine Lake is filled by natural runoff during the rainy season.

Villa Park Dam, a jurisdictional dam owned by Orange County Public Works (OCPW), is located downstream of Santiago Creek Dam. A sudden and total failure of the Santiago Creek Dam may lead to a sequential failure at Villa Park Dam downstream. The inundation maps prepared in Part II of this Emergency Action Plan (EAP) are based on a sequential failure analysis for both dams.

The Santiago Creek Dam is an earthen dam originally constructed in 1933. The California State Dam Number is 75.000 and the National Dam Number is CA00298. The dam has a curved spillway crest which empties into a concrete-lined chute. The chute connects to an energy dissipater which then empties into a concrete channel. In addition to the spillway, Santiago Creek Dam has an outlet tower that discharges into a 60-inch diameter welded steel pipe which splits into two pipes at the downstream toe of the dam. The two pipes are 36-inch for regular conveyance and 30-inch for emergency releases.

The dam is located in the Santa Ana River watershed in hills about 15 miles inland from the Pacific Ocean. Topography below the dam is hilly, with elevations ranging from about 780 feet at the dam to sea level. Flooding from a failure at Santiago Creek Dam has the potential to inundate portions of the following communities:

- County of Orange[1]
- City of Orange
- City of Villa Park
- City of Garden Grove
- City of Santa Ana
- City of Tustin
- City of Westminster
- City of Fountain Valley
- City of Costa Mesa
- City of Huntington Beach
- City of Irvine
- City of Newport Beach
- City of Seal Beach

In total, thirteen jurisdictions could be affected, including one county and twelve cities. Within those jurisdictions, the following emergency response agency buildings may be inundated (maps

[1] Including North Tustin, a census-designated place that is part of unincorporated County of Orange.

of the full inundation extents showing flood arrival times and labeled critical infrastructure are included in Part II of this EAP):

- Orange County Fire Authority (OCFA) Station 23
- OCFA Station 37
- OCFA Station 70
- OCFA Station 71
- OCFA Station 73
- OCFA Station 77
- OCFA Station 79
- Orange Fire Department Station 1
- Orange Fire Department Station 2
- Orange Fire Department Station 5
- Orange Fire Department Station 6
- Santa Ana Police Department
- Tustin Police Department

Figure 1-1 Santiago Creek Dam Reservoir Area Overview shows the location of Irvine Lake, Santiago Creek Dam, Villa Park Dam, and the above-listed communities. *Figure 1-2 Vicinity Map* shows the vicinity downstream of the dam. Santiago Creek Dam impounds Irvine Lake along Santiago Creek, which is tributary to the Santa Ana River. The drainage area upstream of the Santiago Creek Dam is 63.2 square miles. Downstream of Santiago Creek Dam, Santiago Creek flows northwest for roughly 3.5 river miles, where it is impounded by Villa Park Dam. The drainage area between Santiago Creek Dam and Villa Park Dam is approximately 20.2 square miles. Downstream of Villa Park Dam, Santiago Creek flows through the Santiago Creek Recharge Basins and then continues for another 5.5 river miles before joining the Santa Ana River. At its point of discharge into the Santa Ana River, Santiago Creek drains a total area of 99 square miles. The Santa Ana River drains a total of 2,650 square miles and flows into the Pacific Ocean at Huntington Beach.

Adjacent to the Santa Ana River watershed to the south is the San Diego Creek watershed. San Diego Creek is highly channelized and flows into Upper Newport Bay, draining roughly 120 square miles. Newport Bay is a large estuary and harbor which is influenced by ocean tides. The total drainage area of Newport Bay is about 150 square miles.

Flooding from a failure at Santiago Creek Dam has the potential to affect communities in both the Santa Ana River and San Diego Creek watersheds, as shown in *Figure 1-3 Inundation Area Overview*.

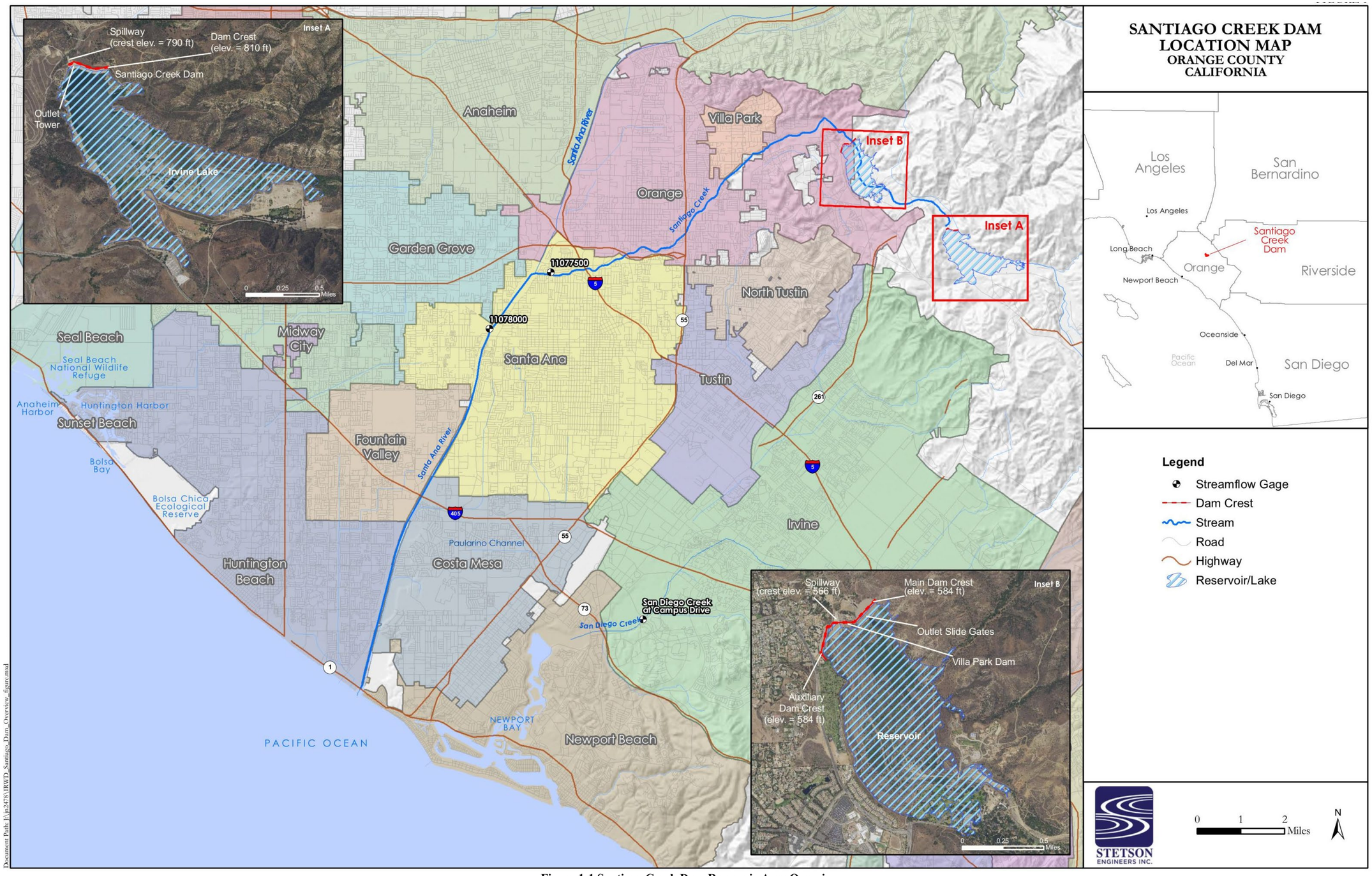


Figure 1-1 Santiago Creek Dam Reservoir Area Overview

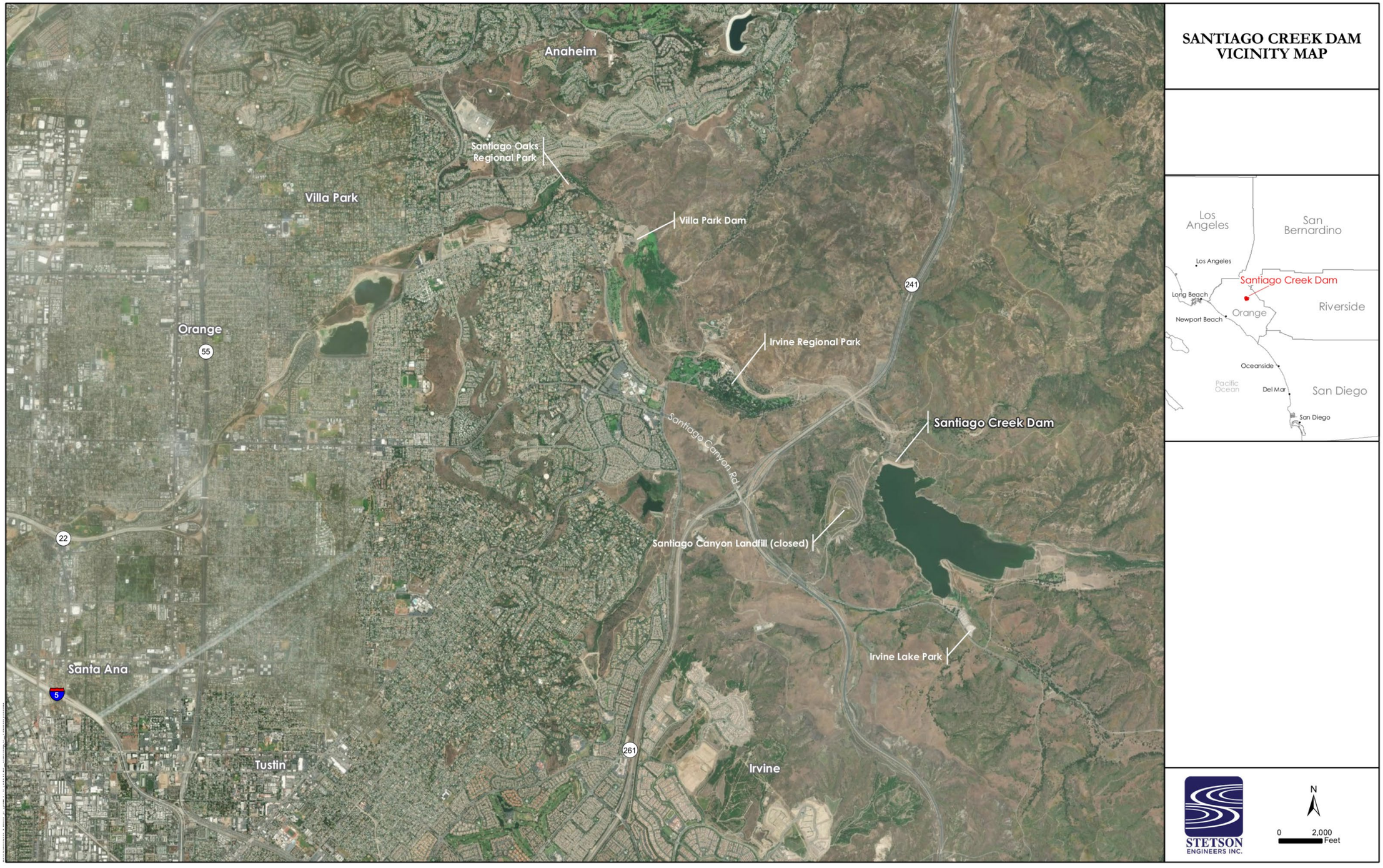


Figure 1-2 Vicinity Map

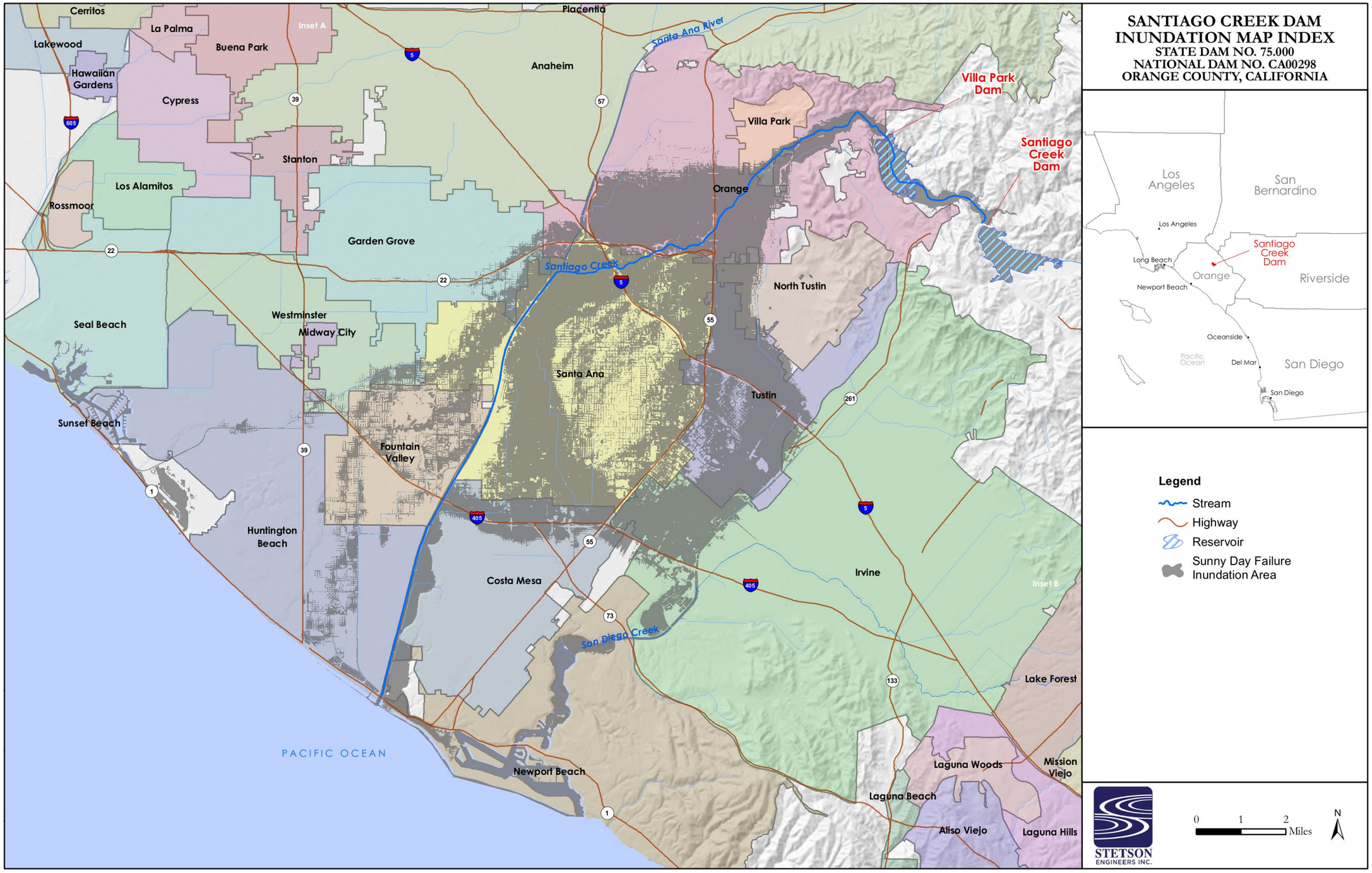


Figure 1-3 Inundation Area Overview

1.2 Purpose

A dam safety incident is an impending or actual sudden uncontrolled release or excessive controlled release of water from an impounding structure. The release may be caused by damage to or failure of the structure, flood conditions unrelated to failure, or any condition that may affect the safe operation of the dam. The release of water may or may not endanger human life, downstream property, or the operation of the structure. When people live in an area that could be affected by the operation or failure of a dam, there is the potential for an emergency related to a dam safety incident. The National Incident Management System (NIMS) defines an emergency as "any incident, whether natural or manmade, that requires responsive action to protect life or property."

The purpose of this EAP is to identify potential emergency conditions at Santiago Creek Dam, facilitate notification of affected parties, assign roles and responsibilities to involved agencies, and take mitigating actions in time to minimize loss of human life or injury and property damage. These situations include, but are not limited to dam instability, sizable earthquakes, extreme storm events, major spillway releases, overtopping of the dam, outlet system failure, abnormal instrument readings, vandalism or sabotage, spillway or gate failures, and failure of the dam.

Emergency management authorities will use the information in this EAP to facilitate the implementation of their responsibilities. Local, county, and state authorities have coordinating plans in place to address local emergency operations and/or warnings and evacuations. Those plans are not reprinted in the EAP but are maintained by the responsible agencies.

DSOD has rated the Santiago Creek Dam as "Extremely High" based on the downstream hazard classification. Because of its hazard classification, IRWD developed this EAP in accordance with the requirements listed in California Water Code Sections 6160 and 6161 and Government Code Section 8589.5, following the Federal Emergency Management Agency (FEMA) Federal Guidelines for Dam Safety: Emergency Action Planning for Dams (FEMA-64/July 2013).

1.3 Planning and Outreach to Affected Jurisdictions

As discussed in Section 1.1, there are thirteen jurisdictions potentially affected by a failure at Santiago Creek Dam. The jurisdictions and their emergency planning, law, and fire public safety agencies are listed in Table 1-1.

Due to the large inundation area of a failure at Santiago Creek Dam, and its location on unincorporated Orange County land, Orange County Sheriff's Department (OCSD) is the primary Public Safety Answering Point (PSAP) for this EAP. OCSD provides law enforcement to unincorporated areas of the inundation area. Orange County Fire Authority (OCFA)[2] provides fire service to unincorporated areas of Orange County, as well as several incorporated cities.

[2] OCFA provides fire protection services to the following communities potentially affected in this EAP: unincorporated areas of Orange County, City of Garden Grove, City of Santa Ana, Community of North Tustin, City of Tustin, City of Westminster, City of Irvine, and City of Seal Beach.

Table 1-1- Impacted Jurisdictions and Public Safety Agencies

Jurisdiction	Office of Emergency Services	Police Response	Fire Response
County of Orange (unincorporated areas) [a]	OCSD EMD	OCSD	OCFA
City of Orange	None [b]	City of Orange Police Department	City of Orange Fire Department
City of Villa Park	None [c]	OCSD	OCFA
City of Garden Grove	None [b]	Garden Grove Police Department	OCFA
City of Santa Ana	None [b]	Santa Ana Police Department	OCFA
City of Tustin	None [b]	Tustin Police Department	OCFA
City of Westminster	None [b]	Westminster Police Department	OCFA
City of Fountain Valley	None [b]	Fountain Valley Police Department	Fountain Valley Fire Department
City of Costa Mesa	None [b]	Costa Mesa Police Department	Costa Mesa Fire & Rescue
City of Huntington Beach	None [b]	Huntington Beach Police Department	Huntington Beach Fire Department [d]
City of Irvine	None [b]	Irvine Police Department	OCFA
City of Newport Beach	None [b]	Newport Beach Police Department	Newport Beach Fire Department
City of Seal Beach	None [b]	Seal Beach Police Department	OCFA

a. Includes the census-designated community of North Tustin
b. Emergency planning is coordinated through Police or Fire Department
c. City of Villa Park does not have an office of emergency services, but the City Manager requested to be included as a Plan Holder.
d. OCFA provides fire service to the Bolsa Chica area within Huntington Beach.

The EAP was sent to the following affected parties and all emergency planning, law, and fire public safety agencies for all affected jurisdictions:

- IRWD (dam owner)
- OCSD
- OCFA
- City of Orange Police Department
- City of Orange Fire Department

- City of Villa Park[3]
- Garden Grove Police Department
- Santa Ana Police Department
- Tustin Police Department
- Westminster Police Department
- Fountain Valley Police Department
- Fountain Valley Fire Department
- Costa Mesa Police Department
- Costa Mesa Fire and Rescue
- Huntington Beach Police Department
- Huntington Beach Fire Department
- Irvine Police Department
- Newport Beach Police Department
- Newport Beach Fire Department
- Seal Beach Police Department
- California Highway Patrol (CHP)
- CalTrans
- Transportation Corridor Agencies (Toll Roads)
- Orange County Parks
- Orange County Public Works

In May 2020, a preliminary version of the EAP was sent to all of the above parties for review. Initial comments were received from some parties, and the EAP was updated accordingly. A revised draft was circulated for a second time in October 2020. Any party that did not participate in the May 2020 review was contacted again in October 2020 and asked to review the EAP. At the end of the second review period, all jurisdictions either reviewed the EAP, or indicated that they had no comments. The feedback received from each party is summarized below:

- IRWD (dam owner) – Multiple staff provided information on staff responsibilities, dam operations, dam facilities, emergency planning, operational procedures, materials, equipment, and facilities for Santiago Creek Dam.
- OCSD – The Senior Emergency Management Program Coordinator from OCSD EMD reviewed the EAP and provided comments on plan content, phone numbers, points of contact, and notification procedures. Command Staff at OCSD North Operations reviewed the plan's contact information and content related to field operations.
- OCFA – The Division Chief for the Emergency Command Center/ Emergency Planning reviewed the plan and had no revisions. Updated contact information was provided. The Division 2, 4 and 6 Chiefs also reviewed the EAP and had no comments.
- City of Orange Police Department – Staff from the police department reviewed the plan and provided updated contact information for inclusion in the EAP.
- City of Orange Fire Department – Staff from the fire department reviewed the plan and provided updated contact information for inclusion in the EAP.

[3] City of Villa Park law and fire emergency response is provided by OCSD and OCFA, respectively. Staff from the City Manager's office opted to review the EAP in addition to OCSD and OCFA staff.

- City of Villa Park – Staff from the city reviewed the plan on behalf of the City Manager's office. City of Villa Park reviewed the document, provided comments, and provided contact information for inclusion in the EAP. IRWD responded to these comments and made adjustments to the EAP.
- Garden Grove Police Department – The Emergency Operations Center (EOC) Operation Coordinator for the Garden Grove Police Department reviewed the plan, confirmed information about planning at the city, and provided updated contact information.
- Santa Ana Police Department – The Emergency Operations Coordinator for the City of Santa Ana Police Department reviewed the plan and provided comments. IRWD responded to these comments and made adjustments to the EAP. Updated contact information was provided for inclusion in the EAP.
- Tustin Police Department – A sergeant with the police department reviewed the EAP and clarified how emergency planning is conducted at the City of Tustin. Updated contact information was provided for inclusion in the EAP.
- Westminster Police Department – A staff member from Emergency Services at the police department reviewed the EAP, confirmed information about emergency planning, and did not have comments.
- Fountain Valley Police Department – Staff from the police department reviewed the plan and provided updated contact information for inclusion in the EAP.
- Fountain Valley Fire Department – Staff from the fire department reviewed the plan and provided updated contact information for inclusion in the EAP.
- Costa Mesa Police Department – The Emergency Services Administrator at the police department reviewed the EAP and clarified how emergency planning is conducted at the city. Updated contact information was provided for inclusion in the EAP.
- Costa Mesa Fire and Rescue – The Fire Protection Specialist/Community Education staff member reviewed the EAP and provided comments. IRWD responded to these comments and made adjustments to the EAP. Updated contact information was provided for inclusion in the EAP.
- Huntington Beach Police Department – A lieutenant from the police department reviewed the plan and provided updated contact information for inclusion in the EAP.
- Huntington Beach Fire Department – The Emergency Services Coordinator at the fire department reviewed the plan and provided updated contact information for inclusion in the EAP.
- Irvine Police Department – The Emergency Management Administrator from the police department reviewed the EAP and clarified how emergency planning is conducted at the city.
- Newport Beach Police Department – The Emergency Services Coordinator at the police department reviewed the plan and provided updated contact information for inclusion in the EAP.
- Newport Beach Fire Department – The Assistant Chief of Operations reviewed the EAP but did not have comments.
- Seal Beach Police Department – The Emergency Services Coordinator reviewed the EAP and clarified how emergency planning is conducted at the city.
- California Highway Patrol (CHP) – Staff provided updated contacts to be listed in the EAP.

- CalTrans – EAP was sent to CalTrans for review; staff provided contacts to be listed in the EAP.
- Transportation Corridor Agencies (Toll Roads) – Staff reviewed the EAP and provided contact information and notification phone numbers.
- Orange County Parks – The Operations Support Manager reviewed the EAP and confirmed the notification procedures for the parks department.
- Orange County Public Works (OCPW) – Staff reviewed the EAP and provided contact information and notification phone numbers for staff associated with Villa Park Dam.

The same agencies were contacted during the annual EAP update process to verify and update their respective information, most recently in September and October 2025.

Outreach was completed to DSOD to clarify responsibilities listed in this EAP. Additional coordination was conducted with the National Weather Service (NWS), and the Department of Water Resources (DWR) Flood Operations Center. The school districts potentially affected by an incident at Santiago Creek Dam were provided with a copy of the EAP for informational purposes.

For more information, please contact the EAP Coordinator:

Steve Choi, Director of Safety and Security

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

Section 2: Summary of EAP Responsibilities

2.1 Irvine Ranch Water District Responsibilities (Dam Owner)

IRWD, as the dam owner, is responsible for detecting and evaluating dam safety incidents, classifying the incident, notifying emergency management authorities, taking appropriate response actions, terminating the EAP, and follow-up tasks related to the dam incident.

General EAP responsibilities for IRWD are to:

- Detect, verify and assess emergency conditions
- Respond to emergencies at the dam site
- Activate and implement the Santiago Creek Dam EAP, including determining the appropriate emergency level.
- Notify other participating emergency management agencies of emergency conditions, emergency level, EAP activation, and other critical information
- Utilize IRWD Emergency Operations Plan (EOP) for internal emergency response coordination
- Take corrective action at the dam/reservoir
- Terminate the EAP
- Facilitate an after-action evaluation and report
- Update EAP on at least an annual basis
- Communicate with the public and the media

More detailed responsibilities, including duties by staff member, are given in Section 6.1 and *Table 6-1 Dam Owner Responsibilities by Role.*

2.2 Impacted Jurisdictions'/Public Safety Agencies' Responsibilities

A safety incident at Santiago Creek Dam has the potential to impact 13 jurisdictions, which are served by 18 public safety agencies, listed above in *Table 1-1- Impacted Jurisdictions and Public Safety Agencies*. The involvement of potential impacted jurisdictions is crucial to the successful implementation of the EAP. Copies of the EAP were sent to impacted jurisdictions and public safety agencies as part of a local agency coordination effort to gather feedback and input to the emergency response process laid out in this EAP (see discussion in Section 1.3). Where applicable, comments from these agencies informed the responsibilities detailed below.

2.2.1 Field Level Incident Management

A dam safety incident is reported through 911 or a direct phone call to OCSD (see Section 3). The emergency response through the public safety agencies will be coordinated by OCSD "Control One," which is the central point of contact for interoperable communications between all law enforcement, fire, and public works agencies responding to a dam safety emergency at

the Santiago Creek Dam. Upon notification of an incident, Control One would broadcast an emergency message to all dispatcher centers at once via radio and would send messages via teletype over communications terminals.

Once the incident is reported, a Unified Command is expected to be established. The Unified Command would include OCSD, OCFA, representatives from IRWD (dam owner), plus representatives from all agencies of downstream jurisdictions (see Table 2-1), as necessary. The Unified Command will facilitate coordination among agencies and disciplines.

An Incident Command Post (ICP) would be established in an area near the dam, outside of the inundation zone. Possible ICP location for Santiago Creek Dam is at the parking lot for the Irvine Lake recreation area, located at 4621 E. Santiago Canyon Road, Silverado, CA 92676.

The County and Operational Area (OA) EOC is expected to be activated during emergencies at Santiago Creek Dam. The EOC would be established at the County Emergency Management office at 2644 E Santiago Canyon Rd, Silverado, California.

The Unified Command will facilitate coordination among agencies and disciplines. Responsibilities consist of establishing the ICP, protecting life and property, controlling personnel and equipment resources, maintaining accountability for responder and public safety, and establishing and maintaining an effective liaison with outside agencies and organizations. The Unified Command is responsible for all incident activities, including the development of strategies and tactics and the ordering and the release of resources.

The Unified Command has overall authority and responsibility for conducting incident operations, while IRWD is responsible for monitoring and remedial actions at the dam site (see Section 5). IRWD remedial actions will be controlled at the IRWD operations center. IRWD actions will be coordinated with external emergency response agencies through the ICP and the County and OA EOC.

Unified Command duties may include the following:

- Establishing command.
- Ensuring responder safety.
- Assessing incident priorities.
- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Proclamation of a Local Emergency by local authorities.
- Determining operational objectives.
- Developing an appropriate organizational structure.
- Maintaining a manageable span of control.
- Coordinating overall emergency activities.
- Establish evacuation routes and road closures
- Care and shelter operations, including establishing shelters.
- Facilitating return of evacuated individuals.
- Access and perimeter control.

- Public health operations.
- Restoration of vital services and utilities.
- Coordinating the activities of outside agencies.
- Authorizing the release of information to the media.
- Terminating the emergency response.[4]
- Coroner operations.
- Participating in an annual review and update of the EAP.
- Participating in an after-action evaluation.

2.2.2 Orange County Sheriff's Department, Emergency Management Division

Thirty-four incorporated cities in the county are responsible for emergency planning within their jurisdictions. The County is responsible for the emergency planning of 205 square miles of unincorporated area and all county-owned facilities and properties. The County's OA Alert and Warning Plan establishes guidelines for the use of the County and OA's alert and warning program in partnership with the cities and water districts within Orange County. The alert and warning program provides public notification of protective actions to take before, during, and after threats or emergencies and to disseminate other kinds of messages to community member opt-ins. The plan may be used during an activation of this EAP to notify the public of developments. All County departments are in agreement with the warning plan and will execute the responsibilities included therein.

Based on the inundation mapping conducted in support of this EAP, activation of the County and OA EOC is anticipated for any failure scenario at Santiago Creek Dam. The dam is located on unincorporated County land, which is under the jurisdiction of OCSD. Moreover, an emergency at the Santiago Creek Dam would most likely impact multiple cities and communities, so it is necessary to have a response coordinated at the County level.

OCSD would be responsible for coordinating evacuations in unincorporated areas of the inundation area, including unincorporated county land near the Santiago Creek Dam including Irvine Regional Park, the community of North Tustin, Bolsa Chica State Beach, and some unincorporated areas between Costa Mesa and Newport Beach.

The County and OA EOP provides guidance and procedures for the County to prepare for and respond to significant or catastrophic natural, technological or conflict-related incidents that produce situations requiring a coordinated response. The OCSD EMD is responsible for developing, maintaining and distributing the County and OA EOP.

There are two roles within the OA discussed in this EAP: County and OA EOC Manager and the Operational Area Coordinator (OAC).

County and OA EOC Manager. The OCSD EMD Director serves as the County and OA EOC Manager. The County and OA EOC Manager is the 24-hour point of contact for the County, OA, State, Federal entities and agencies, and Mutual Aid Coordinators.

[4] The Unified Command has the authority to terminate the emergency response. IRWD, as the dam owner, will terminate the EAP.

Responsibilities of the County and OA EOC Manager may include:

- Establish and maintain contact with the affected dam and reservoir owner or operators.
- Request current situational status of the affected dam and reservoir.
- Ensure the OAC, Board of Supervisors and Policy Group are notified and kept apprised of emergency conditions occurring due to a dam and reservoir failure event.
- Coordinate with the OAC to establish activation level of the County and OA EOC.
- Direct EMD staff to notify appropriate key personnel to report to the County and OA EOC, based on the activation level established.
- Establish and maintain communication with all impacted jurisdictions to ensure coordination of response activities and situational information.
- Ensure situational information is provided to OA jurisdictions, County departments and Cal OES, and updated on a regular basis.
- Activate the County and OA's alert and warning program to provide public notification of protective actions to take before, during, and after threats or emergencies and to disseminate other kinds of messages to community member opt-ins.
- Assist with the coordination of the County's reentry and recovery efforts.

Operational Area Coordinator. When an emergency impacts an OA jurisdiction, the Orange County Operational Area Agreement designates the OAC as being responsible for direction, coordination and communication of policy decisions, and coordinating resource needs and priorities between OA jurisdictions and the State throughout the emergency. In cases of dam and reservoir failure, the County and OA Emergency Operational Plan, Dam and Reservoir Failure Annex designates OCPW as the OAC.

Responsibilities of the OAC may include:

- Serve as a key decision maker in the County and OA EOC, providing direction and coordination necessary to accomplish the purposes of the Operational Area Agreement and responsibilities of the Operational Area Lead as specified in Title 19 California Code of Regulations Section 2409 (e).
- Coordinate with OA jurisdictions during emergency response.
- Maintain contact with the dam and reservoir owner/operator to receive regular updates on water releases and situation status.
- Represent the OA in all dealings with the public or private agencies on matters pertaining to emergencies.
- Appoint a Public Information Manager (PIM) to coordinate dissemination of all emergency information.
- In coordination with the PIM, prepare and approve dam and reservoir failure information statement and instructions for the public to be released via: media, Emergency Alert Systems, NWS, and AlertOC.
- Activate the County and OA EOC to the appropriate level of organization and staffing to support operations.
- Participate in conference calls.

- Initiate discussion with the Policy Group on the necessity to proclaim a Local Emergency and/or Operational Area Proclamation of Emergency.

A dam and reservoir failure may require multi-jurisdiction, multi-agency and multi-discipline coordination at all levels, including first responders. The appropriate Standardized Emergency Management System (SEMS) and NIMS functions will be activated, based on the failure threat or situation. Activation of the County and OA EOC is required by SEMS, Title 19 California Code of Regulations Section 2409 (f), under the following conditions:

- On Request - A local government within the OA has activated its EOC and requested activation of the County and OA EOC to support its emergency operations. Jurisdiction(s) determine that additional response resources beyond that which would normally be covered by mutual aid are required and assistance from the OA may be necessary.
- Two City Local Emergency - Two or more cities within the OA have proclaimed a Local Emergency.
- County and City Local Emergency - The County and one or more cities have proclaimed a Local Emergency.
- Request for Governor's Proclamation - A city, city and County, or County has requested a Governor's proclamation of a State of Emergency, as defined in Government Code 8558(b).
- State of Emergency - A State of Emergency is proclaimed by the Governor of the State for the County or two or more cities within the OA.
- Request for Outside Resources - The OA is requesting resources from outside its boundaries, except those resources used in normal day-to-day operations which are obtained through existing agreements providing for the exchange or furnishing of certain types of facilities and services on a reimbursable, exchange, or other basis as provided for under the Master Mutual Aid Agreement.

2.2.3 City of Orange (Orange Police Department and Orange Fire Department)

A sudden and total failure of Santiago Creek Dam has the potential to inundate a large area of the City of Orange at a depth of greater than one foot, meaning that evacuation of many residents may be necessary. Emergency planning for the City of Orange is coordinated through the Orange Fire Department. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuation in the City of Orange would be carried out by the City of Orange Police Department and City of Orange Fire Department. Actions taken by the Orange Police and Fire Departments in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.

- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.4 City of Villa Park (OCSD and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Villa Park at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. Emergency planning for the City of Villa Park is coordinated through OCSD, which provides police services to City of Villa Park. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Villa Park would be carried out by OCSD and OCFA, which provides fire response for the City of Villa Park. Actions taken by the City of Villa Park in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.5 City of Garden Grove (Garden Grove Police Department and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Garden Grove at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. Emergency planning for the City of Garden Grove is coordinated through the Garden Grove Police Department. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Garden Grove would be carried out by the Garden Grove Police Department and OCFA. City of Garden Grove responsibilities include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.6 City of Santa Ana (Santa Ana Police Department and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate a large area within the City of Santa Ana at a depth of greater than one foot, meaning that evacuation of many residents may be necessary. Emergency planning for the City of Santa Ana is coordinated through the Emergency Management department of the Santa Ana Police Department. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Santa Ana would be carried out by the Santa Ana Police Department and OCFA. Santa Ana Police Department and OCFA responsibilities include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.7 City of Tustin (Tustin Police Department and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate a large area of the City of Tustin at a depth of greater than one foot, meaning that evacuation of many residents may

be necessary. Emergency planning for the City of Tustin is coordinated through the Tustin Police Department. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Tustin would be carried out by the Tustin Police Department and OCFA. Tustin Police Department and OCFA responsibilities include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.8 City of Westminster (Westminster Police Department and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Westminster at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Westminster would be carried out by the Westminster Police Department and OCFA. Actions taken by the City of Westminster in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.9 City of Fountain Valley (Fountain Valley Police Department and Fountain Valley Fire Department)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Fountain Valley at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Fountain Valley would be carried out by the Fountain Valley Police and Fire Departments. Actions taken by the City of Fountain Valley in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Establish evacuation routes and road closures.
- Evacuation and rescue operations.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.10 City of Costa Mesa (Costa Mesa Police Department and Costa Mesa Fire and Rescue)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Costa Mesa at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Costa Mesa would be carried out by the Costa Mesa Police Department and Costa Mesa Fire and Rescue. Actions taken by the City of Costa Mesa in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.

- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

In the event of a failure at Santiago Creek Dam, inundation in the City of Costa Mesa would occur in the western and northern areas of the city. Areas potentially inundated include: lands adjacent to the Santa Ana River, including Mesa Verde Country Club, Fairview Park and Talbert Regional Park; and residential and commercial areas near Interstate 405 at and near the intersections of Harbor Blvd, Fairview Rd, State Route 73, and Bristol St. Detailed inundation areas for the City of Costa Mesa are shown in Part II on map panels K9 through K12, L8 through L12, M8, M9, N8, and O8.

2.2.11 City of Irvine (Irvine Police Department and OCFA)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Irvine at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Irvine would be carried out by the Irvine Police Department and OCFA. Actions taken by the City of Irvine in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.12 City of Newport Beach (Newport Beach Police Department and Newport Beach Fire Department)

In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Within City of Newport Beach limits, a sudden and total failure of Santiago Creek Dam would most likely be confined to Newport Bay within the San Diego Creek watershed. In those areas, evacuation of residents is not likely to be necessary. At the mouth of

the Santa Ana River near the West Newport neighborhood off of Highway 1, inundation at depth greater than one foot is possible and evacuations may be necessary there. Actions taken by the City of Newport Beach in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.13 City of Huntington Beach (Huntington Beach Police Department and Huntington Beach Fire Department)

A sudden and total failure of Santiago Creek Dam has the potential to inundate portions of the City of Huntington Beach at a depth of greater than one foot, meaning that evacuation of some residents may be necessary. In the event of an incident at Santiago Creek Dam, field level response will be coordinated with the Unified Command. Evacuations in the City of Huntington Beach would be carried out by the Huntington Beach Police and Fire Departments. Actions taken by the City of Huntington Beach in the event of a failure at Santiago Creek Dam may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Identifying the need for mutual aid and requesting such through the Orange County OA.
- Proclamation of a Local Emergency by local authorities.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Medical care operations.
- Care and shelter operations.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.14 City of Seal Beach (Seal Beach Police Department and OCFA)

Within City of Seal Beach limits, a sudden and total failure of Santiago Creek Dam would most likely be confined to existing waterways, meaning that evacuation of residents is not likely to be necessary. In the event of an incident at Santiago Creek Dam, any field level response will be coordinated with the Unified Command. Actions would be carried out by the Seal Beach Police Department and OCFA, which provides fire service to Seal Beach. Responsibilities may include:

- Advising threatened populations of the emergency and apprising them of safety measures to be implemented.
- Dissemination of accurate and timely emergency public information and warning to the public.
- Evacuation and rescue operations.
- Establish evacuation routes and road closures.
- Facilitate return of evacuated individuals.
- Access and perimeter control.
- Public health operations.
- Restoration of vital services and utilities.

2.2.15 California Governor's Office of Emergency Services and Cal OES Warning Center

Cal OES plays dual roles in managing an emergency; one at the regional level and the other at the state level. The regions include Inland Region, Coastal Region, and Southern Region, while the state level constitutes the executives and brokers resources between the regions. The state level also interfaces with the National Response Framework, and informs the governor, legislature, and state emergency management stakeholders. Cal OES also implements state-level media policy and provides the primary coordination with SEMS and NIMS at the federal level. Cal OES Southern Region will participate in the reviews of and updates to the EAP.

The Dam Safety Planning Division is responsible for reviewing and approving dam owners' EAP. This process includes division outreach and technical assistance to dam owners and local emergency management personnel. The Cal OES Dam Safety Planning Division may also provide guidance to local public safety agencies with regard to incorporating EAPs into their existing all-hazards key response and mitigation plans. The division will also participate in the annual review and update of the EAP.

The Cal OES Warning Center is the link for notifications between state and federal agencies for this EAP. The mission of the Cal OES Warning Center is to be a central intelligence hub for statewide emergency communications and notifications, serving as a highly reliable and accurate "onestop" resource for emergency management, law enforcement, fire, and key decision-making personnel throughout the state. The Cal OES Warning Center is staffed 24 hours a day, seven days a week watching over California to identify potential and emerging threats, provide alert notification to all levels of government as well as critical situational awareness during an emergency or disaster.

The Cal OES Warning Center has the responsibility to receive, coordinate, verify and disseminate information pertaining to events which occur within California or that could affect California. Information received by the Cal OES Warning Center is coordinated between Cal OES and other sources to ensure that the information which is disseminated is both timely and accurate.

2.2.16 California Department of Water Resources – Division of Safety of Dams

The mission of DSOD is to protect people against the loss of life and property due to dam failure. The California Water Code entrusts this regulatory power to DWR, which delegates the responsibility to DSOD. Section 6110 of the Water Code directs the Department to immediately employ any remedial means necessary to protect life and property if either: (a) the condition of the dam is so dangerous to the safety of life or property as to not permit time for the issuance and enforcement of an order relative to maintenance or operation, or (b) passing or imminent floods threaten the safety of any dam or reservoir. Section 6111 of the Water Code states that in applying the remedial means "the department may, in emergency, do any of the following: (a) lower the reservoir; (b) completely empty the reservoir; (c) take such other steps as may be essential to safeguard life and property." In the event of an emergency at the dam, DSOD actions could include, but are not limited to:

- Advising the dam owner's/operator's representative of remedial actions to take.
- Ordering the dam owner's/operator's representative of remedial actions to take.
- Assuming control of the dam if necessary to safeguard life and property.
- Advising the dam owner's/operator's representative of the emergency level determination.
- Inspecting the dam during and after the emergency.
- Design review and approval of emergency repairs.
- Acting as a dam technical specialist in the State Operations Center, or other emergency operations center.

Additionally, per Water Code Sections 6160 and 6161, DSOD is responsible for the review and approval of inundation maps. The California Code of Regulations, Title 23, Division 2, Chapter 1, Article 6 defines the specific requirements of the inundation maps.

IRWD communicated with DSOD staff to confirm DSOD responsibilities as described in this EAP. These DSOD responsibilities were provided to IRWD by Richard Draeger, the regional engineer, via email on December 12, 2019.

2.2.17 National Weather Service Weather Forecast Office

The NWS has a congressional mandate to issue official public warnings for all weather-related events, including dam breaches and flooding. The NWS communicates all flash flood watches and warnings based on the inundation maps provided in this EAP. The San Diego Weather Forecast Office has a copy of the enclosed inundation map and will issue official public warnings upon notification, as appropriate, and in coordination with IRWD and the Unified Command for an incident at Santiago Creek Dam.

The NWS WFO will issue a 'Flash Flood Watch' for a potential dam failure and a 'Flash Flood Warning' following the confirmation of a dam failure for downstream areas.

2.2.18 DWR Flood Operations Center

The mission of the DWR Division of Flood Management is to prevent loss of life and reduce property damage caused by floods and to assist in recovery efforts following any natural disaster. The State-Federal Flood Operations Center, located in Sacramento, California, is operated by the Division of Flood Management. The Flood Operations Center provides a facility from which DWR can centrally coordinate emergency response state-wide. Upon activation of this EAP, the DWR Flood Operations Center will be notified by the dam owner. During a potential or imminent failure scenario, the DWR Flood Operations Center would be responsible for assisting with coordination among state and local agencies. The DWR Flood Operations Center can also provide technical assistance during an incident.

2.2.19 California Highway Patrol

A copy of the EAP was sent to California Highway Patrol (CHP). State routes and highways downstream of Santiago Creek Dam would be impacted by a breach at the dam. CHP dispatch is included in the notification charts in this EAP. In the event of an emergency at Santiago Creek Dam, CHP would be responsible for evacuating impacted state highways and controlling traffic on these roads. CHP response would be coordinated by the Unified Command/IC.

2.2.20 CalTrans

A copy of the EAP was sent to CalTrans staff at the District 12 (Orange County) office so that they could review the EAP with regard to state highway facilities. Emergency response at state highways would be coordinated by CHP through the Unified Command, but CalTrans staff may assist with response related to state-managed road facilities.

2.2.21 Transportation Corridor Agencies (Orange County Toll Roads)

A copy of the EAP was sent to Transportation Corridor Agencies (TCA), who administers the Toll Roads of Orange County. The Toll Roads of 261 and a small area of 73 could be affected by inundation from Santiago Creek Dam. The EAP was provided for their planning purposes. Caltrans owns the Toll Roads and maintains them as part of the state highway system and the California Highway Patrol is responsible for law enforcement on the Toll Roads.

2.2.22 Orange County Public Works

A copy of the EAP was sent to Orange County Public Works (OCPW), as channel facilities and infrastructure managed by OCPW may be affected by an incident at Santiago Creek Dam. OCPW is a plan holder of this EAP and may assist with response related to county-managed facilities. OCPW operates Villa Park Dam, which is downstream of Santiago Creek Dam and could be affected by a breach at Santiago Creek Dam. In the event of an incident at Santiago

Creek Dam, IRWD staff will notify OCPW staff so that they can take appropriate action at Villa Park Dam in response to the upstream emergency.

2.2.23 Water Emergency Response Organization of Orange County

A copy of the EAP was sent to the Water Emergency Response Organization of Orange County (WEROC), which supports and manages countywide emergency preparedness, planning, response, and recovery efforts among Orange County water and wastewater utilities. WEROC does not have any prescribed responsibilities in this EAP, but is included in the notification flowcharts and is likely to assist with an emergency response to a dam safety incident at the Santiago Creek Dam.

2.2.24 School Districts

The EAP was sent to school districts potentially affected by an incident at Santiago Creek Dam. The school districts do not have formal responsibilities in this EAP. The plan was provided to them for their information and planning.

Section 3: Notification Flowcharts

3.1 Notification Flowcharts

This section contains notification flowcharts and accompanying messages for each emergency level that could be activated at the Santiago Creek Dam: high flow, non-failure, potential failure, and imminent failure. The high flow and non-failure scenarios share a notification flow chart, as the same parties would be notified during each event, but have different notification messages. Similarly, the potential failure and imminent failure share a notification flow chart but have different notification messages. The notification messages for all emergency levels can also be found in Appendix E of this EAP. See Section 5.1 for an explanation of emergency level determination.

IRWD and public safety agencies should reference these flowcharts to know who to contact and in what order in the event of an emergency situation. Individuals or organizations at the beginning of flowchart branches are responsible for making all calls within that branch, in the order indicated. If a party is not answering the number indicated on the flowchart, the notifying party should reference the contact table given in Section 3.2 for alternate methods of contact. In order to facilitate clear and efficient communication of emergency conditions, suggested scripts for notification are included after each flowchart. To ensure timely and efficient notifications during a rapidly developing emergency situation, verbal notifications via phone calls will be short and direct, and will be followed by text and/or email confirmations containing the language in the pre-scripted messages suggested in Appendix E.

The notification flowcharts require that the PSAP, OCSD EMD, make notifications as part of the notification process. IRWD has coordinated with OCSD EMD to ensure that they have a copy of the EAP on hand and will utilize the notification flowcharts in Section 3.1. To ensure that notifications are made in a timely manner, OCSD EMD will use a mass notification system rather than individual phone numbers to communicate with all downstream public agencies at once. The department has agreed to perform the responsibilities in the notification flowcharts and in this EAP. These instructions will be updated annually when the plan is reviewed and contacts are updated (see Section 8.1).

The notification charts in this section rely upon cellular phones and landlines as the means of communication. Alternative communication methods may be necessary during a severe emergency in which the region experiences power and cellular network outages. Orange County Control One has the ability to communicate with local emergency management agencies on a designated radio channel. Local emergency management agencies also utilize the 800-megahertz (MHz) radio system and can communicate dispatch-to-dispatch.

IRWD and other agencies have access to Government Emergency Telecommunications Service (GETS), which is operated by the federal government to prioritize emergency calls made over landlines and cellular lines. Users with a GETS card have priority access to telephone networks when there is congestion or other service problems. IRWD also has satellite phones that can be

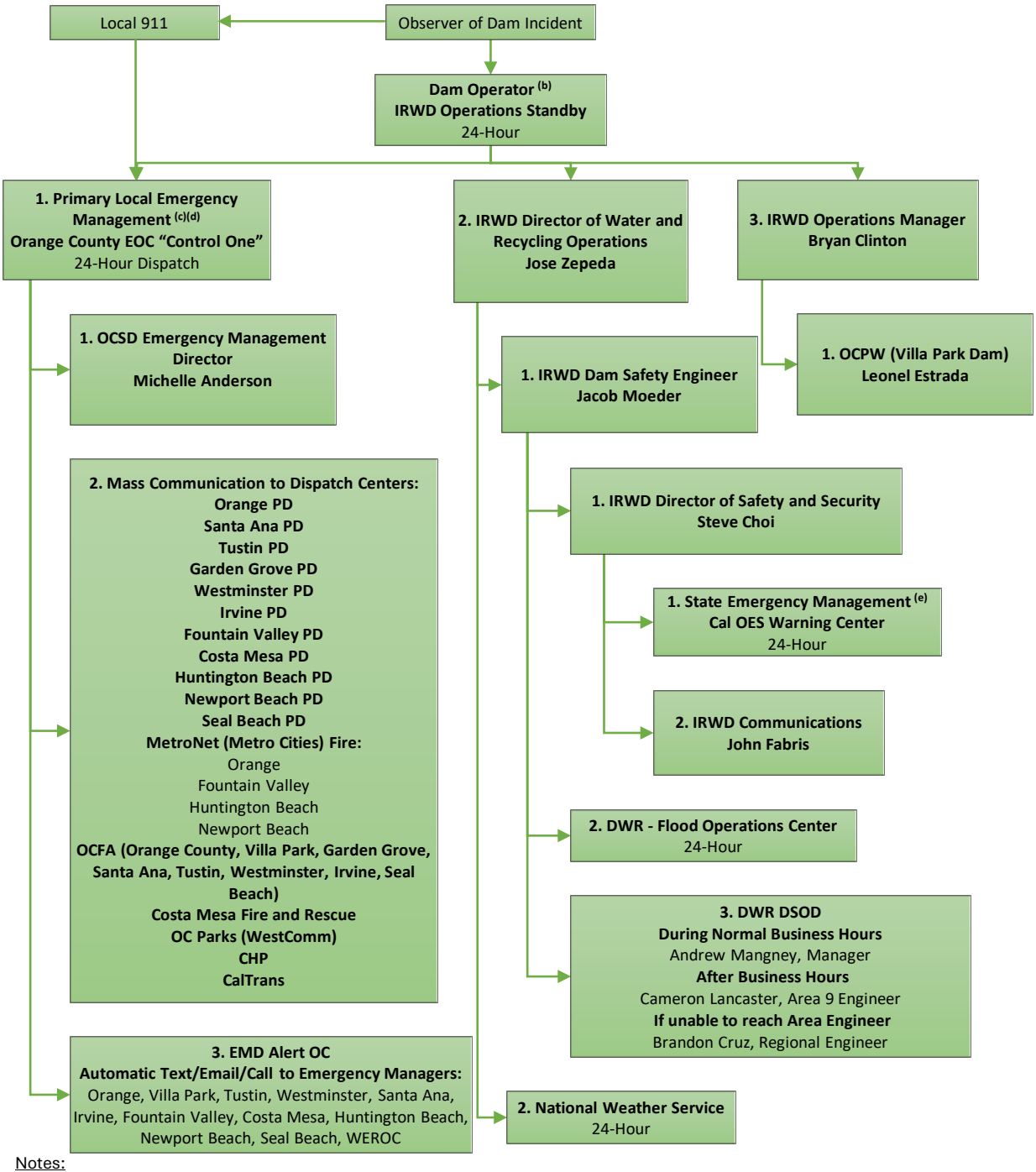
used for communications during a dam emergency, as well as two-way radio communications capability with WEROC.

The NWS has satellite phones which are operated to make outgoing calls if landlines or cellular service are unavailable. The NWS also uses amateur radio transmissions as a backup method for communication.

High Flow or Non-Failure Notification Flowchart [a]

Notifications to be made in order of appearance on flowchart. First number listed is primary contact number, second number listed (if applicable) is secondary contact number.

MAKE IT CLEAR THE DAM IS CURRENTLY SAFE. See suggested notification scripts in Section 3 of the EAP.



Notes:

a. Use this chart in and the Contact Log in Appendix D to document notifications.
b. After dam incident is reported to IRWD, IRWD will activate the EAP if necessary and make emergency level determination, triggering the continuation of notifications. Refer to Section 5 of the EAP for the EAP Response Process.
c. Contact the Dam Operator if 911 is notified by a non-utility observer.
d. Control One to broadcast to all dispatcher centers via radio and send messages via teletype over communications terminals.
e. Use the Cal OES Warning Center Dam Incident Report in Appendix I. Copy to Orange County Sheriff's Department.

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

High Flow Emergency Level Notification Script

This is _____. [your name and position]

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **High Flow** condition but is not in danger of failing.

High flows at the dam began at _____ (time) on _____ (date).

The current flow into the reservoir is approximately ___ cfs.
The current flow out of the reservoir is approximately___ cfs.

You have/will receive a text or email with additional details. We'll provide updates when there are any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

Non-Failure Emergency Level Notification Script

This is _____. [your name and position].

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **Non-Failure** condition and is not in danger of failing.

IRWD activated the EAP because _____ (description of condition).

You have/will receive a written notification with additional details. We'll provide updates detailing any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

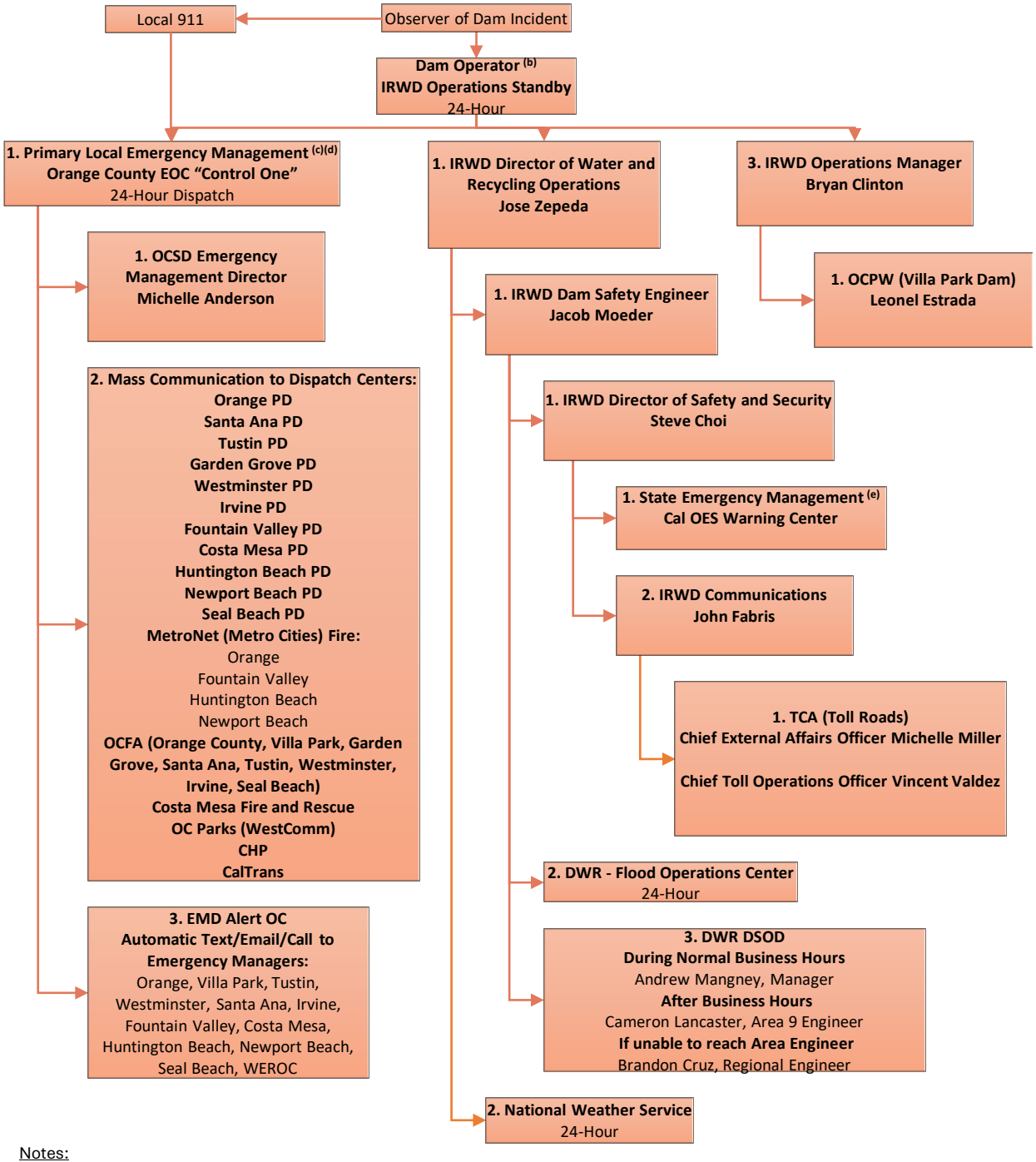
I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

Potential or Imminent Failure Notification Flowchart [a]

Notifications to be made in order of appearance on flowchart. First number listed is primary contact number, second number listed (if applicable) is secondary contact number.

See suggested notification scripts in Section 3 of the EAP.



Notes:

a. Use this chart in and the Contact Log in Appendix D to document notifications.
b. After dam incident is reported to IRWD, IRWD will activate the EAP if necessary and make emergency level determination, triggering the continuation of notifications. Refer to Section 5 of the EAP for the EAP Response Process.
c. Contact the Dam Operator if 911 is notified by a non-utility observer.
d. Control One to broadcast to all dispatcher centers via radio and send messages via teletype over communications terminals.
e. Use the Cal OES Warning Center Dam Incident Report in Appendix I. Copy to Orange County Sheriff's Department.

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Potential Failure Emergency Level Notification Script

This is _____ [your name and position].

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **Potential Failure** condition and may be in danger of failing.

IRWD is responding to _____ [describe event] that could result in dam failure as early as _____.

Please reference the inundation maps and prepare to evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. In the event of a failure, portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area.

The Orange County Sherriff's Department is the PSAP for this emergency.

You have/will receive a written notification with additional details. We'll provide updates detailing any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

Imminent Failure Emergency Level Notification Script

This is an emergency. This is _____ [your name and position].

Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County, is failing. The downstream area must be evacuated immediately.

Repeat, Santiago Creek Dam is failing; evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. Portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area. High flows are expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay. Do not approach channels where high flow is expected.

Reference the inundation map in your copy of the Emergency Action Plan for specific evacuation areas.

The Orange County Sherriff's Department is the PSAP for this emergency.

You have/will receive a written notification with additional details for this **Imminent Failure** condition.

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

The next status report will be provided in approximately 30 minutes. What is the best way to contact you with additional updates? [record contact information].

Imminent Failure Emergency Level Public Message

The following pre-scripted message may be **used for emergency management authorities to communicate the Imminent Failure of the dam with the public**:

Attention: This is an emergency message from _____ [emergency management agency]. Listen carefully. Your life may depend on immediate action.

Santiago Creek Dam, located at Irvine Lake in Orange County is failing. Repeat. Santiago Creek Dam, located at Irvine Lake in Orange County is failing.

If you are in or near this area, proceed immediately to high ground. The low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa may be flooded. Portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area, and access may be limited. High flows are expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay. Do not approach channels where high flow is expected.

If you are in or near this area, proceed immediately to high ground away from low lying areas.

Repeat message.

3.2 Contact Information Table

The contact table below lists all parties included in the notification flowcharts, along with other key stakeholders. If unable to contact a party using the method shown on the flowcharts, refer to this table to attempt to contact through a different pathway. All contacts included in the flow charts and contact tables are confirmed to be up to date as part of the annual EAP review process.

Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
Cal OES	California State Warning Center				Email
Caltrans (District 12)	Notification Number (24-Hour)				None
Caltrans (District 12)	Bala Nanjappa (D-12 Maintenance Engineering)				Text + email
Caltrans (District 12)	John Bybee EOC Coordinator				Text + email
CHP	Santa Ana Dispatch (24-Hour)				None
CHP	Valerie Cardenas (Public Safety Dispatch Supervisor)				None
CHP	Sgt. Anselmo Templado				Email
CHP	Capt. Gustavo Torres				Email
CHP	Lt. Kris Ulibarri				Email
CHP	Lt. Scott Stoos				Email
Costa Mesa Fire and Rescue	Dan Stefano (Fire Chief)				Email
Costa Mesa Fire and Rescue	24-Hour Dispatch				None
Costa Mesa Police Department	Delcie Hynes (Emergency Services Manager)				Email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
Costa Mesa Police Department	24-Hour Dispatch[5]				None
Costa Mesa Police Department	Watch Commander				None
Costa Mesa Police Department	Non-Emergency Dispatch				None
DWR DSOD	Andrew Mangney (Field Engineering Branch Manager, Primary Contact During Business Hours)				Email
DWR DSOD	Cameron Lancaster (Area 9 Engineer, Primary Contact After Business Hours)				Text + email
DWR DSOD	Brandon Cruz (Southern Regional Engineer, Secondary Contact After Business Hours)				Text + email
DWR FOC	Flood Warning Center				None
Fountain Valley Fire Department	Tim Saiki (Fire Chief)				Email
Fountain Valley Fire Department	Metro Net Dispatch (24-Hour)				None
Fountain Valley Police Department	Rodney Cox Chief of Police				Email
Fountain Valley Police Department	Watch Commander (24-hour)				None
Fountain Valley Police Department	Emergency Dispatch (24-Hour)				None

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

[5] Costa Mesa Police and Fire and Rescue are co-located and dispatch number reaches both departments.

Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
Garden Grove Police Department	Amir El Farra (Chief of Police)				Email
Garden Grove Police Department	Royce Wimmer (Emergency Manager)				Email
Garden Grove Police Department	Emergency Dispatch (24-Hour)				None
Garden Grove Police Department	Non-Emergency Dispatch				Email
Huntington Beach Fire Department	Eric McCoy (Fire Chief)				Email
Huntington Beach Emergency Management	Brevyn Mettler (Emergency Manager)				Email
Huntington Beach Fire Department	Metro Net Dispatch (24-Hour)				None
Huntington Beach Police Department	Eric Parra (Chief of Police)				Text + email
Huntington Beach Police Department	Non-Emergency Dispatch				None
Irvine Police Department	Robert Simmons (Manager, Emergency Services)				Text + email
Irvine Police Department	Brendan Manning (Emergency Services Administrator)				Text + email
Irvine Police Department	Christine Tully (Emergency Services Supervisor)				Text + email
Irvine Police Department	Non-Emergency Dispatch				None
Irvine Police Department	24-Hour Dispatch NOT FOR PUBLIC RELEASE				None

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
IRWD	Paul Cook, P.E. (General Manager)				Email
IRWD	Steve Habiger Sand Canyon Dam Keeper				Text + email
IRWD	Jose Zepeda (Director of Water and Recycling Operations)				Text + email
IRWD	Bryan Clinton (Operations Manager)				Text + email
IRWD	John Fabris (Communications)				Text + email
IRWD	Jacob Moeder (Dam Safety Engineer)				Text + email
IRWD	Steve Choi (Director of Safety and Security)				Text + email
IRWD	Operations Standby/Customer Service				None
IRWD	Communications Department				None
Newport Beach Fire Department	Jeff Boyles (Fire Chief)				Text + email
Newport Beach Fire Department	Metro Net Dispatch (24-Hour)				None
Newport Beach Police Department	Katie Eing (Emergency Services Coordinator)				Text + email
Newport Beach Police Department	24-Hour Dispatch				None
Newport Beach Utilities Department	Casey Parks (Utilities Superintendent)				Text + email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
NWS	Notification Number (24-Hour)				Email
OCFA	Nick Freeman (Division 2 Chief)				Email
OCFA	Kevin Fetterman (Division 4 Chief)				Text + email
OCFA	James Henery (Division 6 Chief)				Email
OCFA	Mike Sheehan (Division Chief, Command and Emergency Planning)				Email
OCFA	Emergency Command Center Supervisor				None
OCFA	Non-Emergency Dispatch				None
OCSD	Emergency Operations Center "Control One"				Email
OCSD	Non-Emergency Dispatch				None
OCSD	Michelle Anderson (Emergency Management Director)				Text + email
OCSD	Captain Miquel Sotelo				Text + email
OCSD	Anthony Patella (Captain - North Ops/Villa Park)				Text + email
OCSD	Marcuz Perez (Captain - Emergency Communication Bureau)				Text + email
OCSD	Mayra Wheeler (Senior Emergency Management Program Coordinator)				Text + email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
OCSD	Kevin McArthur (Assistant Emergency Manager)				Text + email
OC Parks	24-Hour Dispatch (WestComm)				None
OC Parks	Eric Rubery (Operations Support Manager)				Text + email
OCPW	Leonel Estrada (Villa Park Dam Operator)				Text + email
OCPW	Trevor Richardson (Assistant Emergency Manager)				Email
OCWD	Main Switchboard				None
Orange City Manager's Office/Emergency Management	Megan Berumen (Emergency Manager)				Text + email
Orange Fire Department	On Duty Battalion Chief				Email
Orange Fire Department	Doug Yates (Fire Marshall/Deputy Fire Chief, Services)				Email
Orange Fire Department	Robert Stefano (Deputy Fire Chief, Operations)				Email
Orange Fire Department	Non-Emergency Dispatch				None
Orange Fire Department	Metro Net Dispatch				None
Orange Fire Department	Sean deMetropolis Fire Chief				Email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
Orange Police Department	Jeremy Smith (Captain)				None
Orange Police Department	Mike Monjaraz (Lieutenant Support Services/Law PIO)				None
Orange Police Department	Kevin Plog (Lieutenant)				Email
Orange Police Department	24-Hour Dispatch				None
Orange Police Department	Adam Jevec Chief of Police				None
Santa Ana Police Department	Steve Rhyner (Emergency Operations Coordinator)				Text + email
Santa Ana Police Department	24-Hour Dispatch				None
Santa Ana Police Department	Watch Commander				None
Santa Ana Police Department	Non-Emergency Dispatch				None
Seal Beach Police Department	Kasandra Edwards (Police Communications Director)				None
Seal Beach Police Department	24-Hour Dispatch (WestComm)				None
Seal Beach Police Department	Michael Henderson (Chief of Police)				None
Seal Beach Police Department	Brian Gray (Emergency Services Coordinator)				Email
TCA (Toll Roads)	Michelle Miller (Chief External Affairs Officer)				Text + email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
TCA (Toll Roads)	Vincent Valdez (Chief Toll Operations Officer)				Text + email
Tustin Police Department	Lt. Rob Nelson (COPPS Lieutenant)				Text + email
Tustin Police Department	Capt. Manny Arzate (Support Services Bureau Commander)				Text + email
Tustin Police Department	Pat Hurtado Emergency Operations Coordinator				Text + email
Tustin Police Department	24-Hour Dispatch				None
Tustin Police Department	Stephen Foster (Emergency Manager)				Text + email
Villa Park	Steve Franks (City Manager)				Email
Villa Park	Mahrooz Ilkhanipour (City Engineer)				None
WEROC	Vicki Osborn (Director of Emergency Management)				Text + email
WEROC	Gabriela Landeros (WEROC Specialist)				Email
Westminster Police Department	Darin Lenyi (Chief of Police)				None
Westminster Police Department	Jared Kent (Emergency Operations)				Email
Westminster Police Department	24-Hour Dispatch				None
Fountain Valley Elementary School District[/a]	Katherine Stopp (Superintendent)				Email

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Organization	Name (Title)	Primary Phone #	Secondary Phone #	Email Address	Written Emergency Notification Method
Garden Grove Unified School District[a]	Gabriela Mafi				Email
Huntington Beach Union High School District[a]	Mark Hansberger (Director of Maintenance, Transportation and Operations)				Text
Huntington Beach City School District[a]	Leisa Winston (Superintendent)				Email
Irvine Unified School District[a]	Stephen Bayne (Director of Risk Management and Insurance)				Email
Newport-Mesa Unified School District[a]	Jonathan Wilby. (Director of Risk Management)				None
Orange Unified School District[a]	Heriberto Angel (Executive Director, Student & Community Services)				Email
Santa Ana Unified School District[a]	Richard Hoffman (Emergency Services Manager)				Email
Tustin Unified School District[a]	Sal Sanchez (Director of Maintenance and Operations)				None

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a. School districts have been included in this table so that public copies of the EAP can be distributed to them directly for informational purposes.

Section 4: Project Description

The Santiago Creek Dam was constructed in 1933. The dam impounds Irvine Lake, which stores imported water and local runoff. The water stored in Irvine Lake supplies drinking water and irrigation water. Irvine Lake is also used for recreation purposes by the general public.

The dam is an earthen dam with a crest length of 1,425 feet. DSOD has designated it an Extremely High Hazard Dam. The barrier height is 120 feet, as measured from the maximum water surface at the spillway crest elevation of 790 feet[6] to the estimated downstream toe at an elevation of 674 feet. The dam's upstream toe is at an elevation of about 680 feet. Above elevation 797.5 feet, the upstream face of the dam has a slope of 1.5:1. Below 797.5 feet, the upstream face of the dam has a slope of 2.5:1. Above elevation 790 feet, the downstream face of the dam is sloped at a 1.5:1 ratio, and below 790 feet, the downstream face is sloped at 2:1.

DSOD has not identified any CAS for Santiago Creek Dam. Figure 4-1 is a schematic of the reservoir, showing the dam, spillway, and outlet works. Overview and vicinity maps were presented in Figures 1-1 and 1-2, respectively. A figure depicting commonly used dam terms is included in Appendix K.

The estimated capacity of the reservoir is 24,335 acre-feet at the spillway crest elevation of 790 feet. Stoplogs may be inserted at the spillway to raise the maximum water elevation to 794 feet, which results in a total capacity of 26,670 acre-feet. The storage capacity curve of the reservoir is included as *Figure 4-2 Irvine Lake Storage Capacity Curve*.

The drainage area upstream of the Santiago Creek Dam is 63.2 square miles. Irvine Lake collects natural runoff during the rainy season from this area, which is used as part of IRWD's water supply. The dam has an outlet tower that discharges into a 60-inch diameter welded steel pipe which is 592 feet long and splits into two pipes at the downstream toe of the dam. One pipe is 36-inch for regular conveyance, and the other is 30-inch for emergency releases.

[6] Elevations used here are in the construction datum of the dam; to convert to North American Vertical Datum of 1988 (NAVD88), add approximately 1.9 feet to values in the construction datum.

Figure 4-1 Schematic of Santiago Creek Dam and Irvine Lake

The Santiago Creek Dam has a spillway that discharges into a concrete-lined chute, which leads to an energy dissipator and a concrete channel which conveys water downstream to Villa Park Dam. The spillway is rated for 30,000 cubic feet per second (cfs). Though the spillway is not designated by DSOD as a CAS, it is included in DSOD's Spillway Re-Evaluation Program, a program enacted in 2017 that requires re-evaluation of certain spillways throughout California. IRWD completed the spillway re-evaluation study in two parts in 2018 and 2019 and concluded that the spillway is nearing the end of its useful life. IRWD is now actively proceeding with plans to replace the spillway. In addition, IRWD has an interim lake level operations plan which aims to minimize use of the spillway. During the winter season (October 31 - April 1), the lake operates with reduced water levels.

A dam failure at Santiago Creek Dam is expected to greatly exceed the capacity of the downstream channel. At a gage located downstream[7] of both Santiago Creek Dam and Villa Park Dam, a historical peak flow of 6,600 cfs was recorded on February 25, 1969. During this peak event, large storms caused high flows at Santiago Creek Dam and Villa Park Dam. Both reservoirs were filled to capacity by runoff, and as a result highway bridges and commercial and residential properties were damaged. Peak flows from a failure at Santiago Creek Dam would greatly exceed the historical peak flow.

[7] USGS Gage 11077500, Santiago Creek at Santa Ana, California

Discharge curves for the Santiago Creek Dam outlet pipes have not been prepared and preparation of them is outside the scope of this EAP.

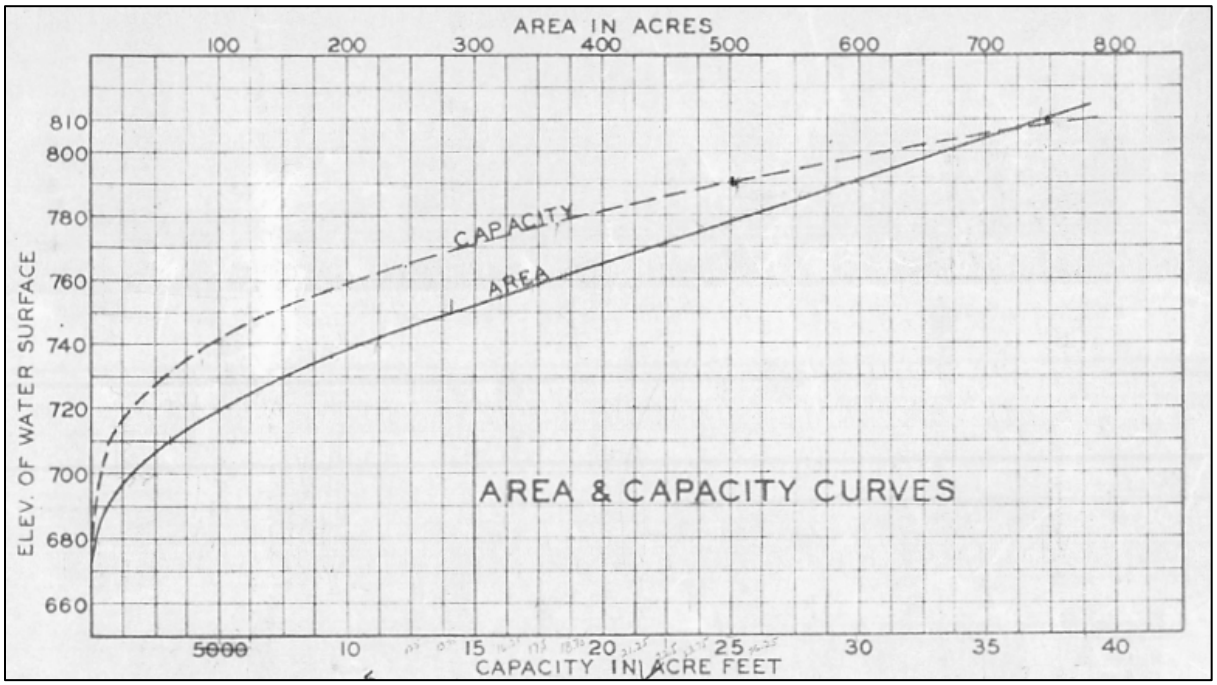


Figure 4-2 Santiago Creek Dam/Irvine Lake Storage Capacity Curve

There are no jurisdictional dams upstream of Santiago Creek dam. There is one jurisdictional dam, Villa Park Dam, located downstream of Santiago Creek Dam. Villa Park Dam could be impacted by an incident at Santiago Creek Dam.

Villa Park Dam is a jurisdictional dam located downstream of Santiago Creek Dam. It is owned and operated by OCPW. It was constructed in 1963 to control spills from Irvine Lake and regulate flow from Santiago Creek to the Santa Ana River. The Villa Park Dam is an earthen embankment with an impervious fill core, consisting of two sections: a main section with a crest length of 1,460 feet, and an auxiliary section with a length of 1,420 feet. The crest of both sections is at 584.3 feet. There is a spillway located between the two sections, with a crest elevation of 566 feet. The capacity of Villa Park Dam is 15,600 acre-feet at the spillway crest, and 22,000 acre-feet at the maximum water level of 577 feet. The storage capacity curve of the reservoir is included as *Figure 4-3 Villa Park Dam Reservoir Storage Capacity Curve*.

A sudden and total failure of the Santiago Creek Dam may lead to a sequential failure at Villa Park Dam downstream. The inundation maps prepared for this EAP (see Part II) are based on a sequential failure analysis for both dams. The inundation maps reflect a worst-case scenario in which both reservoirs are full and both dams fail suddenly. No other downstream jurisdictional dams are within the inundation area of Santiago Creek Dam. There are no upstream jurisdictional dams which would impact Santiago Creek Dam.

If Santiago Creek Dam were to fail, the low-lying portions of south Orange, Villa Park, Santa Ana, North Tustin, Tustin, Fountain Valley, Garden Grove, Costa Mesa, Irvine, Huntington Beach and Newport Beach may be flooded. Portions of the state highway system could be inundated, including I-5, I-405, CA-22, CA-55, CA-57, and CA-261 (toll road). Many surface streets would also be inundated. High flows are expected in Santiago Creek, Santa Ana River, Peters Canyon Wash, San Diego Creek, and Upper Newport Bay.

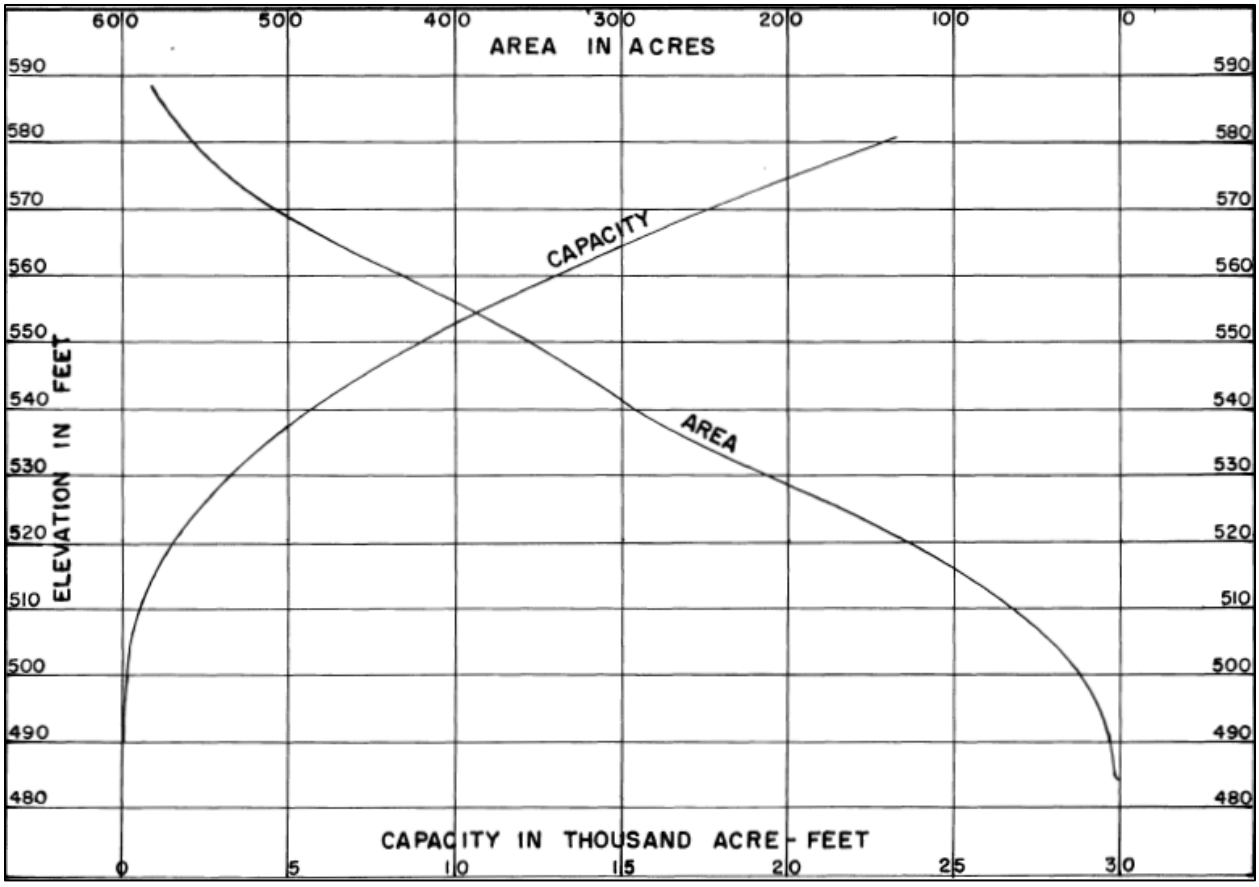


Figure 4-3 Villa Park Dam Reservoir Storage Capacity Curve

Section 5: EAP Response Process

There are four steps that should be followed when an unusual or emergency incident is detected at the dam. These steps constitute the EAP Response Process. The steps are:

- Step 1: Incident detection, evaluation and emergency level determination
- Step 2: Notification and communication
- Step 3: Emergency actions
- Step 4: Termination and follow up

Early detection and evaluation of the condition(s) or triggering event(s) that initiate or require an emergency response action are crucial. Timely determination of an emergency level ensures that the appropriate response actions are taken based on the urgency of the situation. Procedures for early notification are provided in Section 3 that allow all entities involved with plan implementation to respond appropriately. Preventive or mitigating actions must be taken to attempt to address conditions at the dam. Eventually, a determination will need to be made concerning termination of the incident. After the incident is over, follow-up activities may be required. All of these steps make up the general EAP response process and are discussed in the following sections.

5.1 Step 1: Incident Detection, Evaluation, and Emergency Level Determination

Step 1 involves emergency detection, evaluation, and incident classification. Regular surveillance at the site is the normal method of detecting potential emergency situations. For conditions beyond the normal range of operations, contact DSOD for assistance with evaluation.

5.2.1 Monitoring, Detection, and Early Warning

This EAP establishes the procedures to be employed by IRWD personnel to ensure the safety of life and property at and downstream of the Santiago Creek Dam. IRWD has a dam safety program which regularly monitors and inspects features of the dam to detect problems. This program includes:

- Monitoring of reservoir data in a SCADA system with alarms/alerts.
- Routine visual inspections of the dam.
- Annual surveys of survey monuments. Lateral and vertical displacement are compared to historical data to assess trends and detect anomalies.
- Measurement of groundwater levels on a weekly basis. Measurements are compared to historical data to assess trends and detect anomalies.
- Annual inspections by IRWD staff.
- Annual inspections by DSOD.
- Periodic dam safety reviews that consider potential failure modes and risk analysis.

Public access to the dam is restricted by locked gates and fencing. Areas of Irvine Lake are open to the public for recreation, but the general public does not have access on foot or vehicle to view or observe the dam. Because of this, any anomalies at the dam are expected to be detected by IRWD staff and not by the general public.

Section 7: Preparedness contains more details about how monitoring and detection instrumentation are used for incident preparedness.

5.2.2 Emergency Level Determination

After identification of a dam threatening condition, the dam operator or a qualified engineer will determine if there is sufficient time for additional investigation before declaring an emergency situation. Prior to activating the EAP, the IRWD Director of Water and Recycling Operations will determine the emergency level.

An emergency level determination may be re-evaluated at times during a dam emergency as it may not be readily apparent whether a complete breach will occur or how long it may take. The IRWD Director of Water and Recycling Operations, in conjunction with IRWD and DSOD engineers, will be appropriately conservative in evaluating the emergency level determination and will provide emergency management authorities with the most complete information possible so that decisions regarding public safety and evacuations may be made quickly and effectively.

There are four dam safety emergency level categories for the Santiago Creek Dam. The sections below describe how each emergency level applies to the dam, and *Table 5-1 Emergency Level Determination* is provided for different incidents that pose dam safety hazards.

High Flow – High Flows in System, No Threat to Dam

The High Flow emergency level indicates that flooding is occurring on the river system, but there is no apparent threat to the integrity of the dam. The High Flow emergency level is used by the dam owner to convey to outside agencies that downstream areas may be affected by the dam's release. Although the amount of flooding may be beyond the control of the dam owner, information on the timing and amount of release from the dam may be helpful to authorities in making decisions regarding warnings and evacuations.

The Villa Park Dam is downstream of Santiago Creek Dam, and was built to control high flows and flooding from Santiago Creek Dam.

Non-Failure – Unusual, Slowly Developing Event

The Non-Failure emergency level is appropriate for an event at a dam that will not, by itself, lead to a failure, but requires investigation and notification of internal and/or external personnel. This classification indicates a situation is developing; however, the dam is not in danger of failing. In many cases, these unusual events are remedied with no further action required. In some cases, flow over spillways could cause unexpected flooding downstream, but the dam is not

endangered. In cases of spillway releases, downstream residents may need to be notified if flooding threatens life or property, but it should be made clear that the dam is safe. Examples of Non-Failure events are (1) new seepage or leakage on the downstream side of the dam, (2) presence of unauthorized personnel at the dam, and (3) malfunction of an outlet valve in the open position creating the potential for high flow downstream of the dam or excessive erosion in the vicinity of the outlet works.

Potential Failure – Potential Dam Failure, Rapidly Developing

This classification indicates that a situation is rapidly developing that could cause the dam to fail. A reasonable amount of time is available for analysis before deciding whether to evacuate residents. Emergency responders in affected areas will be alerted that an unsafe situation is developing. The Potential Failure emergency level indicates that conditions are developing at the dam that could lead to a dam failure. Examples of Potential Failure events are (1) rising reservoir levels that are approaching the top of the non-overflow section of the dam, (2) transverse cracking of an embankment, and (3) a verified bomb threat. Declaration of a Potential Failure should convey that time is available for analyses, decisions, and actions before the dam could fail. A failure may occur, but predetermined response actions may moderate or alleviate failure.

Imminent Failure – Dam Failure Appears Imminent or In-Progress

The Imminent Failure emergency level indicates that time has run out, and the dam has failed, is failing, or is about to fail. Imminent Failure typically involves a continuing and progressive loss of material from the dam. It is not usually possible to determine how long a complete breach of a dam will take. Therefore, once a decision is made that there is no time to prevent failure, the Imminent Failure warning must be issued. For purposes of evacuation, emergency management authorities may assume the worst-case condition that failure has already occurred.

Decision criteria to assist the dam owner/operator in determining the appropriate emergency level is provided in *Table 5-1 Emergency Level Determination*. The guidance provided in Table 5-1 is intended to function as a framework for IRWD to use to determine when the EAP should be activated but is not prescriptive and each situation will be evaluated on a case-by-case basis.

Table 5-1 Emergency Level Determination

Event	Example Situation	Emergency Level
Erosion of Spillway	Spillway flowing with active erosion gullies	Potential Failure
	Spillway flowing with significant erosion and head cutting advancing rapidly toward reservoir	Imminent Failure
Embankment Overtopping	Reservoir level reaches higher than spillway crest and is increasing rapidly	Potential failure
	Water from the reservoir is flowing over the top of the dam	Imminent Failure
Seepage	New seepage areas of elevated concern in or near dam	Non-Failure
	New seepage areas with cloudy discharge or increasing flow rate	Potential Failure
	Seepage with increasing and significant flow rate	Imminent Failure
Sinkholes	Observation of new sinkhole in reservoir area or on embankment	Potential failure
	Rapidly enlarging sinkhole	Imminent failure
Embankment Cracking or Settlement	New cracks in embankment greater than 1/4-inch-wide without seepage	Non-Failure
	Cracks in the embankment with seepage	Potential Failure
Embankment Movement	Visual shallow slippage	Non-Failure
	Visual deep-seated movement/slippage of embankment	Potential Failure
	Sudden or rapidly proceeding slides of embankment slope	Imminent Failure
Earthquakes	Measurable earthquake reported within 50 miles of the dam	Non-Failure
	Earthquake resulting in visible damage to dam or appurtenances	Potential Failure
	Earthquake resulting in uncontrolled release of water over dam or rapidly developing flow through cracks or rapidly developing erosion through increased seepage	Imminent Failure
Fire	Significant fire in the area that affects access to the dam	Non-Failure
Instruments	Instrumentation readings beyond predetermined values	Non-Failure
Outlet System Failure	Releases causing erosion around outlet works	Non-Failure
	Uncontrolled releases through the outlet but the dam's structural integrity is still maintained	Potential Failure
	Uncontrolled releases through the outlet with dam failure imminent	Imminent Failure
Security Threat	Verified bomb threat that, if carried out, could result in damage to the dam	Potential failure
	Detonated bomb that has resulted in damage to the dam or appurtenances	Imminent failure
Sabotage/ Vandalism	Damage that could adversely impact the functioning of the dam	Non-failure
	Damage that has resulted in seepage flow	Potential failure
	Damage that has resulted in uncontrolled water release	Imminent failure

5.2 Step 2: Notification and Communication

After the emergency level at the dam has been determined, notifications are made in accordance with the appropriate notification flowcharts in Section 3. The three notification flowcharts were prepared to assist EAP response personnel during an emergency. Each chart identifies who is responsible for notifying representatives and/or emergency management officials; the prioritized order in which individuals are to be notified; and who is to be notified. A contact list for the flowchart contacts, as well as other affected parties is found in Section 3.2.

During a dam safety incident, the observer of the dam incident will call 911 and/or the dam operator. If local 911 (primary local emergency management) is called first, they will then notify the dam operator. If the dam operator is notified first, they will ensure that primary local emergency management is also aware of the situation. Once the appropriate emergency level has been determined, the flowchart corresponding to that level will be used to inform affected parties of the situation as it progresses. Parties at the start of each branch are responsible for making all calls within that branch, in the order indicated. Positive contact is required. If it is not possible to contact a particular party based on the information given in the flowchart, the notifying party should refer to the contact table provided in Section 3.2.

The notification flowcharts (Section 3.1) require that the primary local emergency management agency, City of Irvine Police Department, make additional calls as part of the notification process. City of Irvine Police Department has agreed to perform the responsibilities in the notification flowcharts and in this EAP. These instructions will be updated annually when the plan is reviewed and contacts are updated (see Section 8.1).

When performing notification and communication activities, it is important that people speak in clear, non-technical terms to ensure that those being notified understand what is happening at the dam, what the current emergency level is, and which actions to take. To assist in this step, pre-scripted messages are available in Appendix E. Additionally, fill out the Cal OES Warning Center Dam Incident Report (Appendix I) and use it for initial notifications.

Use the Contact Log (Appendix D) to track required notifications that are attempted or made. The contact information on each notification flowcharts must be updated annually by the dam owner’s/operator’s representative.

In the event of an emergency, IRWD will coordinate closely with emergency management authorities. All parties must understand that the formal declaration of public emergency by emergency management authorities can be a very difficult decision. During this step, IRWD will provide any information that will assist in that decision. An early decision and declaration are critical to maximizing available response time.

5.3 Step 3: Emergency Actions

After the initial notifications have been made, IRWD will act to save the dam and minimize impacts to life, property, and the environment. A Unified Command will be established to coordinate emergency response and/or evacuations. During this step, there is a continuous process of taking actions, assessing the status of the situation, and keeping others informed

through communication channels established during the initial notifications. Additional resources may be requested through the County and OA EOC if requirements exceed the IRWD internal maintenance, construction, and contracting capabilities.

Table 5-2 Possible Remedial Actions provides the dam owner/operator with a set of actions to take for different events. The actions listed are not all inclusive of those that may need to be taken during an emergency. Use the Emergency Incident Log (Appendix F) to document the emergency event.

Table 5-2 - Possible Remedial Actions

Condition	Description of Condition	Action to be Taken
Spillway Release/High Water Level	Reservoir level reaches elevation 790 feet (spillway begins to discharge).	1. Cease filling operations unless overfilling and spillway discharge is planned. Close inlet valves.
		2. If inlet valves have malfunctioned and cannot be closed, contact maintenance crews for immediate repair. Determine if inlet flowrate exceeds the spillway discharge capacity. If not, monitor spillway for signs of excessive erosion, and determine whether a high flow condition may exist downstream. Make notifications as appropriate.
Seepage	Localized new seepage or boils observed along downstream face / toe of earthen embankment with muddy discharge and increasing but controllable discharge of water	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos if camera is available. Document location on a site plan and in inspection report.
		2. Place a ring of sandbags with a weir at the top towards the natural drainage path to monitor flow rate. If boil becomes too large to sand bag, place a blanket filter over the area using non-woven filter fabric and pea gravel. Attempt to contain flow in such a manner (without performing any excavations) that flow rates can be measured. Stockpile gravel and sand fill for later use, if necessary.
		3. Inspect the dam and collect piezometer, water level and seepage flow data daily unless otherwise instructed by engineer. Record any changes of conditions. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.
		4. Contact geotechnical engineer and provide all data collected.
		5. Maintain continuous monitoring of feature. Record measured flow rate and any changes of condition, including presence or absence of muddy discharge.

Condition	Description of Condition	Action to be Taken
Seepage (cont.)	Localized new seepage or boils (cont.)	6. Review information collected by field inspection and provide additional instructions / actions as required. Recommend remedial seepage and stability measures.
		7. Make notifications if condition worsens such that failure is imminent.
Sabotage and Miscellaneous Other Issues	Criminal action with significant damage to embankment or structures where significant repairs are required and the **integrity of the facility is compromised – condition appears stable with time.**	1. Contact law enforcement authorities and restrict all access (except emergency responders) to dam. Restrict traffic on dam crest to essential emergency operations only.
		2. Assess extent of damage and visually inspect entire dam for additional less obvious damage. Based on inspection results, confirm if extent of damage to various components of the dam warrants revised emergency level and additional notifications.
		3. Perform additional tasks as directed by the Engineering Supervisor or designee.
		4. Make notifications if conditions worsen.
Earthquakes	Report of an earthquake epicenter within 50 miles	Inspect dam and evaluate the damage sustained and the potential danger of failure. Check for seepage, cracks, displacements, and settlement. Inspect outlet works and spillways. Evaluate instrumentation.
Erosion of Spillway	Erosion or undermining of concrete spillway	Provide temporary protection at the point of erosion by placing sandbags, riprap materials, or plastic sheets weighted with sandbags. Consider pumps and siphons to help reduce the water level in the reservoir. When inflow subsides, lower the water level in the reservoir to a safe level; continue operating at a lower water level to minimize spillway flow.
Fire		Implement fire procedures (if applicable).

Condition	Description of Condition	Action to be Taken
Abnormal Instrumentation Reading	Piezometers, monuments, and seepage measurements are outside of established dam safety parameters.	Conduct daily inspections of the dam. Check and record reservoir elevation, rate at which reservoir is rising, weather conditions (past, current, forecasted), discharge conditions of creeks/rivers downstream, and new or changed conditions associated with this event. Evaluate accuracy of instrumentation.
Outlet System Failure	Failure of the outlet system piping at a point inside the dam foundation.	Implement temporary measures to protect the damaged structure, such as closing the inlet. Lower the water level in the reservoir to a safe elevation, possibly by using pumps or siphons. Consider the severity of flow through outlet, risk to the dam foundation/liner and increased flows in determining emergency level.
Embankment Deformation	**Cracks:** New longitudinal (along the embankment) or transverse (across the embankment) cracks more than 6 inches deep or more than 3 inches wide or increasing with time. New concave cracks on or near the embankment crest associated with slope movement.	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos if camera is available. Document location on a site plan and in inspection report.
		2. Restrict traffic on dam crest to essential emergency operations only.
		3. Contact geotechnical engineer and provide all data collected.
		4. Place buttress fill (min 3 feet high, 15 feet wide) against base of slope immediately below surface feature and extending 20 feet beyond visible feature limits (parallel to the embankment). Stockpile additional fill.
		5. Place sandbags as necessary around crack area to divert any storm water runoff from flowing into crack(s).
		6. Inspect the dam; collect piezometer and water level data twice daily unless otherwise instructed by engineer; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.
		7. Review information collected by field inspectors and provide additional instructions / actions as required. Consider survey monitoring.
		8. Make notifications if conditions worsen such that failure is imminent.

Condition	Description of Condition	Action to be Taken
Embankment Deformation (cont.)	**Slides / Erosion:** Deep slide / erosion (greater than 2 feet deep) on the embankment that may also extend beyond the embankment toe but does not encroach onto the embankment crest and appears stable with time.	1. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos if camera is available. Document location on a site plan and in inspection report.
		2. Restrict traffic on dam crest to essential emergency operations only.
		3. Contact geotechnical engineer and provide all data collected.
		4. Re-establish embankment fill slope. Place 5 feet. high buttress fill against base of slope at the slide location that extends at least 15 feet. beyond the furthest downstream limits (perpendicular to the embankment) and extending 20 feet. beyond visible feature limits at either end (parallel to the embankment).
		5. Place sandbags as necessary around slide area to divert any storm water runoff from flowing into slide(s).
		6. Inspect the dam; collect piezometer and water level data daily unless otherwise instructed by engineer; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.
		7. Review information collected by field inspectors and provide additional instructions / actions as required. Consider survey monitoring.
		8. Make notifications if conditions worsen such that failure is imminent.
	Sinkholes: Small depression observed on the embankment or within 50 feet of the embankment toe that is less than 5 feet deep and 30 feet wide or which is increasing with time.	1. Lower reservoir elevation.
		2. Measure and record feature dimensions, approximate flow rate, and relative location to existing surface features. Take photos if camera is available. Document location on a site plan and in inspection report.
		3. Restrict traffic on dam crest to essential emergency operations only.
		4. Contact geotechnical engineer and provide all data collected.

Condition	Description of Condition	Action to be Taken
Embankment Deformation (cont.)	**Sinkholes (cont.):**	5. Backfill the depression with relatively clean earth fill (free of organic materials) generally even with surrounding grade and slightly mounded (6 to 12 inches higher) in the center in order to shed storm water away from the depression. Stockpile additional fill.
		6. Inspect the dam; collect piezometer and water level data daily unless otherwise instructed by engineer; and record any changes of condition. Carefully observe dam for signs of depressions, seepage, sinkholes, cracking or movement.
		7. Review information collected by field inspectors and provide additional instructions / actions as required. Consider remedial construction such as grouting.
		8. Make notifications if conditions worsen such that failure is imminent.

5.4 Step 4: Termination and Follow-up

Once conditions indicate that there is no longer an emergency at the dam site, EAP operations are terminated and follow-up actions are performed. Generally, IRWD or a designated safety expert will be responsible for notifying the Unified Command that the condition of the dam has been stabilized.

The IRWD General Manager, in consultation with the IRWD operations and engineering staff members, dam safety experts, and response personnel, is responsible for determining when the dam safety situation has stabilized. The General Manager will terminate the EAP, which signifies that the dam incident has been resolved at the dam site.

The IRWD Director of Water and Recycling Operations, or designee, will follow the notification flowchart to alert all contacts of the EAP's termination. All contacts will be notified of the EAP termination in the same order as they were notified of its activation, using the notification flowchart. The Director of Water and Recycling Operations will complete the Termination Log (Appendix G).

The Unified Command is responsible for terminating the field level emergency response and relaying this decision to appropriate individuals and agencies. Prior to the termination of an Imminent Failure event that has not caused actual dam failure, DSOD will inspect the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage.

Post incident, the EAP Coordinator will set up and facilitate a meeting to review the incident and EAP implementation activities. The dam personnel involved with the plan implementation, as well as the responding agencies should be present at the meeting. The following topics will be discussed and evaluated in an after-action review:

- Events or conditions leading up to, during, and following the incident
- Significant actions taken by each participant and improvements for future emergencies
- All strengths and deficiencies found in the incident management process, materials, equipment, staffing levels, and leadership
- Corrective actions identified and a planned course of action to implement recommendations

IRWD will prepare an after-action report (Appendix H), which analyzes what happened, why it happened, and how it can be prevented in the future from a dam safety and/or EAP perspective. OCSD, OCFA, and the County and OA EOC Manager may prepare separate after-action reports focused on localized emergency response and evacuation. Outside agencies will be invited to contribute to the after-action report, and findings of the report will be used to improve the EAP.

Section 6: General Responsibilities

6.1 Irvine Ranch Water District Responsibilities (Dam Owner)

Overall IRWD dam owner responsibilities include:

- Detect, verify and assess emergency conditions
- Respond to emergencies at the dam site
- Activate and implement the Santiago Creek Dam EAP, including determining the appropriate emergency level.
- Notify other participating emergency management agencies of emergency conditions, emergency level, EAP activation, and other critical information
- Utilize IRWD EOP for internal emergency response coordination.
- Take corrective action at the dam/reservoir
- Terminate the EAP
- Facilitate an after-action evaluation and report
- Update EAP on at least an annual basis
- Communicate with the public and the media

The above responsibilities are to be executed in coordination with emergency management authorities. Dam owner responsibilities by role are outlined in *Table 6-1 Summary of Dam Owner's Responsibilities*. Responsibilities are listed for key personnel including the Director of Water and Recycling Operations, Dam Operator, Operations Manager, General Manager, Communications office, Dam Safety Engineer, and EAP Coordinator.

IRWD, as the dam owner and operator, is responsible for developing and maintaining the EAP. This includes updating the EAP on at least an annual basis, including updating contact information and notification charts in Section 3. The dam owner is responsible for regular monitoring and inspections of the dam and for responding to emergencies at the dam.

As the dam owner, IRWD will carry out notifications as outlined in Section 6.2, including to the primary local emergency management, state emergency management, and the NWS. Notification charts and procedures are given in Section 3. IRWD's Communications office will communicate with the public and the media using the IRWD Crisis Communications Plan. If needed, IRWD will procure outside equipment and materials to aid with a dam incident or emergency.

Table 6-1 Dam Owner Responsibilities by Role

Role	Responsibilities
Director of Water and Recycling Operations, or designee	1. Detect incident from alarms / SCADA / visual inspections, or other monitoring data. 2. As soon as an emergency event is observed or reported, immediately determine the emergency level as detailed in Section 5. 3. Utilize the emergency notification flowcharts in Section 3 to notify the appropriate response personnel and record notifications in the contact log in Appendix D. 4. If no one is onsite, determine emergency level and dispatch operator to the site 5. Coordinate directly with the IC or first responders at the dam site. 6. Coordinate directly with the ICP or County and OA EOC. 7. Coordinate with Dam Operator on gate, valve operations and emergency procedures 8. Dispatch construction and maintenance crews as necessary 9. Procure outside equipment and materials as necessary 10. Participate in periodic status report conference calls initiated by the Executive Director of Operations. 11. Upon termination of EAP by General Manager, notify all entities on notification charts 12. Upon termination of EAP by General Manager, fill out a Dam Emergency Termination Log (Appendix G) 13. Participate in the creation of an After-Action Report (Appendix H) to be used in the EAP review process.
Dam Operator/ On-site Monitor	1. Detect/confirm incident at dam 2. Make calls on notification charts 3. Implement gate and valve operations and other emergency procedures 4. Assess need for construction and maintenance crews and/or outside equipment and materials 5. Coordinate dam site security during incident
Executive Director of Operations	1. Initiate periodic status report conference calls with dam operator, Director of Water and Recycling Operations, General Manager, Communications, Dam Safety Engineer, and Director of Safety and Security 2. Provide regular status reports to ICP or County and OA EOC through the IRWD Agency Representative or Communications 3. Coordinate with Communications office
General Manager	1. Participate in periodic status report conference calls initiated by the Executive Director of Operations. 2. Terminate the EAP 3. Coordinate with Communications office
Communications	1. Mobilize to County and OA EOC. 2. Participate in periodic status report conference calls initiated by the Executive Director of Operations 3. Provide input to staff on emergency communications 4. Represent IRWD to media

Role	Responsibilities
	5. Develop non-technical description of dam emergency situation and IRWD remedial actions to inform emergency management authorities and the public 6. Utilize Crisis Communications Plan to communicate with impacted areas.
Dam Safety Engineer	1. Make calls on notification charts 2. Initiate periodic status report conference calls with DSOD. 3. Participate in periodic status report conference calls initiated by the Executive Director of Operations 4. Coordinate with Dam Operator/On-site Monitor. 5. Monitor and review data relevant to dam emergency situation. 6. Notify government authorities when the dam condition has been stabilized. 7. Coordinate with dam safety experts. 8. Maintain and update inundation maps. 9. Manage and implement dam safety program.
EAP Coordinator/ Director of Safety and Security	1. Make calls on notification charts 2. Initiate periodic status report conference calls with State Emergency Management. 3. Participate in periodic status report conference calls initiated by the Executive Director of Operations 4. Notify government authorities when the dam condition has been stabilized. 5. Update EAP at least annually 6. Distribute EAP copies/updates to other plan holders 7. Facilitate the creation of an After-Action Report (Appendix H) 8. Coordinate with WEROC *(see Section 6.5 for additional information)*

6.2 Notification and Communication Responsibilities

IRWD, as the dam owner/operator, will determine the appropriate emergency level in accordance with Section 5, then notify the appropriate emergency management authorities in accordance with Section 3. The dam operator or IRWD operations center will maintain the contact log (Appendix D) to document notifications for the appropriate emergency level.

IRWD's Director of Water and Recycling Operations will notify the NWS of an emergency at Santiago Creek Dam. Flood warnings and watches will be issued by the San Diego Weather Forecast Office of the NWS. IRWD's Dam Safety Engineer will notify DSOD and the DWR Flood Operations Center. IRWD's Director of Safety and Security will notify the CalOES Warning Center (see notification charts in section 3.1).

IRWD's Communications office will be responsible for communication with the media. IRWD has prepared a Crisis Communications Plan to facilitate providing timely and accurate information and instructions to minimize injuries, impacts on people and property, and potential damage to the environment. The plan outlines how IRWD will provide timely, accurate, wide-reaching, and easy-to-understand information to the media and the public, as well as to IRWD employees, contractors, board members and other stakeholders.

If time allows, onsite personnel may be able to seek internal advice and assistance. However, under an Imminent Failure condition, the responsibility and authority for notification is delegated to the dam operator or local official. Notification protocols are determined by the classification level of the incident and are pre-determined in the notification flowcharts found in Section 3.

For an incident at Santiago Creek Dam, a Unified Command will be established in order to coordinate between multiple jurisdictions and/or agencies. IRWD is designated as the lead agency for notification to OCSD Control One, which will then initiate notifications and coordination with other affected jurisdictions. Once notified of an incident at the dam, the County and OA EOC may be activated to serve as the center for response, warning, and evacuation activities.

Emergency management authorities with statutory obligations are responsible for warning and evacuation within the affected areas (see Part II Inundation Maps).

Emergency incident logs should be used to document incident related events and should be maintained at command centers and at the dam site or dam operations center. Appendix F contains an example emergency incident log.

6.3 Evacuation Responsibilities

Electronic copies of the inundation maps developed by IRWD and approved by DSOD are included in the CD attached as Part II of this EAP, and have been distributed to the emergency management authorities listed in the notification flowcharts in Section 3. The EAP distribution list may be found in Appendix C. These maps inform the development and refinement of warning and evacuation plans, and are based on the worst-case scenario of a complete and sudden failure of both Santiago Creek Dam and Villa Park Dam when they are both filled to the spillway crest elevation during a “sunny day” failure, without additional storm flows in Santiago Creek or Santa Ana River. Water levels in Irvine Lake fluctuate throughout the year.

Inundation maps are based on conservative breach parameters and a situation where each reservoir is storing the maximum capacity of water. Therefore, the inundation maps included in Part II of this EAP should be considered a worst-case scenario.

The Unified Command will facilitate coordination among agencies and disciplines for evacuations in downstream jurisdictions. If Santiago Creek Dam were to fail, evacuations may be necessary in unincorporated areas of Orange County, and the cities of Orange, Villa Park, Garden Grove, Santa Ana, Tustin, Westminster, Costa Mesa, Fountain Valley, Huntington Beach, and Irvine. Within each of these jurisdictions, evacuations will generally be the responsibility of the police and fire public safety agencies that have jurisdiction in each (see Table 1-1):

- Unincorporated Orange County: OCSD and OCFA
- City of Orange: Orange Police Department and Orange Fire Department
- City of Villa Park: OCSD and OCFA
- City of Garden Grove: Garden Grove Police Department and OCFA
- City of Santa Ana: Santa Ana Police Department and OCFA

- City of Tustin: Tustin Police Department and OCFA
- City of Westminster: Westminster Police Department and OCFA
- City of Fountain Valley: Fountain Valley Police Department and Fountain Valley Fire Department
- City of Costa Mesa: Costa Mesa Police Department and Costa Mesa Fire and Rescue
- City of Irvine: Irvine Police Department and OCFA
- City of Newport Beach: Newport Beach Police Department and Newport Beach Fire Department
- City of Huntington Beach: Huntington Beach Police Department and Huntington Beach Fire Department

The Unified Command will coordinate such evacuations, and will use their discretion to deploy resources.

Evacuations are not anticipated in the City of Seal Beach.

6.4 Monitoring, Security, Termination, and Follow-up Responsibilities

The dam operator or an appointed representative will be designated as the onsite monitor from the beginning of a dam safety incident until the emergency has been terminated. This person will provide status updates to the IRWD Director of Water and Recycling Operations, who will provide regular status reports to senior management and local authorities.

During a dam safety incident, the IRWD onsite monitor will oversee security at the dam site. Only those required to respond to the emergency or execute remedial actions will be granted access to the site.

Termination of a dam safety emergency is twofold. The IRWD General Manager, in consultation with IRWD operations and engineering staff members, dam safety experts, and response personnel, is responsible for determining when the dam safety situation has stabilized. The IRWD General Manager will officially terminate the EAP. The Unified Command is responsible for termination of the emergency response activities, including termination of an evacuation.

The dam owner and emergency response authorities should coordinate closely while making decisions to terminate both the dam safety event and the response efforts. Upon termination of the EAP, IRWD will notify all flowchart entities which were activated at the start of the emergency incident, and complete an Emergency Termination Log (Appendix G) for submission to DSOD and the Cal OES Warning Center (if notified).

Recovery activities will continue on different levels for all involved in the dam safety incident after the emergency has been terminated. IRWD will coordinate a follow-up evaluation after any emergency and prepare an after-action report. All participants in the dam safety incident should be involved in the evaluation and should keep logs during the incident. An example emergency incident log is provided in Appendix F, although emergency response agencies may maintain alternate documentation methods according to their established internal procedures.

IRWD's EAP Coordinator will prepare an after-action report (Appendix H), which analyzes what happened, why it happened, and how it can be prevented in the future from a dam safety and/or EAP perspective. OCFA and the County and OA EOC Manager may prepare a separate after-action report focused on the emergency response and evacuation.

6.5 EAP Coordinator Responsibilities

IRWD has designated the IRWD Director of Safety and Security as the EAP Coordinator. The EAP Coordinator is responsible for overall EAP related activities, including the following:

- Provide leadership to ensure the EAP is reviewed and updated annually.
- Coordinate annual EAP exercises (see Section 7.2.2 for exercise schedule).
- Summarize the annual EAP exercise for posting to the IRWD website.
- Prepare revisions to the EAP after annual exercise and review.
- Verify and update agency contact information.
- Distribute copies of the revised EAP to all parties who received copies of the original EAP.
- Establish training seminars for IRWD personnel and primary emergency management authorities.
- Coordinate emergency outreach programs with residents and businesses in close proximity to the reservoir.
- After a dam safety incident, hold a meeting to review the incident and EAP implementation activities.
- Facilitate the creation of an After Action Report (Appendix H) after a dam incident by gathering incident information from authorities.
- Utilize any After Action Reports during EAP review process.

The EAP Coordinator is the main point of contact for any questions or comments regarding this EAP. The current EAP Coordinator for IRWD is Steve Choi.

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

Section 7: Preparedness

7.1 Surveillance and Monitoring

This EAP establishes the procedures to be employed by IRWD personnel to ensure the safety of life and property at and downstream of Santiago Creek Dam. The Operations Manager is responsible for the day-to-day operation of the reservoir and the dam surveillance and monitoring program. Operations are supported by IRWD maintenance activities. The reservoir is a source of supply for the IRWD water system and is filled by imported water and runoff from its drainage area. IRWD leads a surveillance and inspection program for the Santiago Creek Dam that is described in the sections that follow. Monitoring and surveillance data is reviewed by an independent consultant and annual reports are prepared and maintained on file with IRWD. The reservoir site plan is included as *Figure 7-1 Santiago Creek Dam Site Plan*. A typical dam cross section is shown in *Figure 7-2 Santiago Creek Dam Cross Section*.

7.2.1 SCADA

IRWD has a supervisory control and data acquisition (SCADA) system that allows staff to remotely monitor water levels and alarms at Santiago Creek Dam.

7.2.2 Survey Monuments

Santiago Creek Dam has several survey benchmarks at which elevation and net horizontal displacement are measured annually. The survey data are compared to historical data and graphs are prepared that indicate movement of the monuments over time. Lateral or vertical shifting of the monuments is indicative of a potential dam safety issue and requires further investigation. DSOD reviews the annual surveys.

7.2.3 Piezometers

A piezometer is a small-diameter well used mainly to measure water levels. The water levels in the piezometers are measured by IRWD personnel generally on a weekly basis. Water levels in the piezometers are compared to reservoir surface water elevations and evaluated against data collected over a 10-year historical period. Anomalies in the piezometer data may be an indication of adverse conditions in the dam embankment or abutments.

7.2.4 Visual Surveillance and Monitoring

Visual inspections are conducted daily that consist of monitoring the water surface elevation, inspecting visible appurtenances, inspecting the access roadway and spillway for cracking, inspecting the downstream toe for seepage, and inspecting the slopes and crest parapet wall for any visible displacement. Any visible cracking, seepage, or signs of settlement or instability are reported and trigger further investigation of the piezometers and monuments or engineering analysis. All of the outlet gates and blow off valves are exercised at least annually to confirm

operability. DSOD requires the outlet valves and blow-off valves be exercised once every three years in the presence of a DSOD representative.

Maintenance is conducted as required to remove excessive vegetation at or near the spillway or on the dam face and to control rodent activity on the dam face.

7.2.5 IRWD and DSOD Inspections

Annual inspections are documented and maintained on file at both IRWD and DSOD. DSOD inspections are conducted annually. Visual inspections of the dam, spillway, outlet, and seepage are conducted, along with a review of monitoring and surveillance data. IRWD provides inspection reports on their website at:
https://www.irwd.com/construction/dam-safety-program

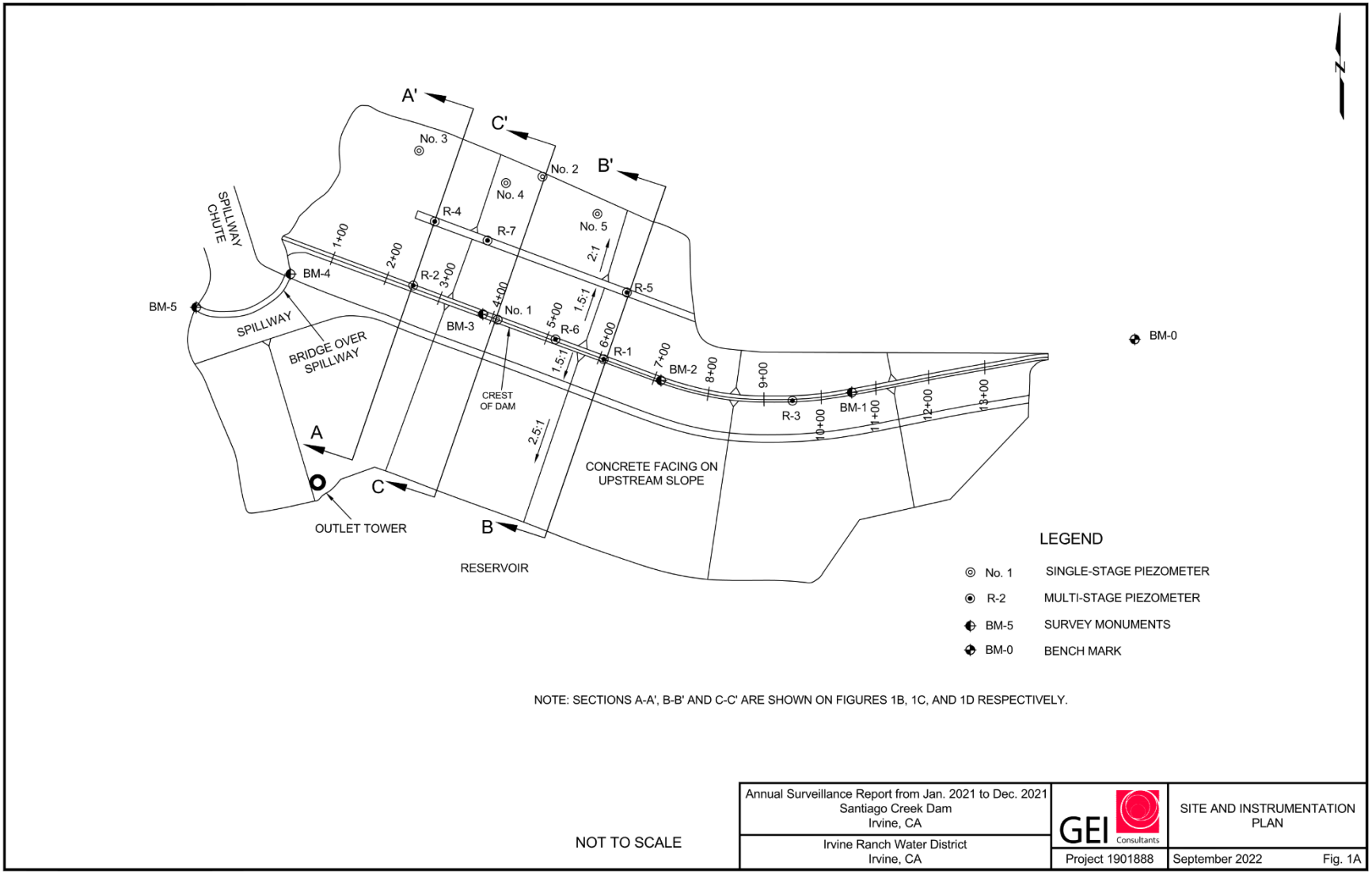


Figure 7.1-1 Santiago Creek Dam Site Plan

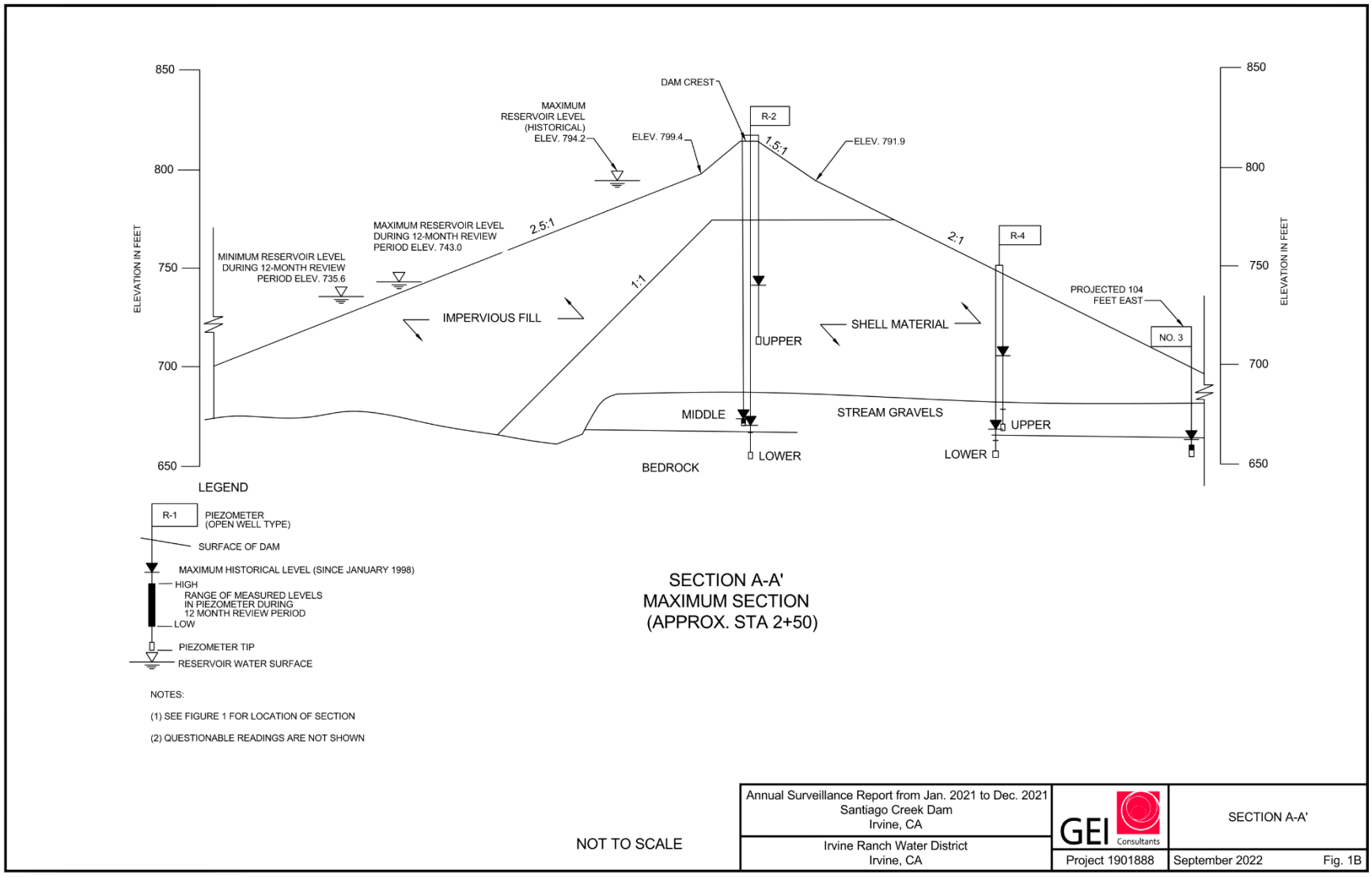


Figure 7.1-2 Santiago Creek Dam Cross Section

7.2 Evaluation of Detection and Response Timing

Timely implementation of the EAP and coordination and communication with emergency management authorities are crucial elements in the effectiveness of the emergency response effort. Total EAP implementation time from the initiation of an actual incident to determination of an emergency situation and notification of appropriate entities involved with implementation is evaluated through annual exercises and training. The time from the initial detection of an incident through the determination of the emergency level and execution of the notifications to the appropriate entities should take no more than 60 minutes. The initial detection and notification time will be evaluated during IRWD's annual review and exercises (see Section 7.2.2), and may be updated in subsequent EAP revisions.

7.3.1 Training

All personnel involved in the EAP should be familiar with the elements of the plan, their responsibilities and duties outlined in the plan and, if applicable, the types and availability of equipment during an emergency. Personnel should be familiar with problem detection and evaluation, and appropriate remediation actions, as detailed in this EAP.

7.3.2 Annual Review and Exercises

IRWD will review and, if needed, update the EAP at least once annually leading up to the emergency action plan notification exercise described below. This review includes contacting all parties listed in this EAP to verify that contact names, phone numbers, addresses and other information is current. One of the most important tasks is to verify and update the contacts listed in the Emergency Notification Flowcharts in Section 3. Making updates to locally available resources along with the other information in the EAP is also important so that accurate information is readily available during an emergency.

In accordance with California Government Code Section 8589.5(c), at least once annually, IRWD will conduct an emergency action plan notification exercise with local public safety agencies, to the extent that a local public safety agency wishes to participate. This annual exercise is to ensure that emergency communications plans and processes are current and implemented effectively.

Exercises will follow the types of exercises defined in the Homeland Security Exercise and Evaluation Program (HSEEP), beginning with simple exercises and advancing to more complex exercises. Sufficient time should be provided between each exercise to learn and improve from the experiences of the previous exercise. IRWD, as the dam owner/operator, will coordinate with OCSD, OCFA, and other downstream jurisdictions in order to exercise the EAP. Exercises promote prevention, preparedness, and response to incidents and emergencies. Exercises may also be extended to include recovery operations. Periodic exercises result in an improved EAP as lessons learned are incorporated into the updated EAP document. The frequency and level of exercise will be determined in coordination with the OCFA, the OCSD EMD and other local emergency response organizations.

The following are recommended frequencies for the exercise types described in the HSEEP:

- Seminars with primary emergency management authorities as part of the annual emergency action plan notification exercise – annually.
- Drills to test the notification flowcharts in Section 3 and emergency equipment/procedures (emergency action plan notification exercise) – annually.
- Tabletop exercise – every 3 to 4 years or before functional exercises.
- Functional exercise – every 5 years.
- Full scale exercise – as required to evaluate actual field movement and deployment. At least one functional exercise should be conducted before conducting a full-scale exercise.

Functional and full-scale exercises should be coordinated with other scheduled exercises, whenever possible, to share emergency management resources and reduce costs.

7.3 Access to the Site

Access to the Santiago Creek Dam can be coordinated with the dam operator at the phone numbers provided in the notification flowcharts in Section 3. Depending on the dam safety incident, IRWD may establish an operations center to coordinate dam safety response activities and provide information to other emergency response personnel. The dam is located at Irvine Lake in Orange County, and can be accessed from an access road in Irvine Regional Park, an access road on East Santiago Canyon Road, or from Oak Canyon Park. Vehicle access to the area around the dam is restricted via locked gates and fencing. However, the east side of the reservoir near Oak Canyon Park is open to the public for recreation purposes.

In order to access the Santiago Creek Dam from the south, take CA-261 N to E Santiago Canyon Road, turn northwest onto E Santiago Canyon Road, and follow it for approximately one mile until Jamboree Road. Head north on Jamboree Road, then turn right on Irvine Park Lane. Continue east on Irvine Park Lane as it turns into Peters Canyon Road, then continue east on Peters Canyon Road until it reaches Santiago Creek Dam.

The primary access road is likely to be inundated during a dam failure. Two other access routes are available which are upstream of the dam and not likely to be inundated:

- Access via Santiago Landfill: Take CA-261 N to E Santiago Canyon Road. Follow E Santiago Canyon Road southeast for 1 mile, and then turn north into the Santiago Landfill. Follow landfill access road north to a location near the spillway.
- Dirt road access via Black Star Canyon: Take CA-261 N to E Santiago Canyon Road. Follow E Santiago Canyon Road southeast for 5.5 miles. Turn left (north) onto Silverado Canyon Rd, then turn left (north) on Black Star Canyon Rd. Drive 1.3 miles north on Black Star Canyon Road to the county access gate. Follow the dirt road north to an intersection with a private dirt road (Latitude 33.772555, Longitude -117.681335). Follow the dirt road west along a winding route until reaching an intersection with another dirt road (Latitude 33.787783, Longitude -117.718690). Turn left (south) and follow the dirt road to the former dam keeper residence. This access route is highlighted in

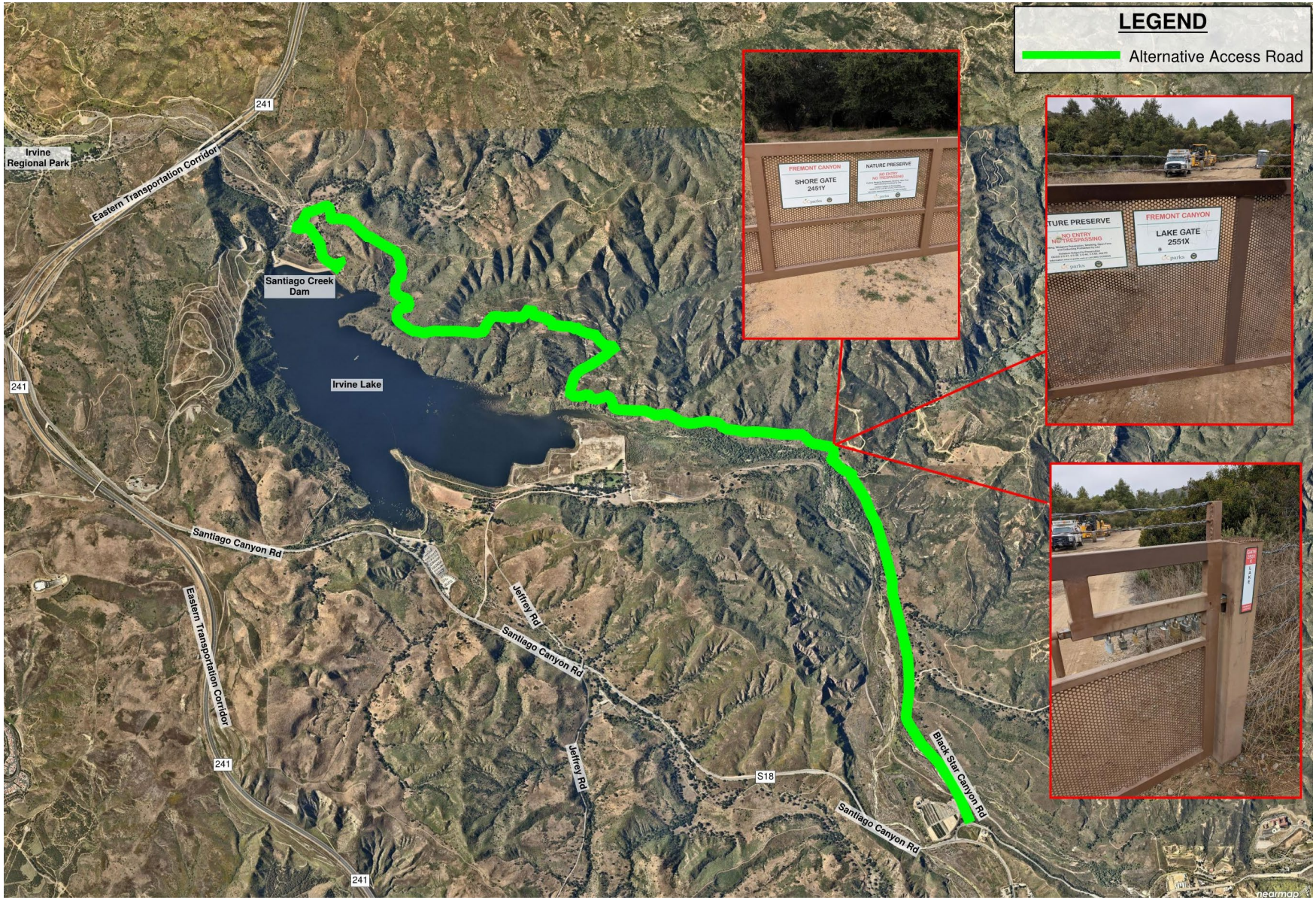


Figure 7.3-3 Santiago Creek Dam Alternate Access Route

7.4 Response During Periods of Darkness

IRWD maintains a 24-hour emergency response staff to respond to various utility outages and emergency maintenance requirements. Because of the availability of 24-hour emergency response staff, the response to an emergency incident during periods of darkness should not be significantly longer than during periods of daylight. Notification times would be within 60 minutes, the same as during daylight hours. Phone numbers in the notification charts are 24-hour contact numbers, so notification procedures during periods of darkness are the same as on weekdays.

Any dam safety incident that requires response actions during periods of darkness may require additional lighting such as portable floodlights. IRWD maintenance and construction personnel can have rental lighting moved to the site in order to respond during times of darkness. Rental lighting equipment is located within 25 miles of the dam and could be moved to the dam site within 2 hours. Additional lighting may also be required by the dam operator in order to perform visual surveillance of a potential or developing situation. Additional lighting options are also available through the IRWD purchasing and contracting department from locally available sources.

7.5 Response During Weekends and Holidays

IRWD staff are available for recall during emergencies on weekends and holidays. For slowly developing situations, staff may be recalled and a 24-hour operations center may be established in order to have resources readily available should the situation deteriorate. A rapidly developing situation occurring after hours or during weekends and holidays may require the recall of engineering, maintenance, or other response personnel, and response may be delayed during the recall and mobilization of the IRWD staff. During weekends and holidays, IRWD staff could be onsite to assess a rapidly-developing emergency within 60 minutes. This means that the daytime response time of 60 minutes could be extended by 60 minutes, for a weekend/holiday response time of about 2 hours.

7.6 Response During Adverse Weather

Periods of adverse weather that have the ability to impact dam safety may require additional staff to be on-call or prepared to execute response actions. The Director of Water and Recycling Operations, in collaboration with the dam operator will make staffing recommendations to IRWD leadership during times of predicted adverse weather. Response time to an emergency situation may be lengthened by 30 minutes during periods of adverse weather. See information in Section 7.3 on site access and alternative points of access. Some of the access points to the dam are dirt roads, which, during adverse weather, may require four-wheel drive or high clearance vehicles.

7.7 Alternative Sources of Power

At Santiago Creek Dam, the aeration system requires power to operate and does not have backup power. However, essential reservoir operations such as control valves and structures do not require power and may be operated manually. Additional generators may be brought to the site to power lighting if needed to evaluate the dam in periods of darkness. Generators are located at the MWRP at 3512 Michelson Drive, Irvine, California, 92612, located about 13 miles southwest of Santiago Creek Dam. Generators may be brought to the dam site within 60 minutes.

In the event of an electrical outage, cellular phones may be used for communications in lieu of a telephone land line or computer.

7.8 Emergency Supplies and Information

IRWD maintains emergency supplies and response equipment for many potential response actions. IRWD's supplies are centrally located at the MWRP at 3512 Michelson Drive, Irvine, California, 92612, located about 13 miles southwest of Santiago Creek Dam. IRWD emergency supplies are listed in Section 7.9. In the event that the IRWD internal response capabilities are exceeded *Table 7-1- Locally Available Resources* is provided to aid in securing additional response materials and equipment. The suppliers listed in Table 7-1 are typically open from 7am-5pm Monday through Friday; outside these hours, a dispatcher is typically available to handle after-hours requests. Secondary phone numbers have been listed where available.

Table 7-1 Locally Available Resources

	Heavy Equipment Service and Rental	Sand and Gravel Supply	Ready-Mix Concrete Supply
Company	Herc Rentals	PTI Sand and Gravel	National Ready Mix Concrete
Address			
Phone Numbers			
Contact Person			

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

*Daytime and after-hours number: calling the main number after hours will route to an on-call employee.

7.9 Stockpiling Materials and Equipment

No equipment is stockpiled at Santiago Creek Dam. Because IRWD owns several dams, as well as other water facilities, IRWD centralizes its emergency supplies stockpile at the MWRP at 3512 Michelson Drive, Irvine, California, 92612, located about 13 miles southwest of Santiago Creek Dam. Supplies and equipment stockpiled centrally at MWRP are ready for deployment for use anywhere within the District's boundary. Equipment and supplies stored at MWRP include generators; diesel fuel; construction equipment such as backhoes and excavators; vacuum trucks; compressors; tools; traffic control equipment; non-woven filter fabric; and excavation and backfill materials including sand, crushed rock, pea gravel, and road base material. Equipment at MWRP can generally be moved to the dam site within 60 minutes. Equipment, materials, and

supplies required that exceed the IRWD capabilities are locally accessible at the locations in *Table 7-1 Locally Available Resources*. Equipment obtained from third parties listed in Table 7-1 could be obtained within about 2 hours during regular business hours.

7.10 Coordination of Information

In the event of an emergency at Santiago Creek Dam, IRWD will notify the NWS so that they can issue appropriate flood watches and warnings. Contact numbers and notification procedures for NWS are outlined in Sections 3.1 and 3.2

The Santiago Creek Dam stores natural flows collected from the surrounding watershed. The water level in the reservoir is controlled through outlet valves, and if a potential or developing dam safety incident requires the lowering of the reservoir level, this must be done in accordance with the standard operating procedures maintained by IRWD. All actions associated with controlling flow into or out of the reservoir must be coordinated with the dam operator or a representative designated by IRWD.

There are no jurisdictional dams upstream of Santiago Creek Dam. Villa Park Dam is a jurisdictional dam located downstream of Santiago Creek Dam and may be affected by an emergency event at Santiago Creek Dam. Coordination with OCPW, the owner of Villa Park Dam, is therefore required. If the EAP is activated, IRWD will notify OCPW per the notification charts in section 3.1 (call to OCPW Operations and Maintenance Emergency Coordinator). IRWD will explain the current status of the dam and any expected high flows, to allow for OCPW staff to adjust operations at Villa Park Dam, if necessary. IRWD will provide updates to OCPW staff if flows or conditions at the Santiago Creek Dam change or worsen.

IRWD will work with the Unified Command and emergency personnel to keep them up to date on any situation involving the Santiago Creek Dam. Communication between IRWD and emergency management authorities may be facilitated by the County and OA JIS as described in the County and OA EOP. The Director of Water and Recycling Operations may designate staff members to act as liaisons at the ICP, a Unified Command, or at the County and OA EOC.

7.11 Training and Exercise

IRWD operations and maintenance staff receive training to ensure that they are thoroughly familiar with the elements of the EAP and potential response actions. The operations, engineering staff, and appropriate personnel are trained in the incident management process, including detection, evaluation, notification, and appropriate response actions during all emergency level determinations. IRWD duty staff are trained in notification requirements for dam safety incidents to ensure that the appropriate recall actions are initiated after working hours.

In accordance with California Government Code Section 8589.5(c), at least once annually, IRWD will conduct an emergency action plan notification exercise with local public safety agencies, to the extent that a local public safety agency wishes to participate. This annual exercise is to ensure that emergency communications plans and processes are current and

implemented effectively. All contact information in the notification charts will be updated and verified; next, a notification exercise will be conducted to simulate the phone calls required in the notification charts. The timing and procedures in the notification exercise will be noted, and the EAP will be updated based on feedback from the participants.

Because the Santiago Creek Dam is categorized as an Extremely High-risk dam, local emergency management authorities may develop evacuation and shelter-in-place training materials for people who would be affected by a dam failure in their jurisdiction. These requirements and materials will be determined and developed through the review and exercise process described in Section 7.2.

7.12 Alternative Systems of Communication

In the event of a dam safety emergency, the Unified Command and emergency response personnel have access to various forms of alternative communication ranging from social media, radio broadcasts, wireless emergency alerts, and opt-in email and cellphone lists. OCSD Control One is the central point of contact for interoperable communications between all law enforcement, fire, and public works agencies. Control One can broadcast an emergency message to all dispatcher centers at once via radio, and can send messages via teletype over communications terminals.

IRWD maintains an operations communication architecture for internal communications. Operations staff are able to use a cellular phone, land line telephone, or a computer connected to the internet to communicate with other IRWD personnel and emergency response personnel.

7.13 Public Awareness and Communication

IRWD will utilize already established communication protocols and channels, including those outlined in their Crisis Communication Plan to publish and promote established inter-agency emergency procedures within the affected area. In addition, information on the location of the reservoir as well as related emergency procedures will be available on the IRWD website (https://www.irwd.com/).

In order to further prepare the public for a dam safety incident IRWD will implement the following measures:

- Educate customers about established IRWD emergency notification systems, which include the ability to text, call or email customers in the event of an emergency such as a dam safety incident.
- Promote the emergency preparedness section on the IRWD website and through various communications channels including the monthly customers billing insert and social media channels.
- Coordinate emergency outreach programs with residents and businesses in close proximity to the reservoir through cities, fire and police departments and the County of Orange.

- Post a map of the inundation area on the IRWD website so that members of the public may see if they live within possible impacted areas.
- Post a summary of the annual EAP exercise on the IRWD website each year.
- Update existing information on dam safety and emergency-preparedness on the IRWD website within one month of the approval of the EAP. After each annual review, updates will be made to the website as necessary.
- Complete outreach to customers through existing outreach channels within 4 months of completion of the EAP.

The timing and frequency of additional outreach measures will be evaluated and updated as part of the annual EAP review.

Section 8: Plan Maintenance

8.1 Plan Review and Maintenance

The EAP Coordinator will review and update the EAP at least once annually leading up to the emergency action plan notification exercise described below. This review includes updating contact information listed to verify that contact names, phone numbers, addresses and other information is current. One of the most important tasks is to update the contacts listed in the Emergency Notification Flowcharts in Section 3. Making updates to locally available resources along with the other information in the EAP is also important so that accurate information is readily available during an emergency.

In accordance with California Government Code Section 8589.5(c), at least once annually, IRWD will conduct an emergency action plan notification exercise with local public safety agencies, to the extent that a local public safety agency wishes to participate. This annual exercise is to ensure that emergency communications plans and processes are current and implemented effectively.

In accordance with California Water Code section 6161(e), IRWD will update the EAP, including the inundation maps, no less frequently than every 10 years, and sooner under conditions that include: (1) a significant modification to the dam or a CAS and (2) a significant change to downstream development that involves people and property. The inundation maps for this EAP are dated January 26, 2018, and requires updating by January 26, 2028.

8.2 Distribution

A status report will be prepared annually that documents the plan review and any exercises that occurred. The EAP will be revised, as required, to incorporate updated information or lessons learned during exercises/event after action reports. Changes will be documented in the revision log in Appendix B, Record of EAP Revisions.

Electronic copies of the EAP Status Report (Appendix A) and revised EAP will be distributed to the EAP Plan Holders annually via email (Appendix C). The EAP Plan Holders include all parties on the notification flowcharts.

To request a copy of the Emergency Action Plan for Santiago Creek Dam, please contact the EAP Coordinator:

Steve Choi, Director of Safety and Security
Irvine Ranch Water District

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

PART II: Inundation Maps

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY **GAVIN NEWSOM,** *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

AUG 2 0 2019

Mr. Paul Cook, General Manager
Irvine Ranch Water District
Post Office Box 57000
Irvine, California 92619-7000

Mr. Jerry Vilander, General Manager
Serrano Water District
18021 East Lincoln Street
Villa Park, California 92861-6446

Santiago Creek Dam, No. 75
Orange County

Dear Mr. Cook and Mr. Vilander:

The Division of Safety of Dams (DSOD) has reviewed the inundation map submitted for Santiago Creek Dam. It was determined that the dam has no critical appurtenant structures and the map listed below is in substantial compliance with the requirements of Title 23, Division 2, Chapter 1, Article 6 of the California Code of Regulations. Therefore, the following inundation map is approved:

1. Main Dam (sunny day failure scenario) map dated January 26, 2018.

The approved map will be made publicly available as required by section 6161(c) of the California Water Code. An emergency action plan (EAP), based on the approved inundation map, must now be submitted to the California Governor's Office of Emergency Services (Cal OES) for their review and approval. Upon Cal OES approval, please submit an electronic copy of the approved EAP with a hard copy of the transmittal letter to DSOD.

Pursuant to section 6161(e) of the CA Water Code, the EAP and inundation map must be updated no less frequently than every 10 years, and sooner under conditions that include, but are not limited to, the following: (1) a significant modification to the dam or a critical appurtenant structure as determined by the department, or (2) a significant change to downstream development that involves people and property. Based on the requirement, the approved maps will expire on January 26, 2028. Please submit the updated map at least six months prior to the expiration date for DSOD's review and approval.

If you have any questions or need additional information, you may contact Design Engineer Dean Smith at (916) 565-7843 or Re-evaluation Engineering Branch Chief Ariya Balakrishnan at (916) 565-7870.

Sincerely,

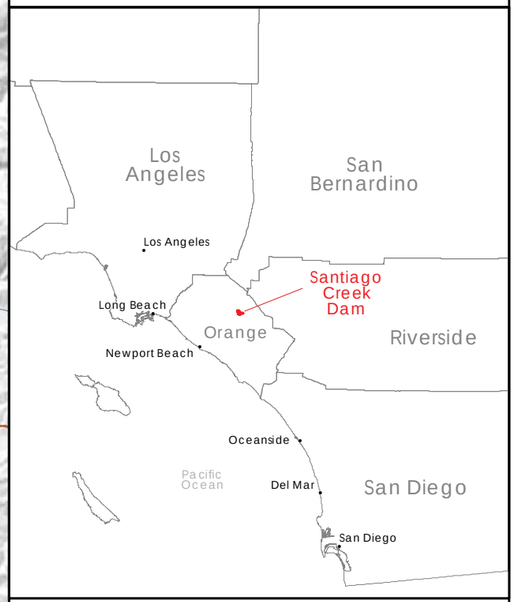
Sharon K. Tapia, Chief
Division of Safety of Dams

cc: (See Attached List)

cc: Mr. José Lara, Chief
Dam Safety Planning Division
California Governor's Office of Emergency Services
3650 Schriever Avenue
Mather, California 95655

SANTIAGO CREEK DAM INUNDATION MAP INDEX

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Index Grid
- Stream
- Highway
- Reservoir
- Sunny Day Failure Inundation Area

1/26/2018

0 1 2 Miles

N

STETSON ENGINEERS INC.

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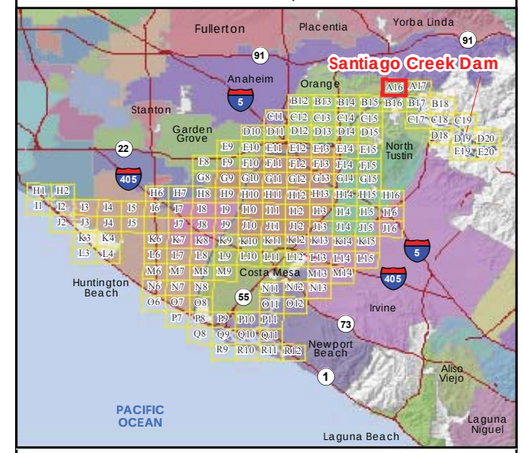
SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

Note: Grid lines show latitude and longitude at 30 arc-second spacing in the WGS84 horizontal datum. Information shown on this map is approximate and should be used as a guideline for emergency response and preparation purposes.

This map meets all applicable state and federal standards and has been prepared in consideration of all potential downstream hazards by a licensed civil engineer.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 1 of 148

A16

STETSON ENGINEERS INC.

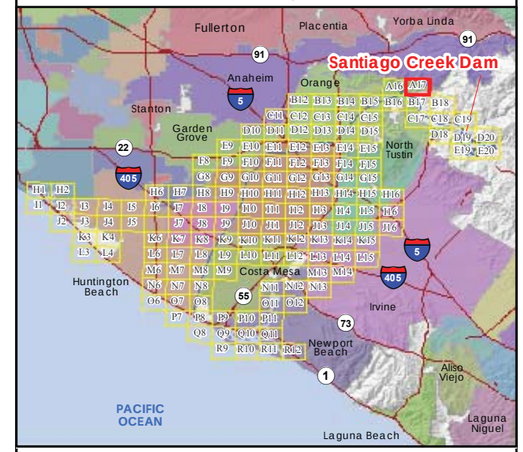
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

117°47'30"W 117°47'0"W 117°46'30"W
33°49'30"N

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 2 of 148

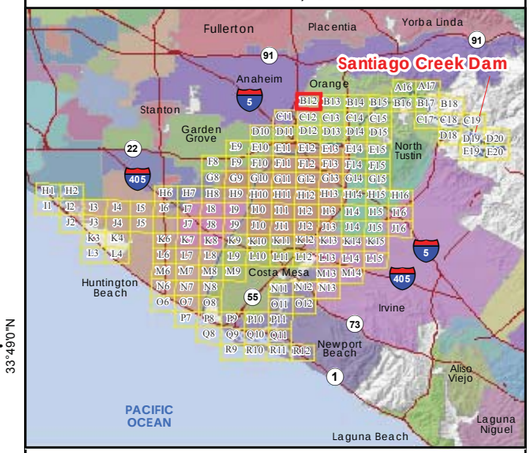
A17

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 3 of 148

B12

STETSON ENGINEERS INC.

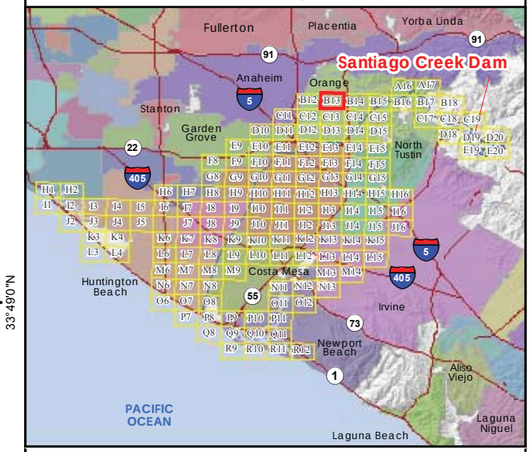
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 4 of 148

B13

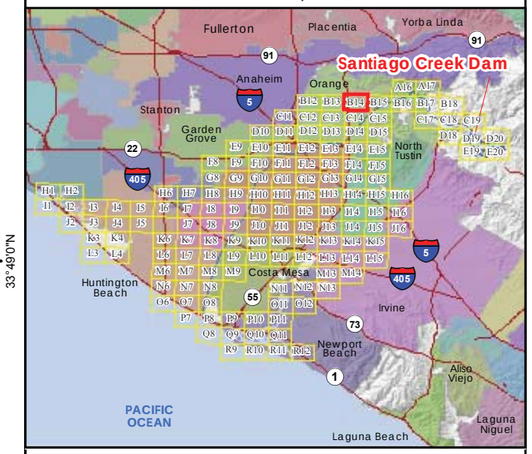
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 5 of 148

B14

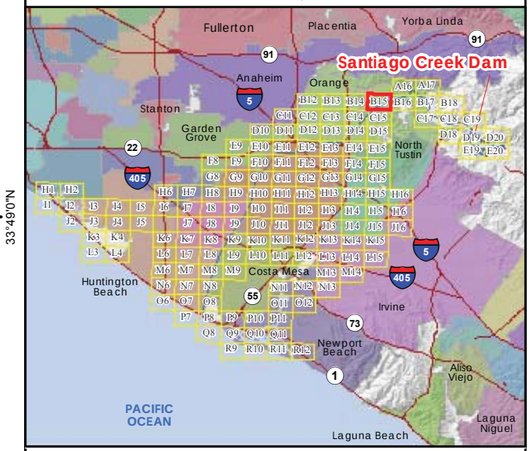
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 6 of 148

B15

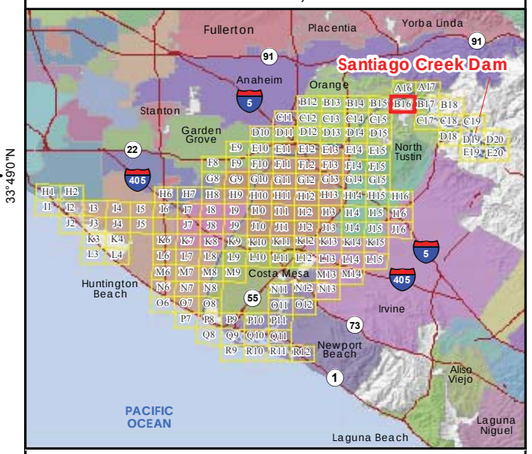
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- Auxiliary Dam Inundation Area*
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 7 of 148

B16

STETSON ENGINEERS INC.

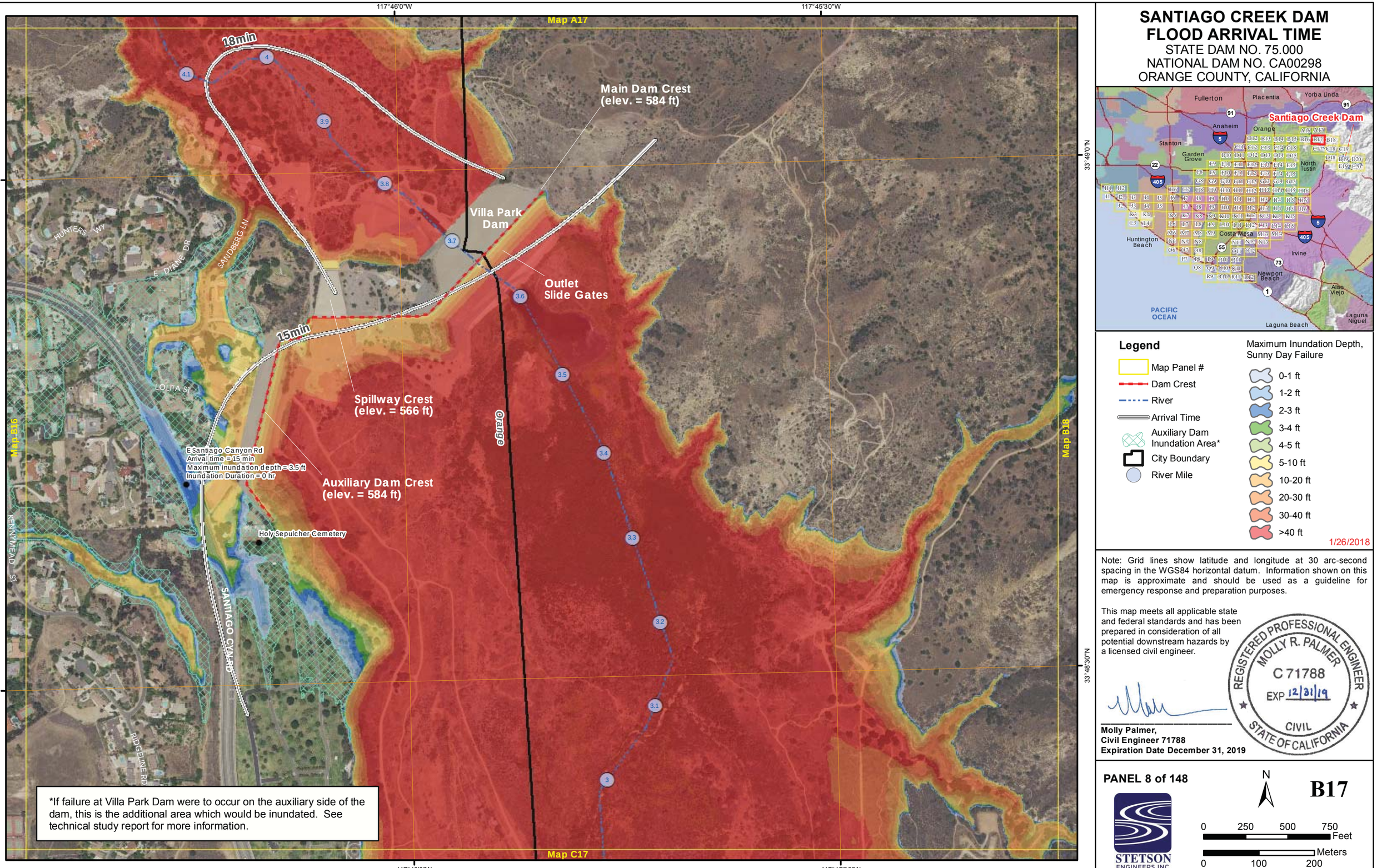
0 250 500 750 Feet
0 100 200 Meters

*If failure at Villa Park Dam were to occur on the auxiliary side of the dam, this is the additional area which would be inundated. See technical study report for more information.

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



*If failure at Villa Park Dam were to occur on the auxiliary side of the dam, this is the additional area which would be inundated. See technical study report for more information.

Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- Auxiliary Dam Inundation Area*
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 8 of 148

B17

N

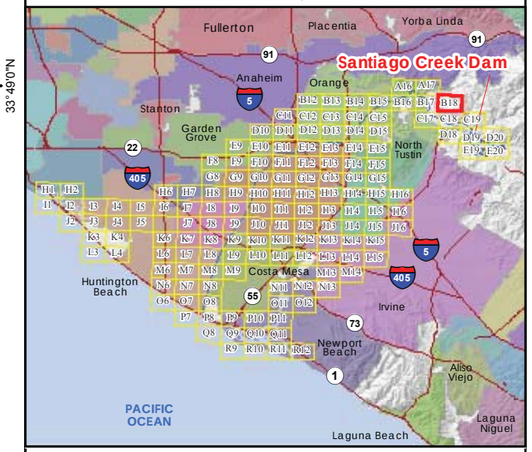
0 250 500 750 Feet
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 9 of 148

B18

STETSON ENGINEERS INC.

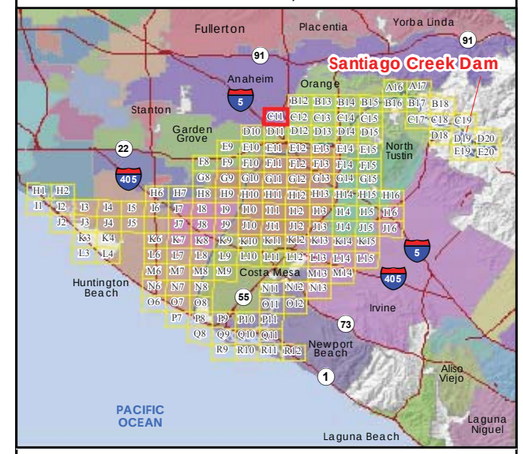
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

Note: Grid lines show latitude and longitude at 30 arc-second spacing in the WGS84 horizontal datum. Information shown on this map is approximate and should be used as a guideline for emergency response and preparation purposes.

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 10 of 148

C11

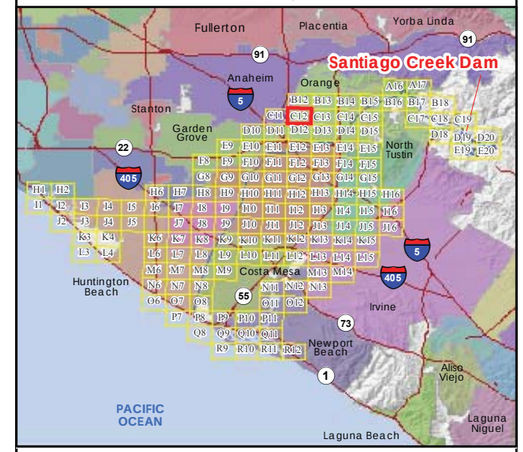
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 11 of 148

C12

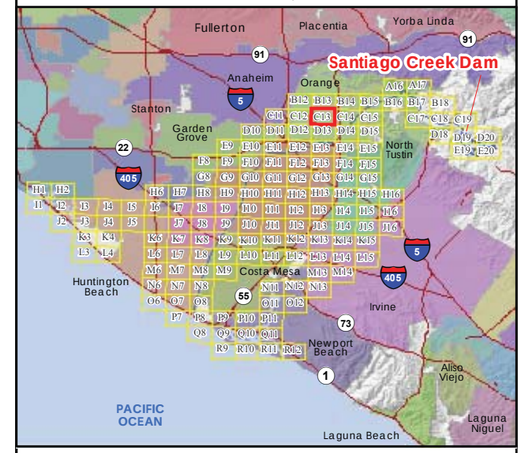
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 12 of 148

STETSON ENGINEERS INC.

N

C13

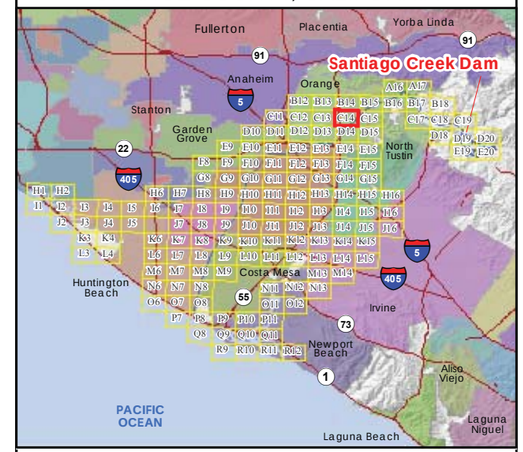
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 13 of 148

C14

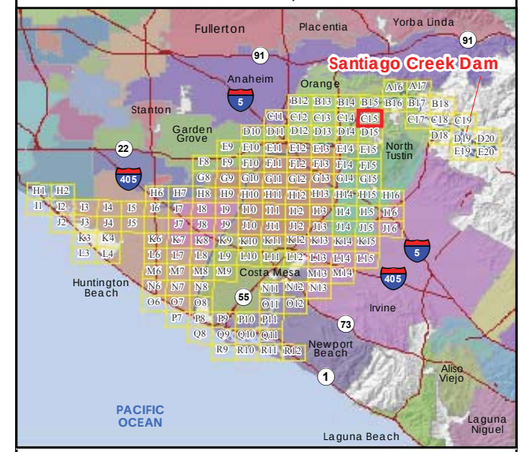
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Communications Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 14 of 148

C15

STETSON ENGINEERS INC.

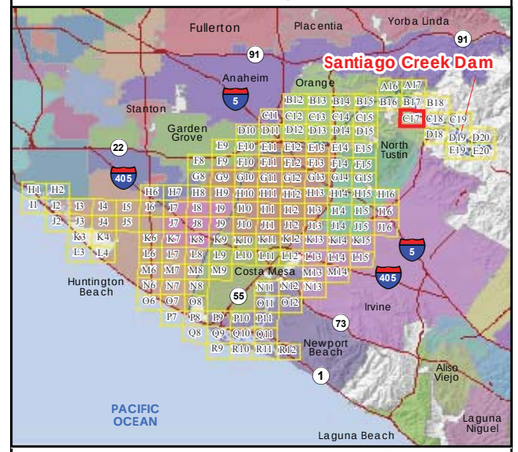
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

117°48'30"W 117°48'0"W 33°48'0"N

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 15 of 148

C17

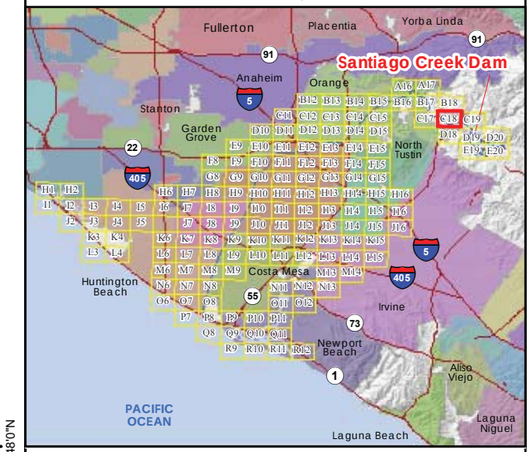
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 16 of 148

C18

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Map B18
Map C17
Map C19
Map D18
117°45'0"W
117°44'30"W
33°48'0"N
33°47'30"N

12min
9min
6min

Equestrian Center
Arrival time = 11 min
Maximum inundation depth = 26.1 ft
Inundation Duration = 1 hr

Peters Canyon Rd
Arrival time = 10 min
Maximum inundation depth = 36 ft
Inundation Duration = 6 hr

Peters Canyon Rd
Arrival time = 7 min
Maximum inundation depth = 48.2 ft
Inundation Duration = 3 hr

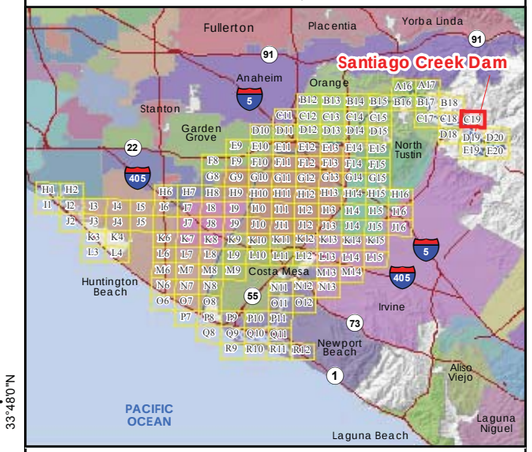
Irvine Regional Park
Arrival time = 9 min
Maximum inundation depth = 36.6 ft
Inundation Duration = 1 hr

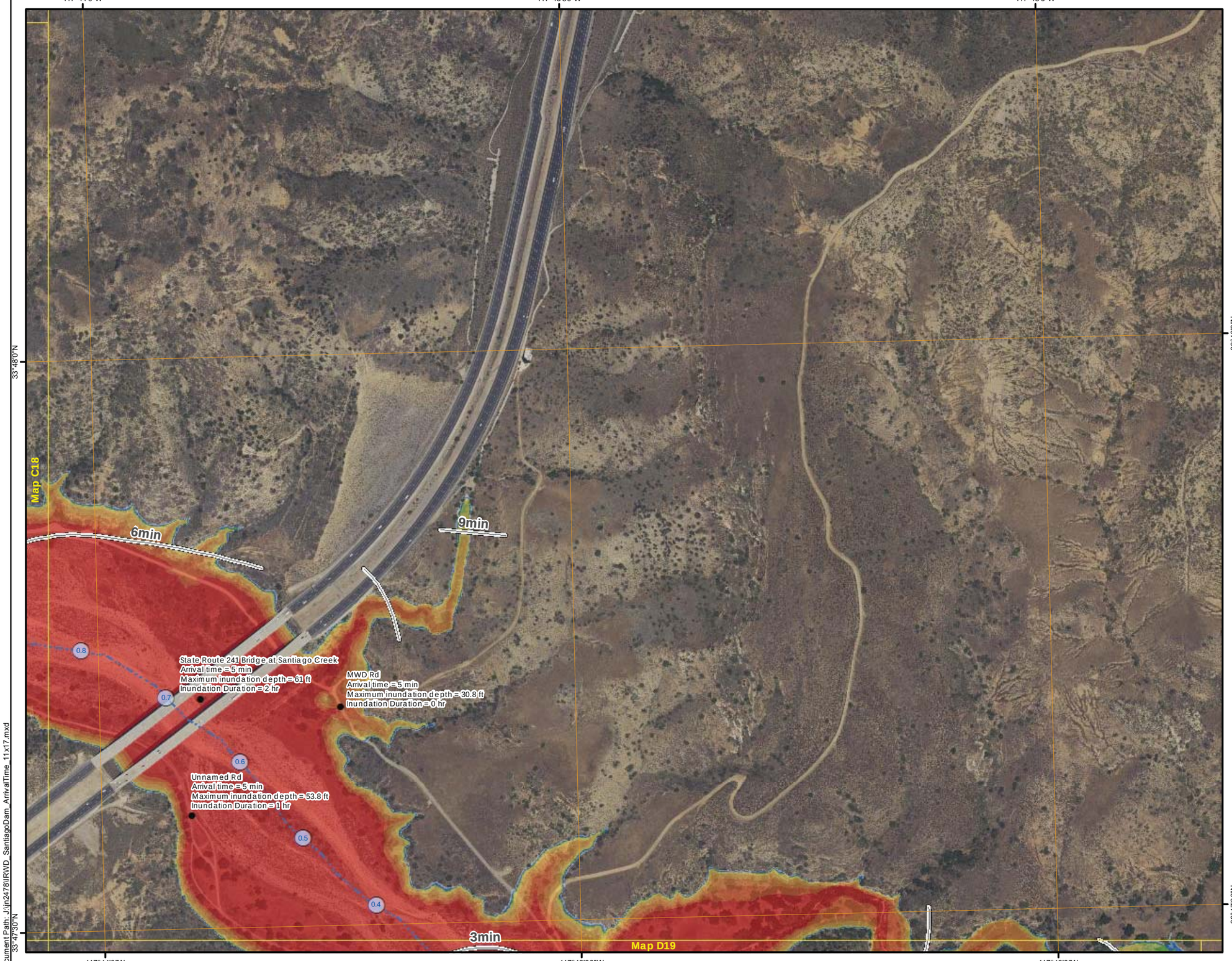
Orange
Orange

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 17 of 148

C19

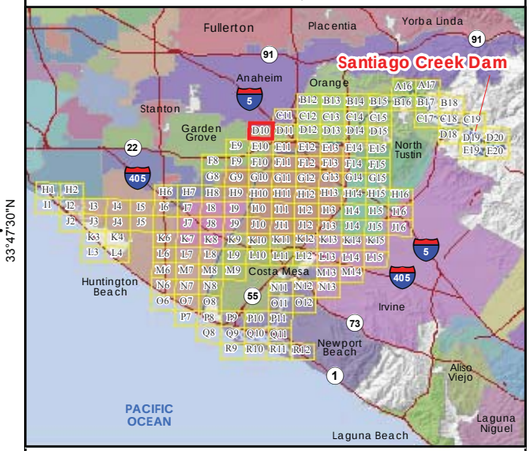
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24781\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 18 of 148

STETSON ENGINEERS INC.

N

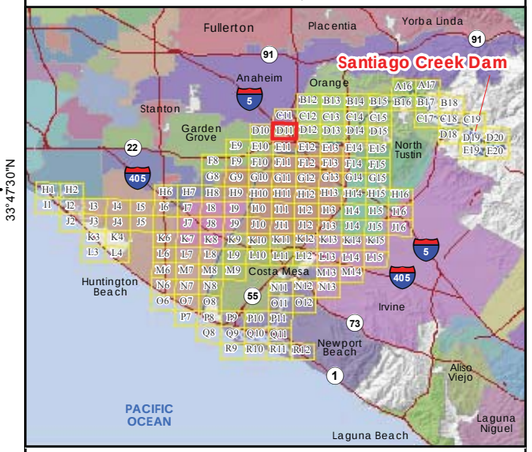
D10

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Correctional Facility
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 19 of 148

D11

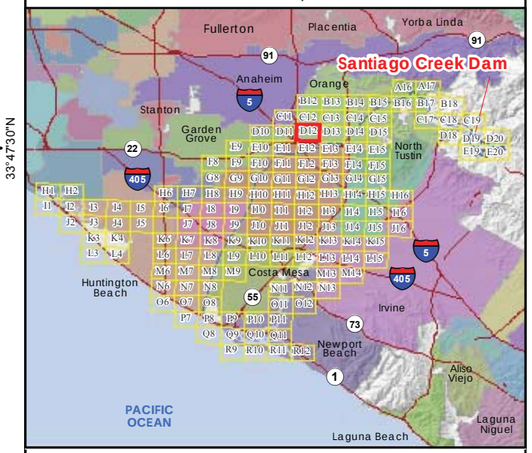
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 20 of 148

D12

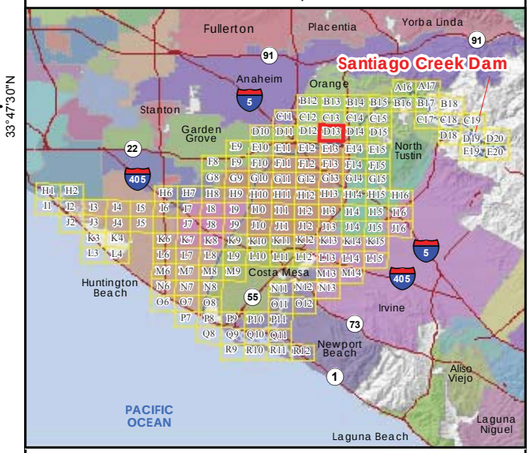
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 21 of 148

D13

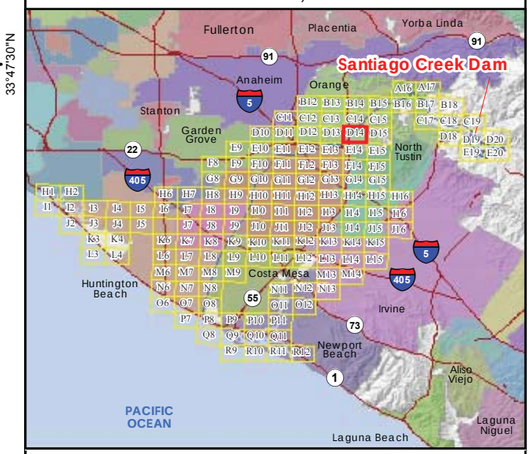
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 22 of 148

D14

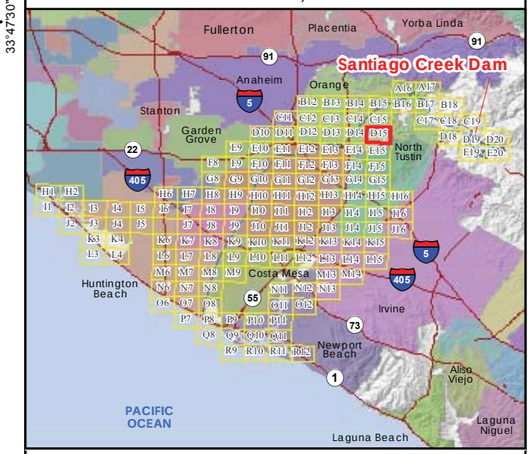
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 23 of 148

D15

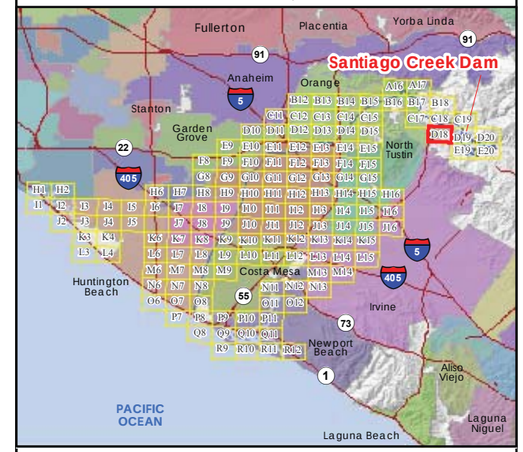
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 24 of 148

D18

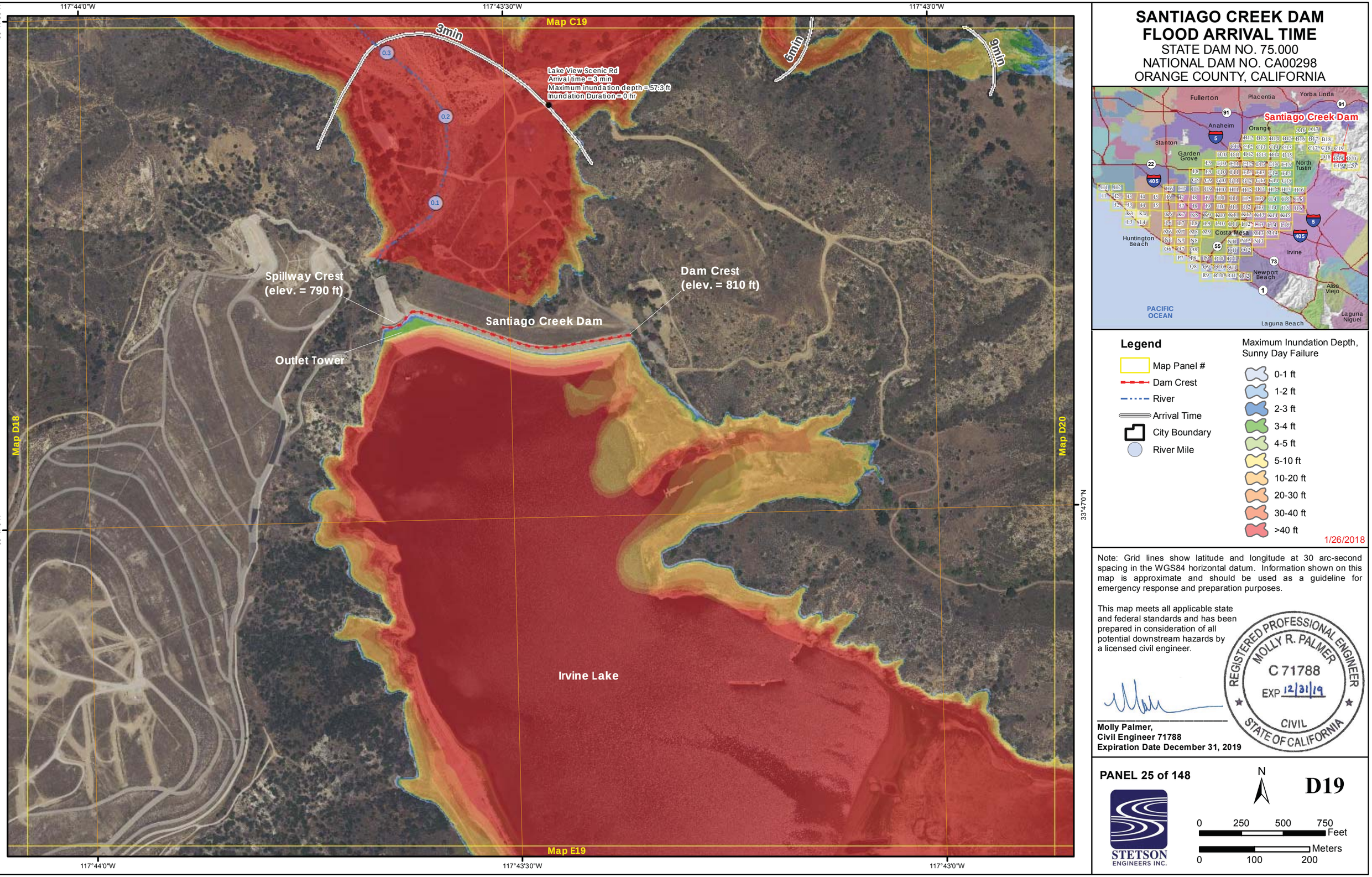
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 25 of 148

D19

STETSON ENGINEERS INC.

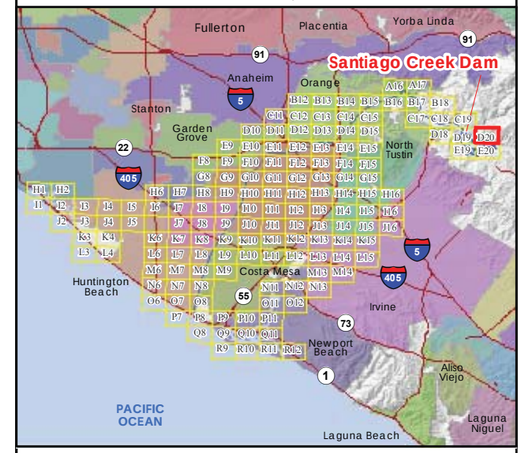
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 26 of 148

D20

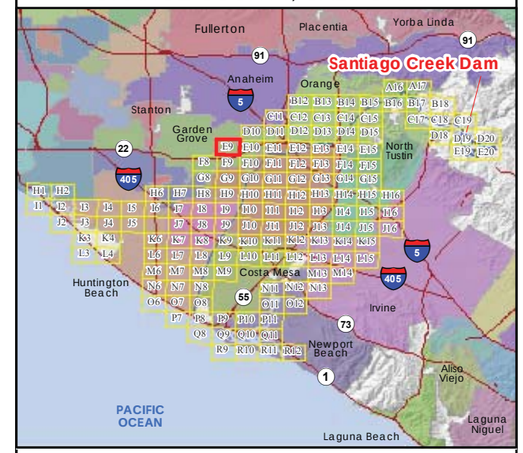
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 27 of 148

STETSON ENGINEERS INC.

N

E9

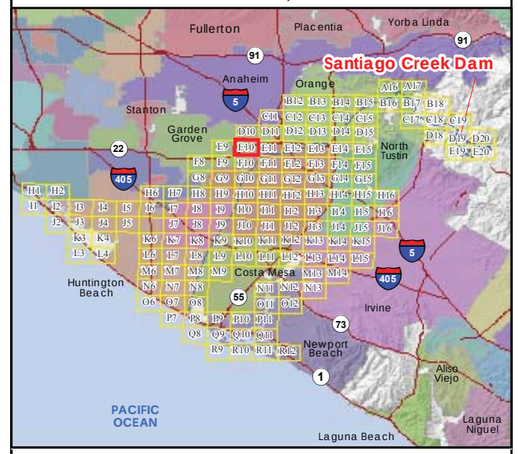
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 28 of 148

E10

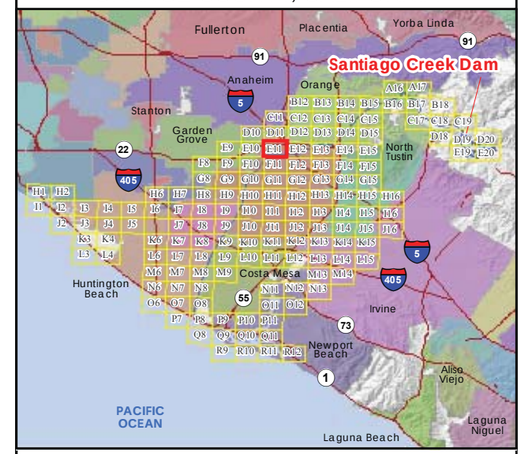
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Communications Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 29 of 148

E11

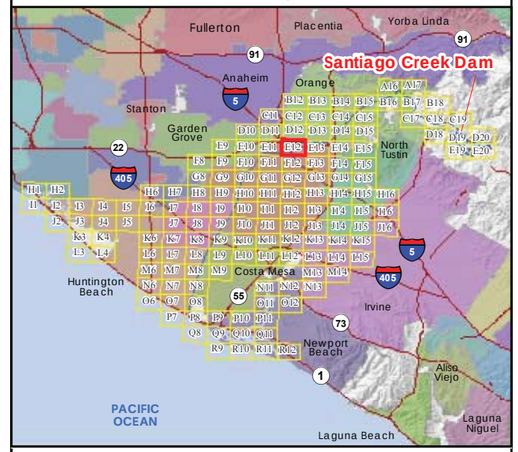
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 30 of 148

E12

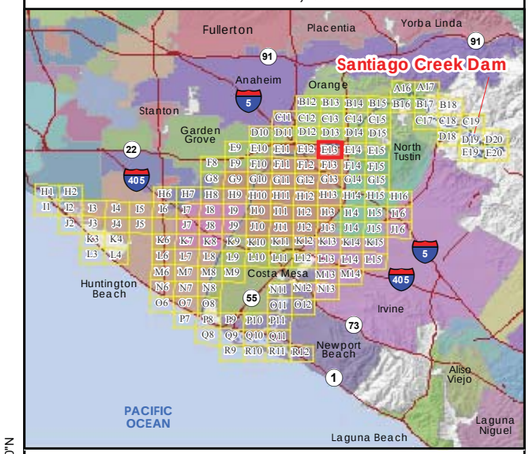
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 31 of 148

E13

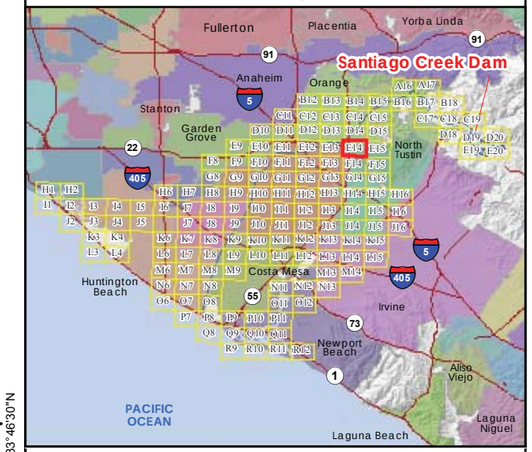
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 32 of 148

E14

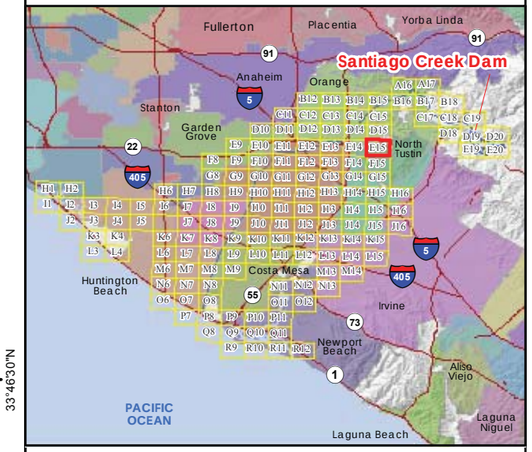
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 33 of 148

E15

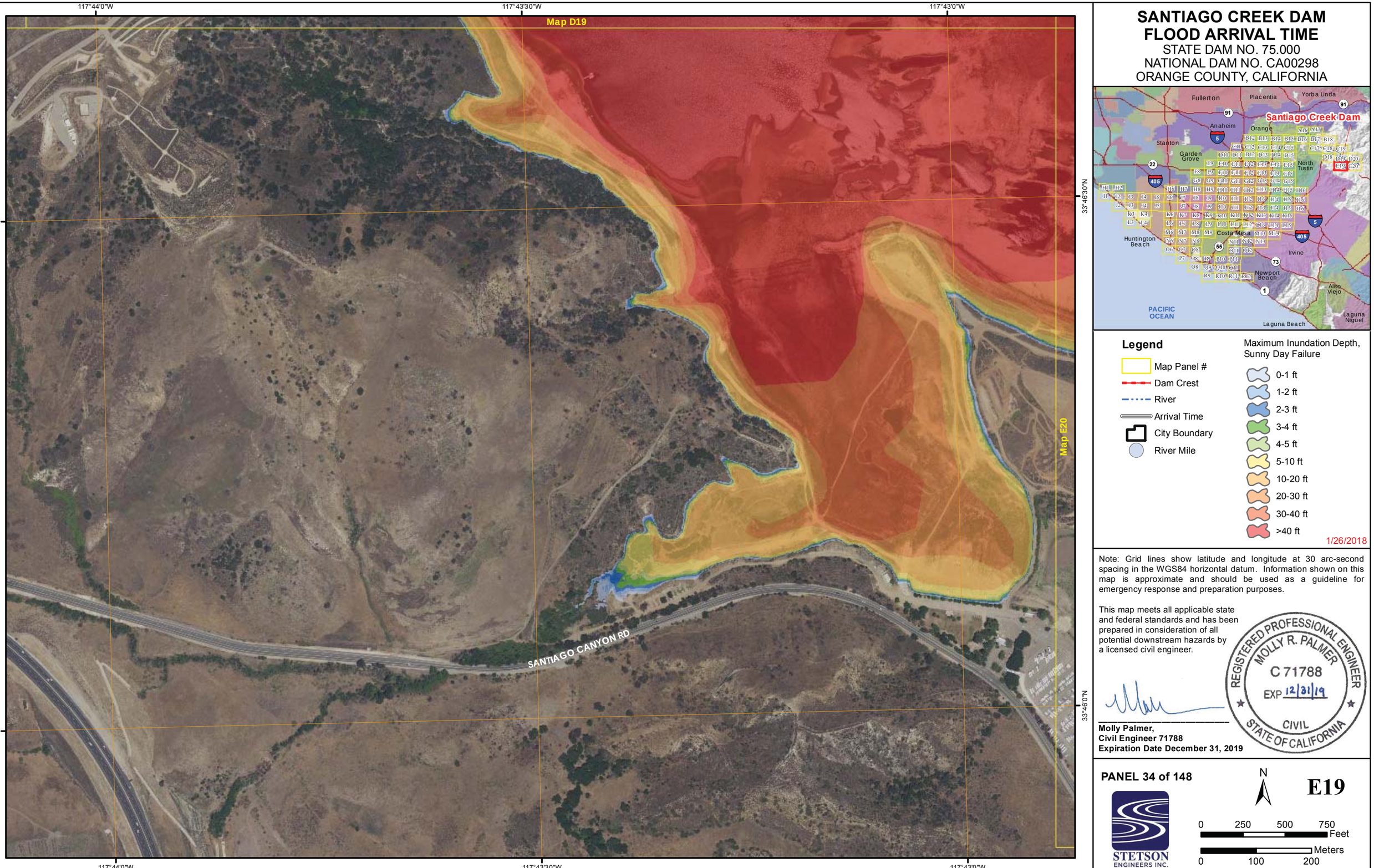
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 34 of 148

E19

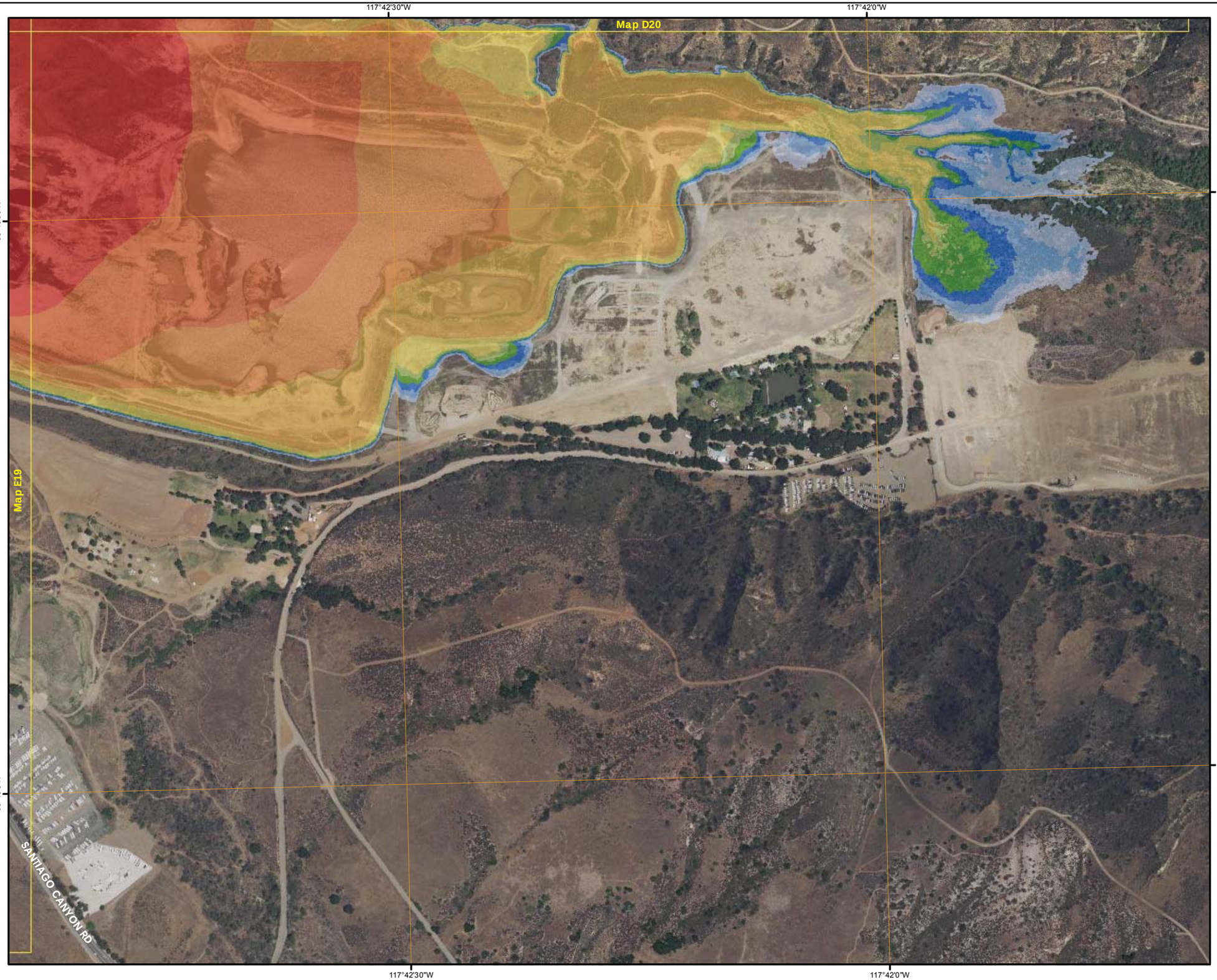
STETSON ENGINEERS INC.

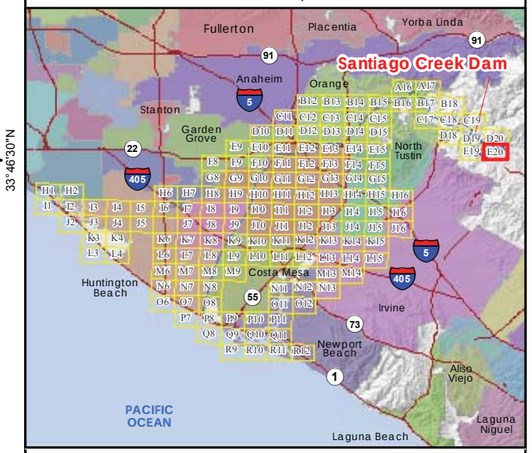
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
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C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 35 of 148

E20

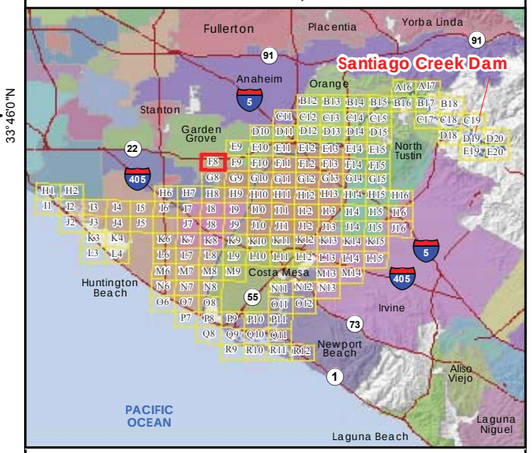
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 36 of 148

F8

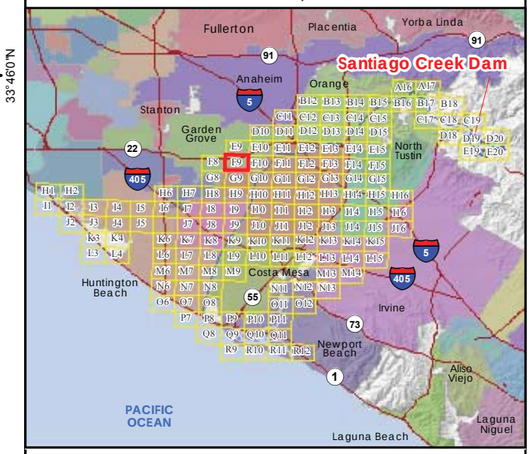
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 37 of 148

F9

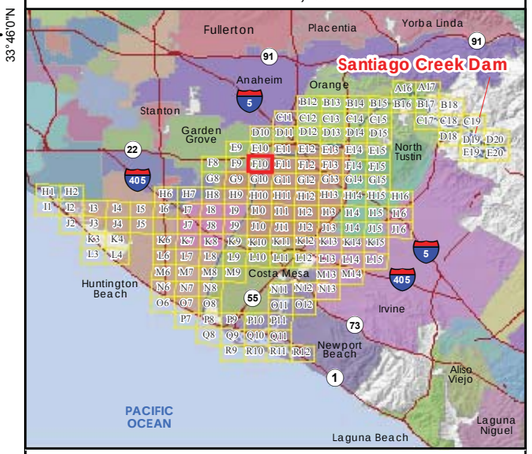
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 38 of 148

F10

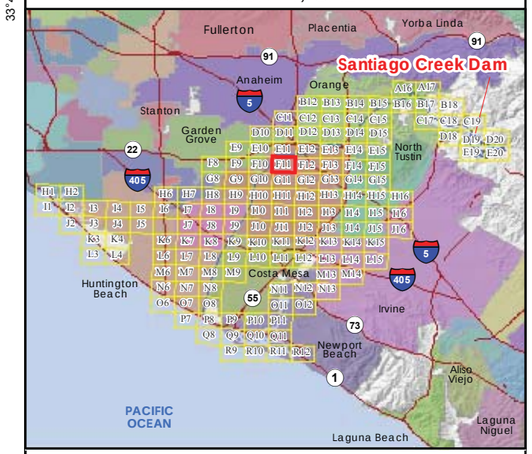
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 39 of 148

F11

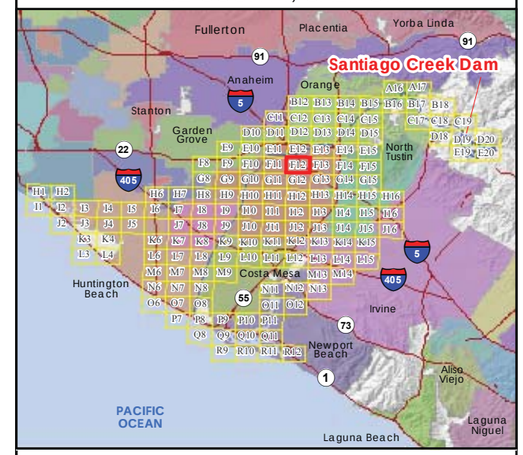
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Communications Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 40 of 148

F12

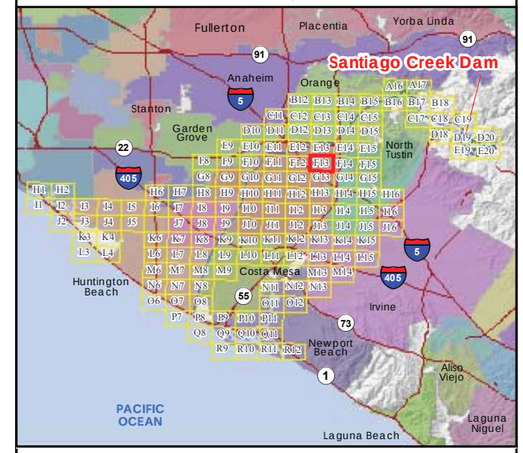
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Communications Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 41 of 148

F13

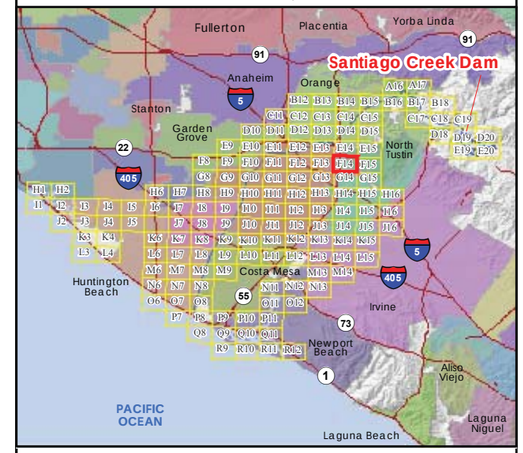
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 42 of 148

F14

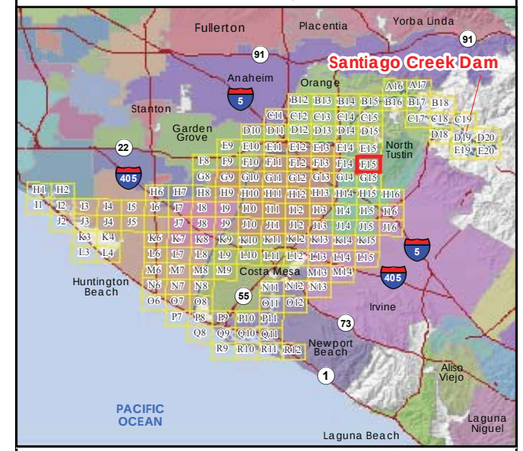
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 43 of 148

F15

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Holt Ave at Warren Ave
Arrival time = 1.2 hr
Maximum inundation depth = 2.1 ft
Inundation Duration = 0 hr

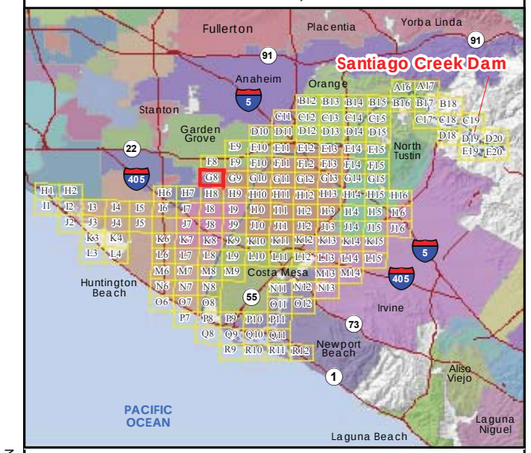
1hr 10min

Map F15
Map F14
Map G15
117°48'30"W
117°48'0"W
33°45'30"N

Document Path: J:\jn\24781\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 44 of 148

G8

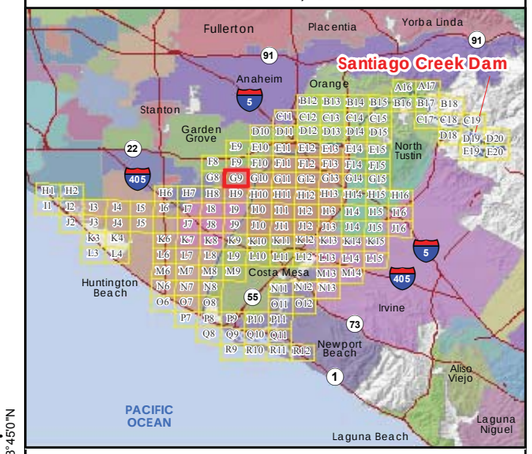
STETSON ENGINEERS INC.

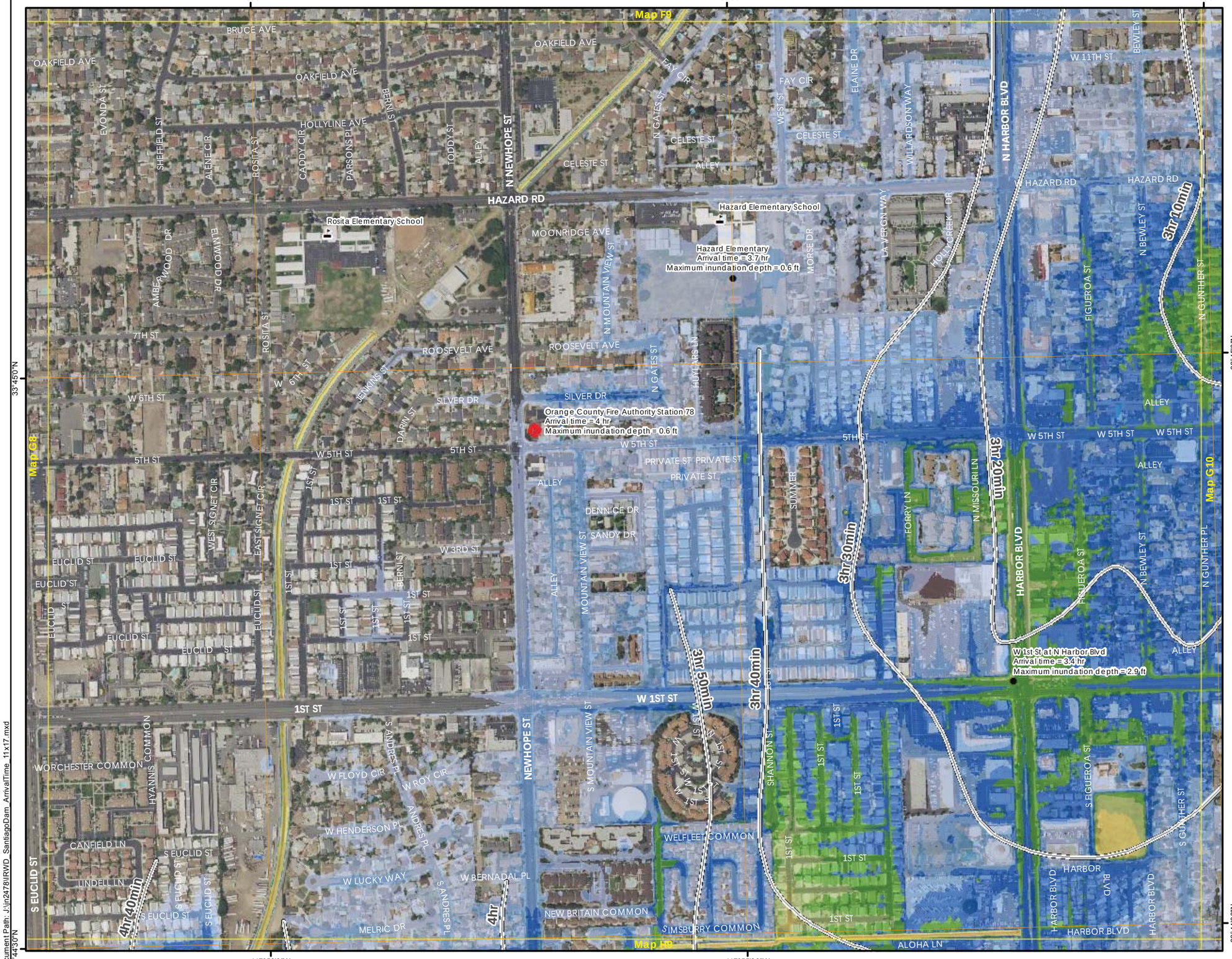
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 45 of 148

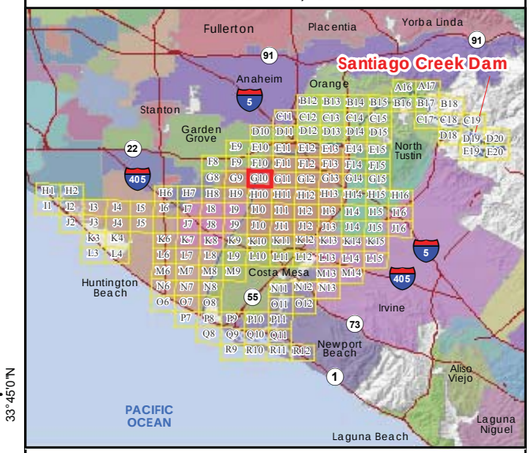
G9

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Communications Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 46 of 148

G10

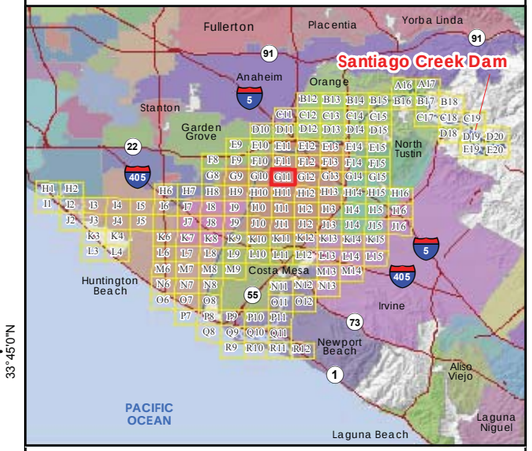
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Police Station
- Correctional Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 47 of 148

G11

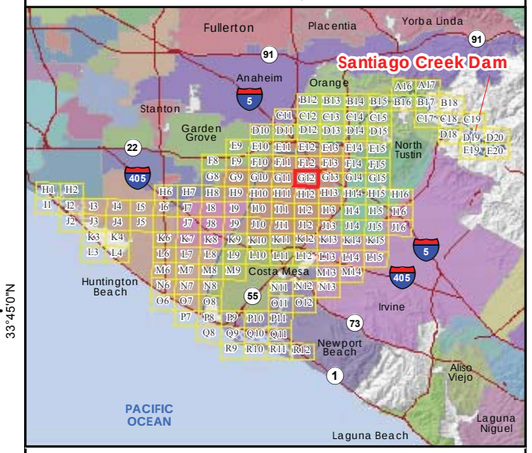
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
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CIVIL
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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 48 of 148

G12

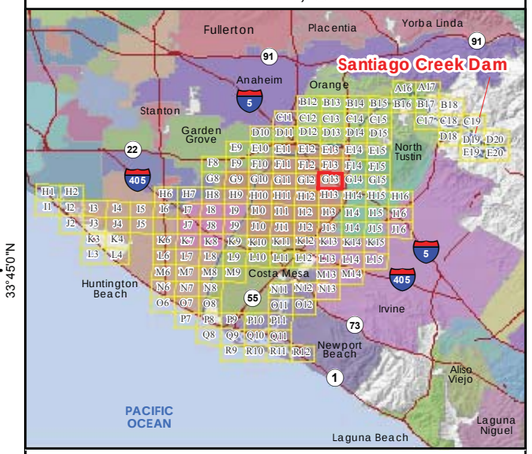
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 49 of 148

G13

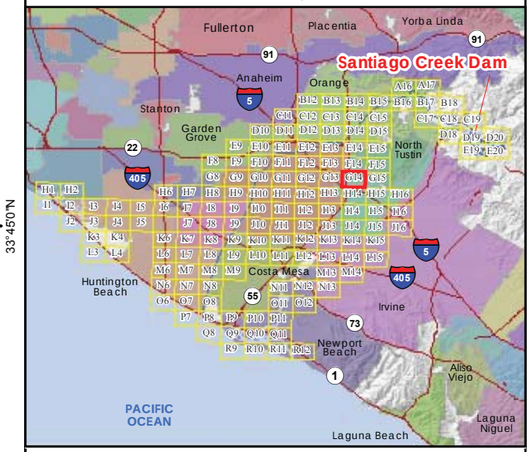
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Police Station
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 50 of 148

G14

STETSON ENGINEERS INC.

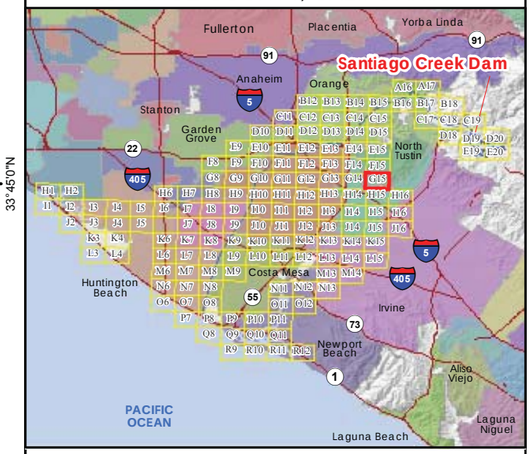
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

117°50'0"W 117°49'30"W 117°49'0"W
33°45'0"N 33°44'30"N

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 51 of 148

G15

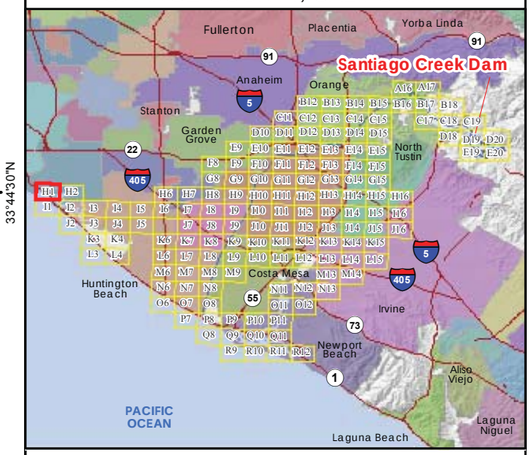
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Trail Head

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 52 of 148

N

H1

STETSON ENGINEERS INC.

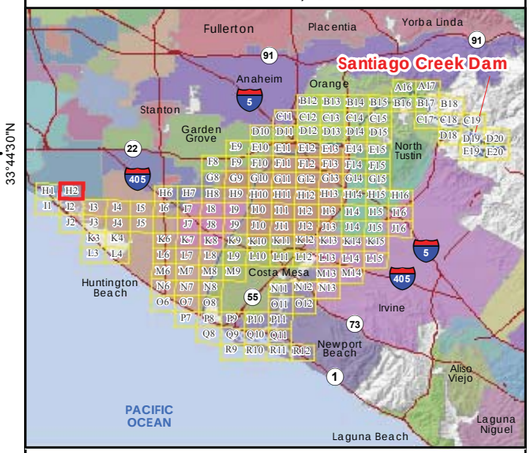
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 53 of 148

H2

STETSON ENGINEERS INC.

0 250 500 750 Feet

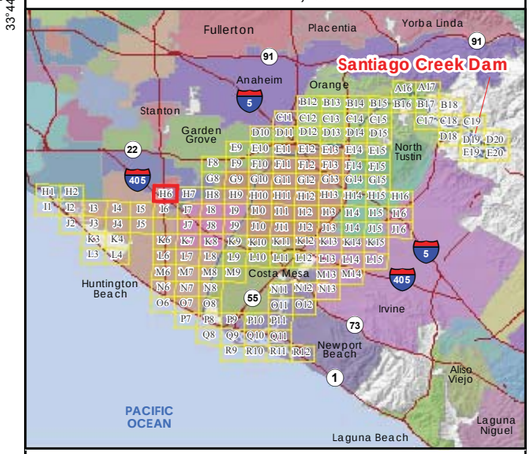
0 100 200 Meters

118°4'30"W
118°4'0"W
118°3'30"W
33°44'30"N
33°44'0"N
Map H1
Map I2
Seal Beach National Wildlife Refuge
Max inundation depth above tide = 0.8 ft
36hr

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 54 of 148

H6

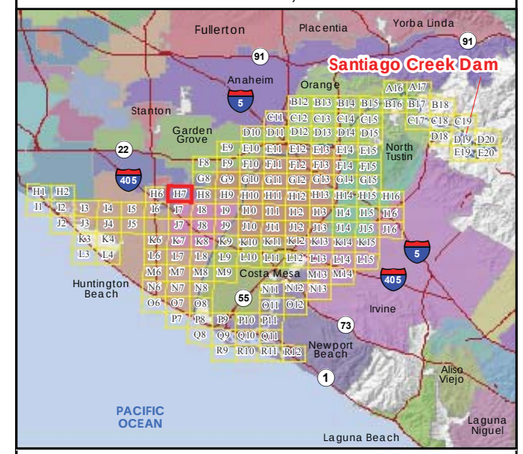
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 55 of 148

H7

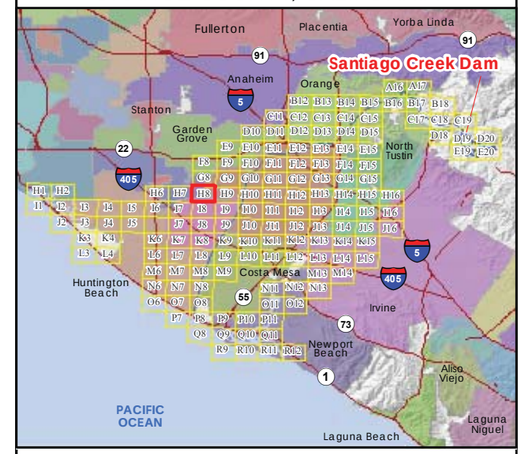
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 56 of 148

H8

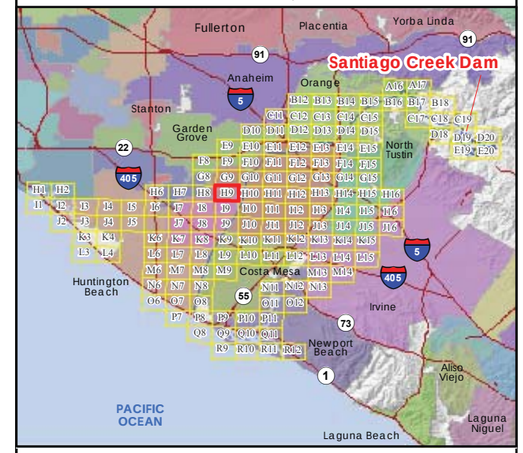
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 57 of 148

N

H9

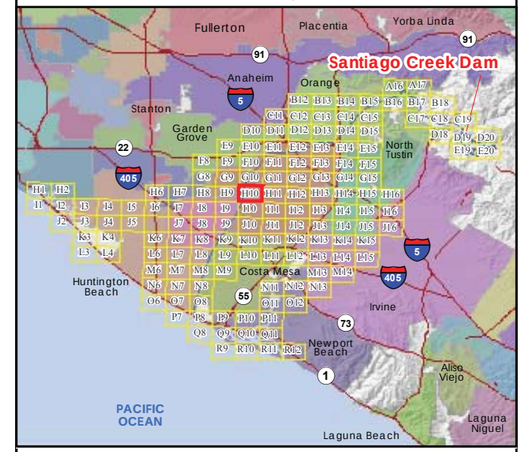
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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C 71788
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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 58 of 148

H10

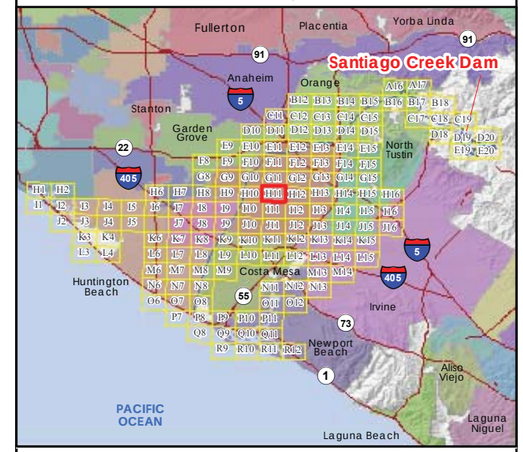
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 59 of 148

H11

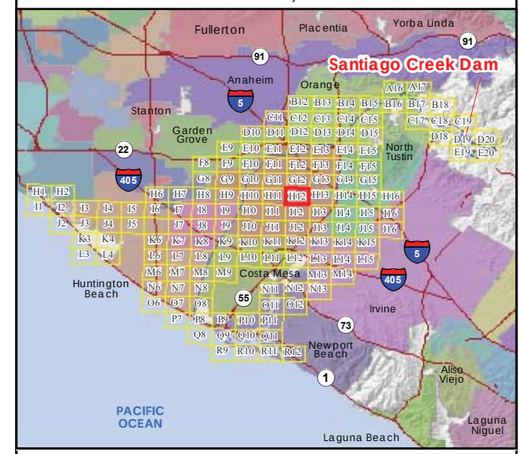
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 60 of 148

H12

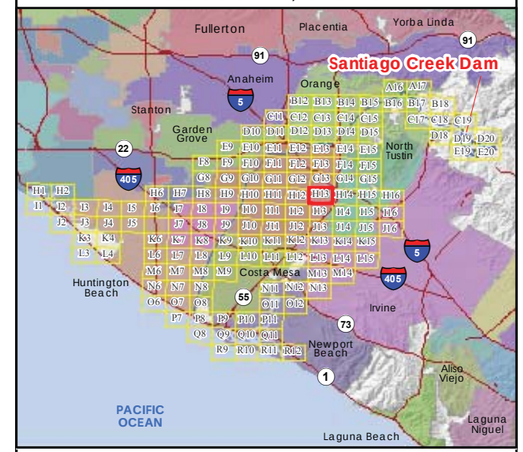
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 61 of 148

H13

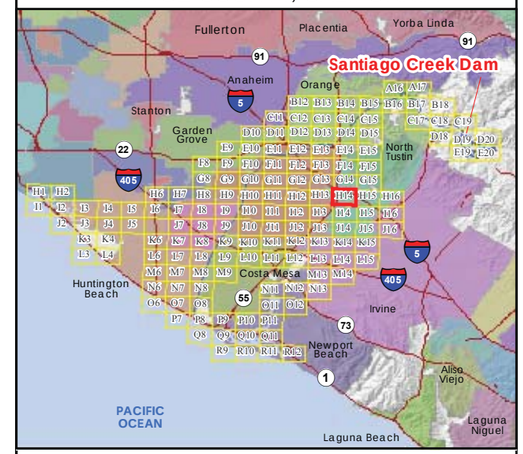
STETSON ENGINEERS INC.

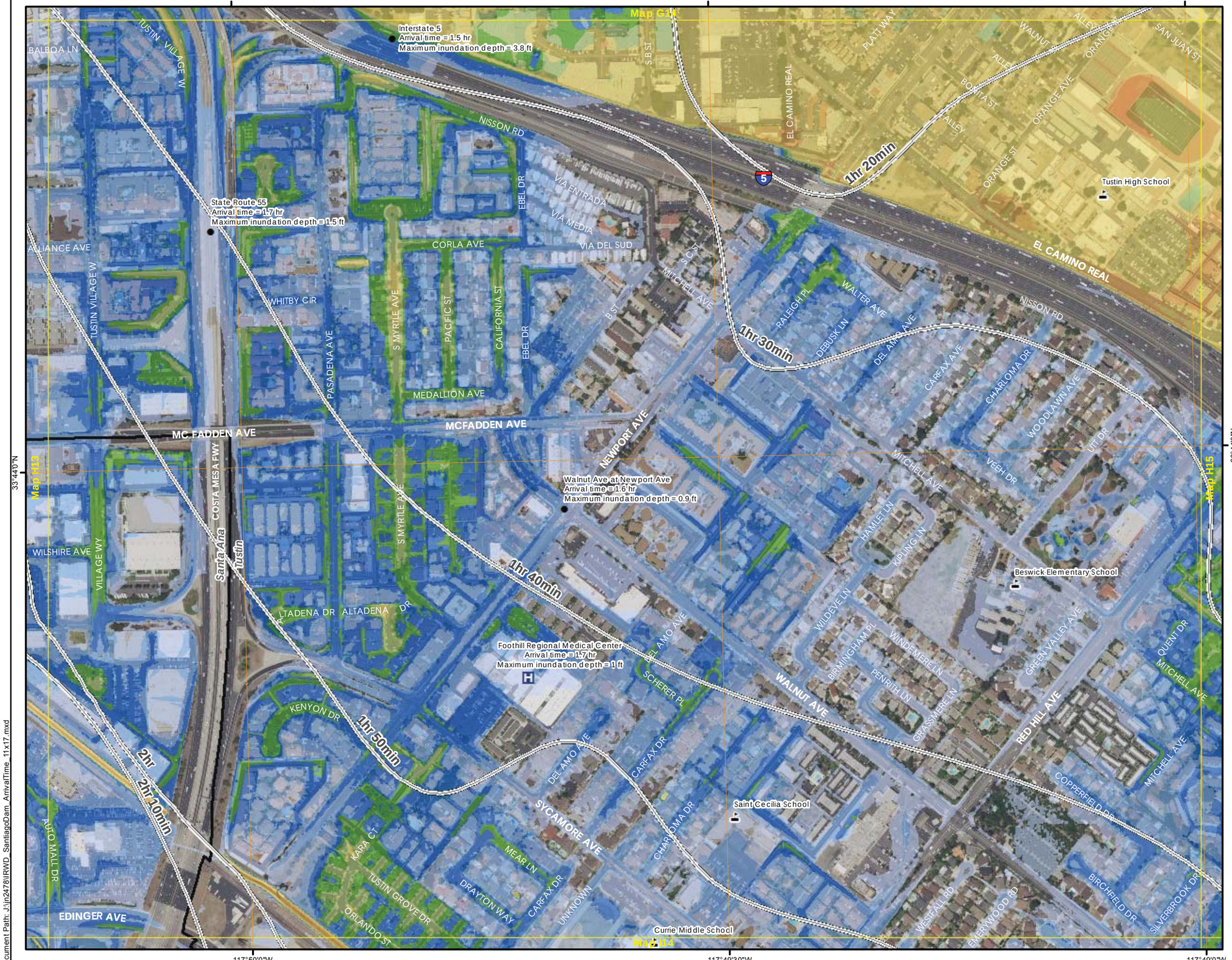
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 62 of 148

H14

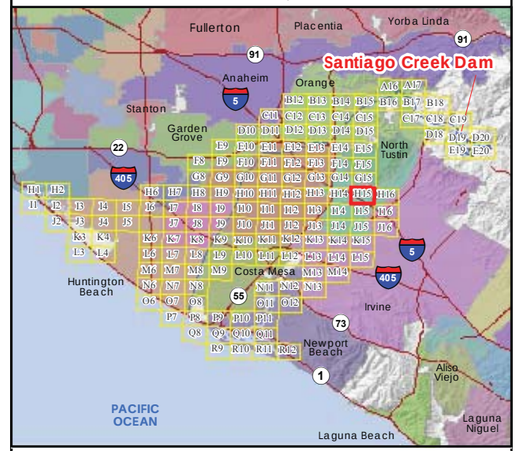
STETSON ENGINEERS INC.

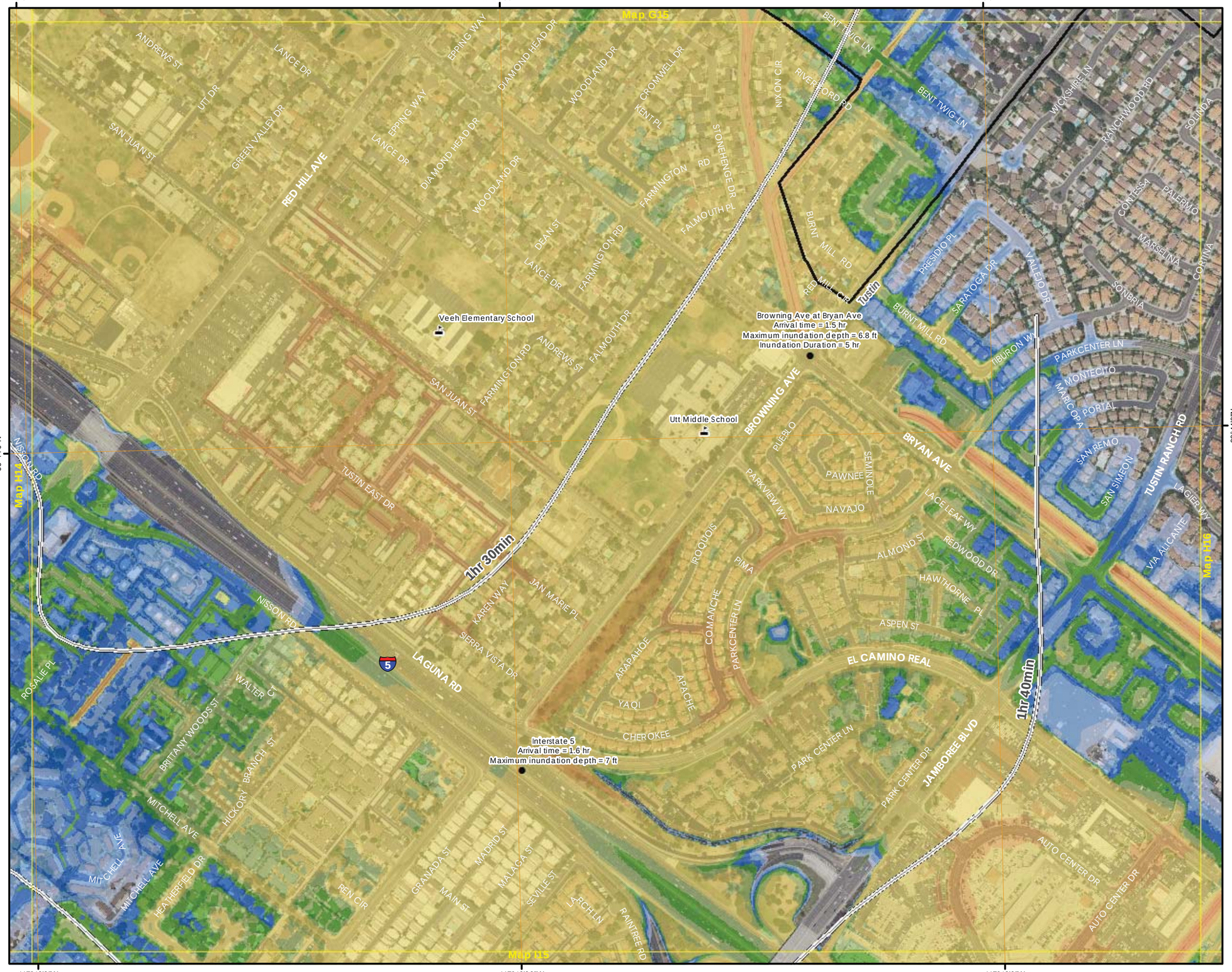
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 63 of 148

H15

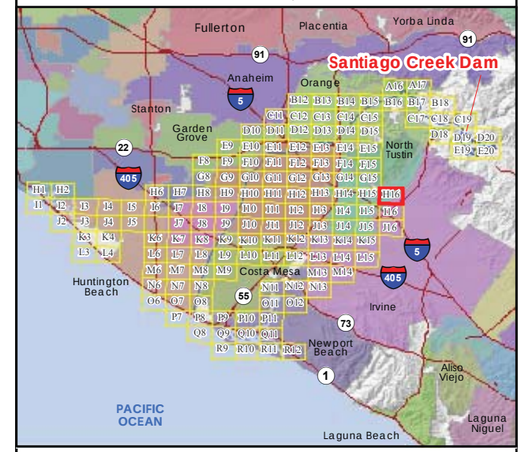
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 64 of 148

H16

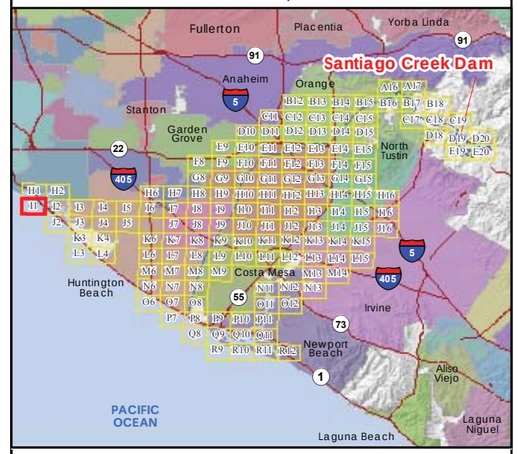
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24781\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 65 of 148

I1

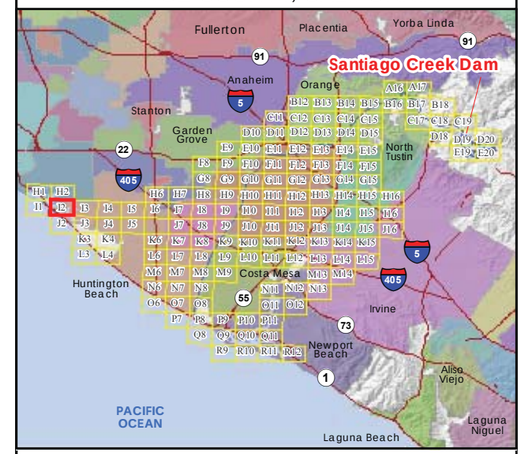
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 66 of 148

I2

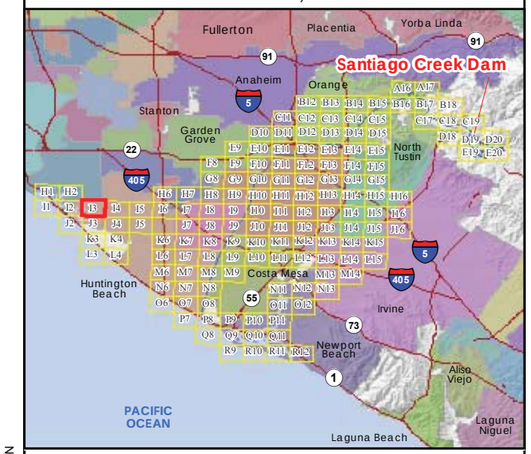
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 67 of 148

STETSON ENGINEERS INC.

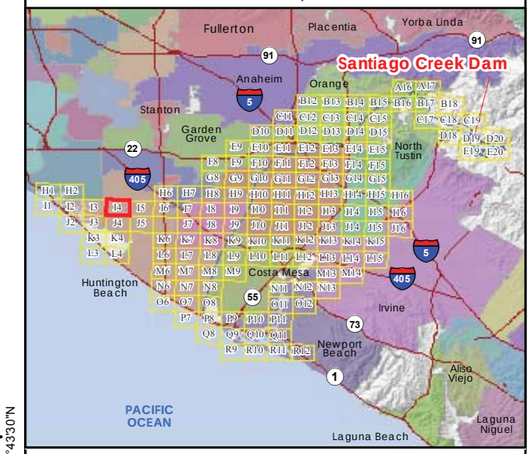
I3

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 68 of 148

STETSON ENGINEERS INC.

N

I4

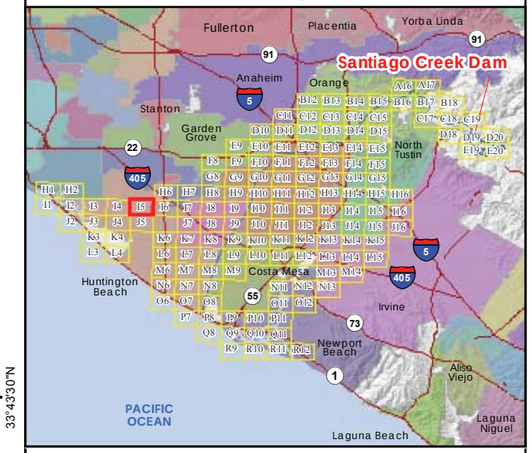
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 69 of 148

STETSON ENGINEERS INC.

N

I5

0 250 500 750 Feet

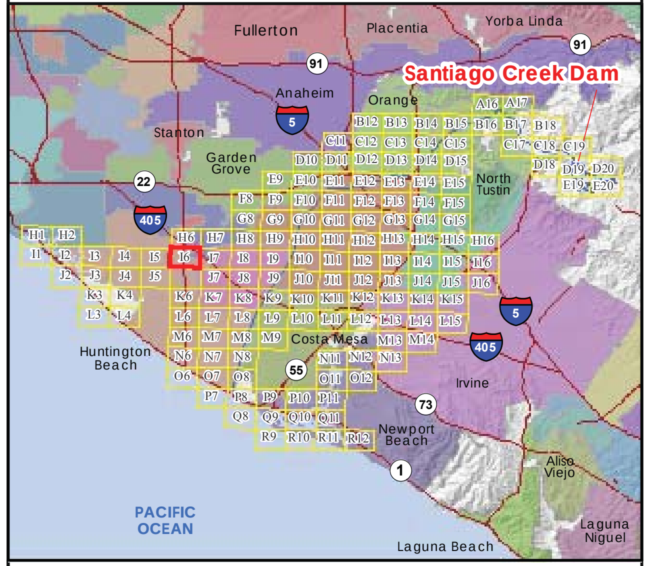
0 100 200 Meters

Document Path: J:\jn\24781IRWD_SantiagoDam_ArrivalTime_11x17.mxd


Map H6
Map I5
Map I7
The Academy of Radio and TV Broadcasting
Sun View Elementary School
Westmont Elementary School
Liberty Christian School
Heil Ave
Arrival time = 7.5 hr
Maximum inundation depth = 1.1 ft
7hr
HEIL AVE
BEACH BLVD
NEWLAND ST
WARNER AVE
Huntington Beach
Westminster
117°59'30"W
117°59'0"W
33°43'30"N
33°43'0"N
ALDRICH DR
VOLGA DR
STARK DR
AMAZON DR
LA PAZ DR
HOLT DR
WELLS RD
ANITA LN
MAC DONALD DR
JULIETTE LOW DR
GLENCOE DR
NANCY DR
DREY RD
BARRY PL
ALHAMBRA DR
DANUBE DR
SEINE DR
CHRYSLER DR
BRUSH DR
DON DR
BRYANT DR
LAMBERT DR
TERRY DR
RHINE DR
HOWARD RD
LANCASTER DR
ARNETT DR
DAMASK DR
NORTHLAKE DR
TAMARU DR
WASHINGTON DR
UNIVERSE AVE
ORWELL AVE

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 70 of 148

I6

0 250 500 750 Feet

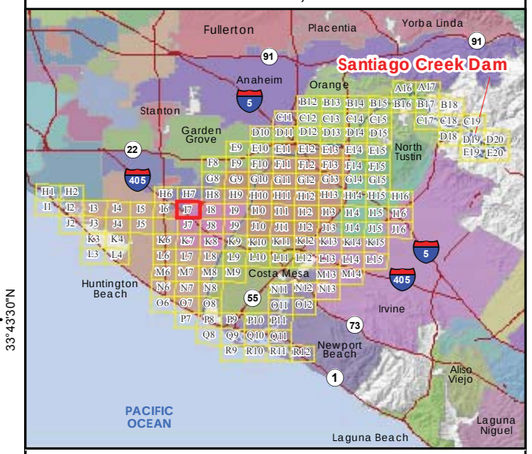
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 71 of 148

I7

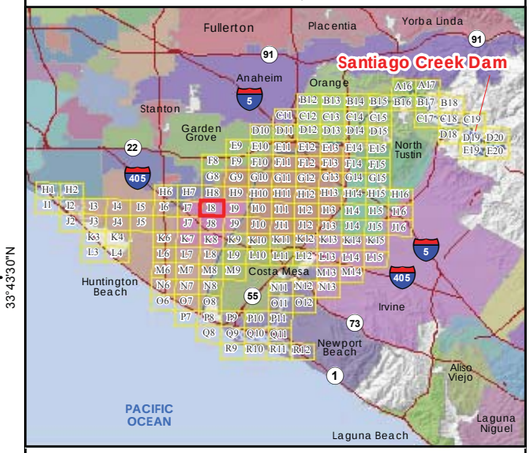
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 72 of 148

I8

STETSON ENGINEERS INC.

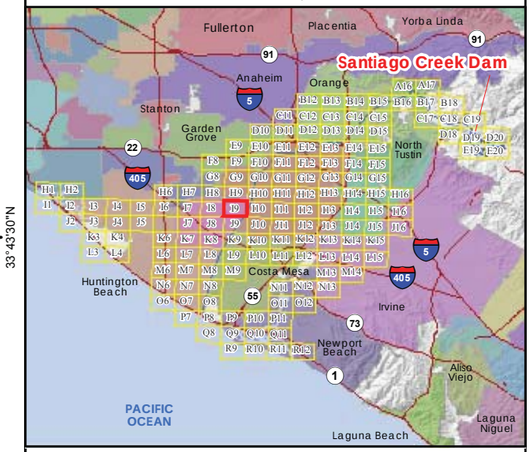
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

117°57'30"W
117°57'0"W
117°56'30"W
33°43'30"N
33°43'0"N
Map H8
Map I7
Map I9
Map I8
6hr
7hr
8hr
5hr 30min
Mile Square Park and Golf Course
Arrival time = 6.8 hr
Maximum inundation depth = 10 ft
GLADIOLA AVE
GLADIOLA CIR
THISTLE AVE
CAMROSE CIR
DAHLIA CIR
DANDELION AVE
HEIL AVE
HEMP CIR
FILBERT ST
SHADBUSH ST
BROOKHURST ST
SEQUOIA ST
APPLE ST
ASTER CIR
SAGE CIR
PETUNIA AVE
CURRANT AVE
WOODRIDGE CIR
MARIPOSA AVE
MERCED RIVER AVE
EMMONS CIR
WINTHROP CIR
PALOMA ST
NECTARINE ST
EL GRECO CIR
WARNER AVE
SAN MATEO ST
SAN BRUNO ST
CIRCULO DE VILLA
WARD ST
COLONIAL CIR
SAN RICARDO ST
CAM REAL
LOS JARDINES WEST ST
EL PLANO AVE

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 73 of 148

I9

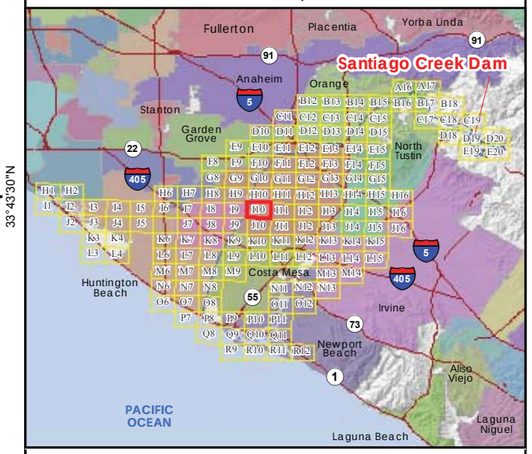
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 74 of 148

STETSON ENGINEERS INC.

N

I10

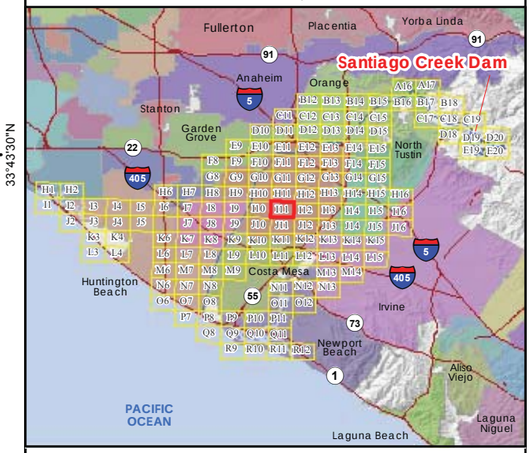
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn\24781RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 75 of 148

STETSON ENGINEERS INC.

N

I11

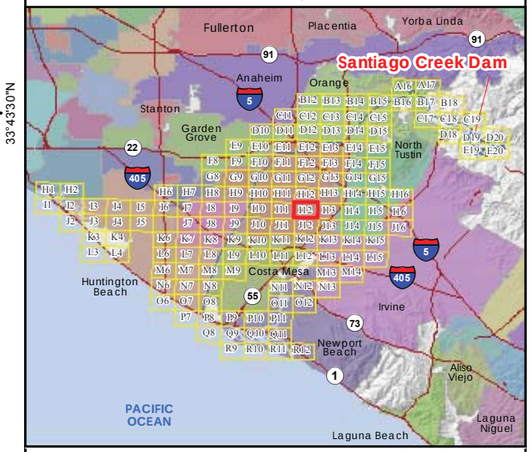
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 76 of 148

I12

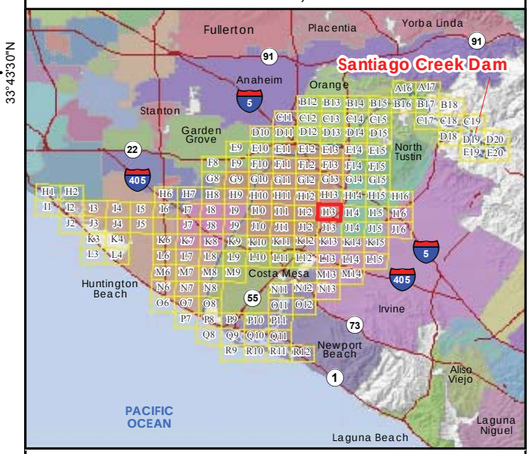
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 77 of 148

I13

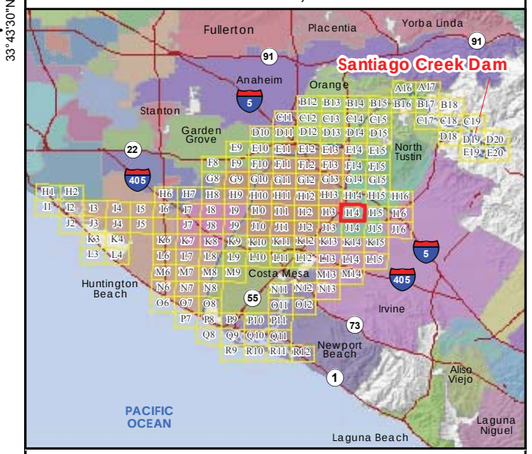
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 78 of 148

I14

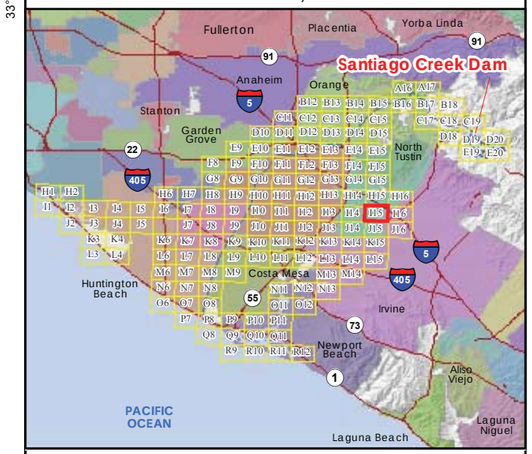
STETSON ENGINEERS INC.

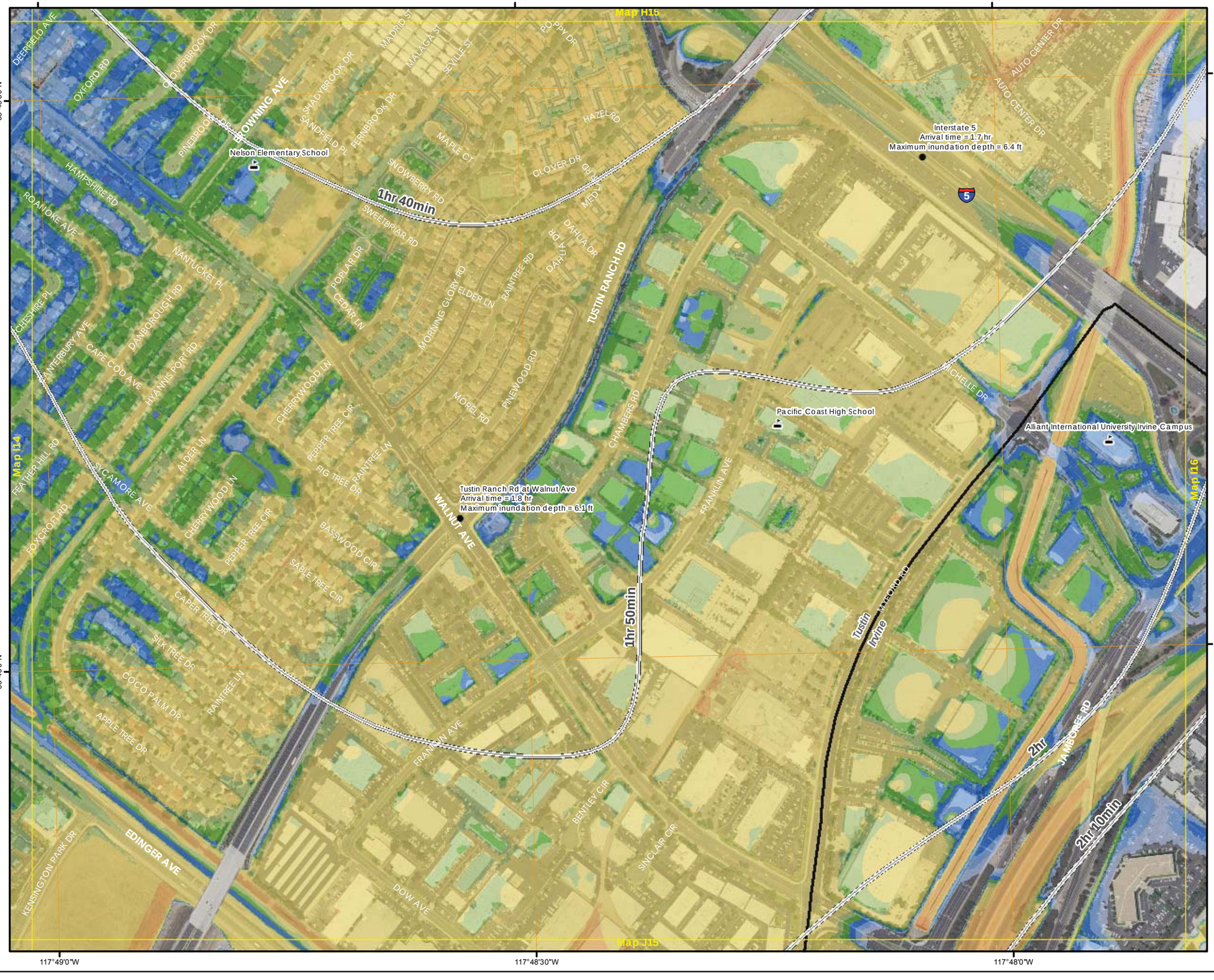
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 79 of 148

I15

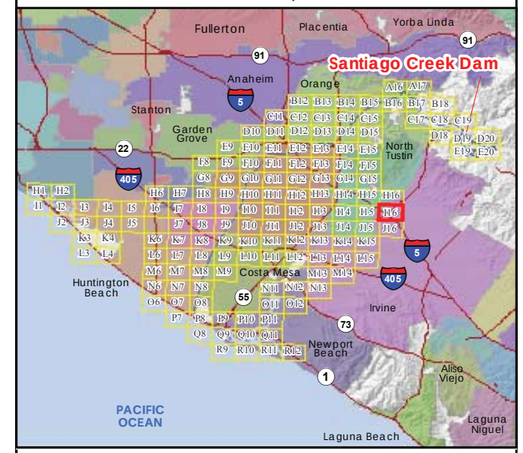
STETSON ENGINEERS INC.

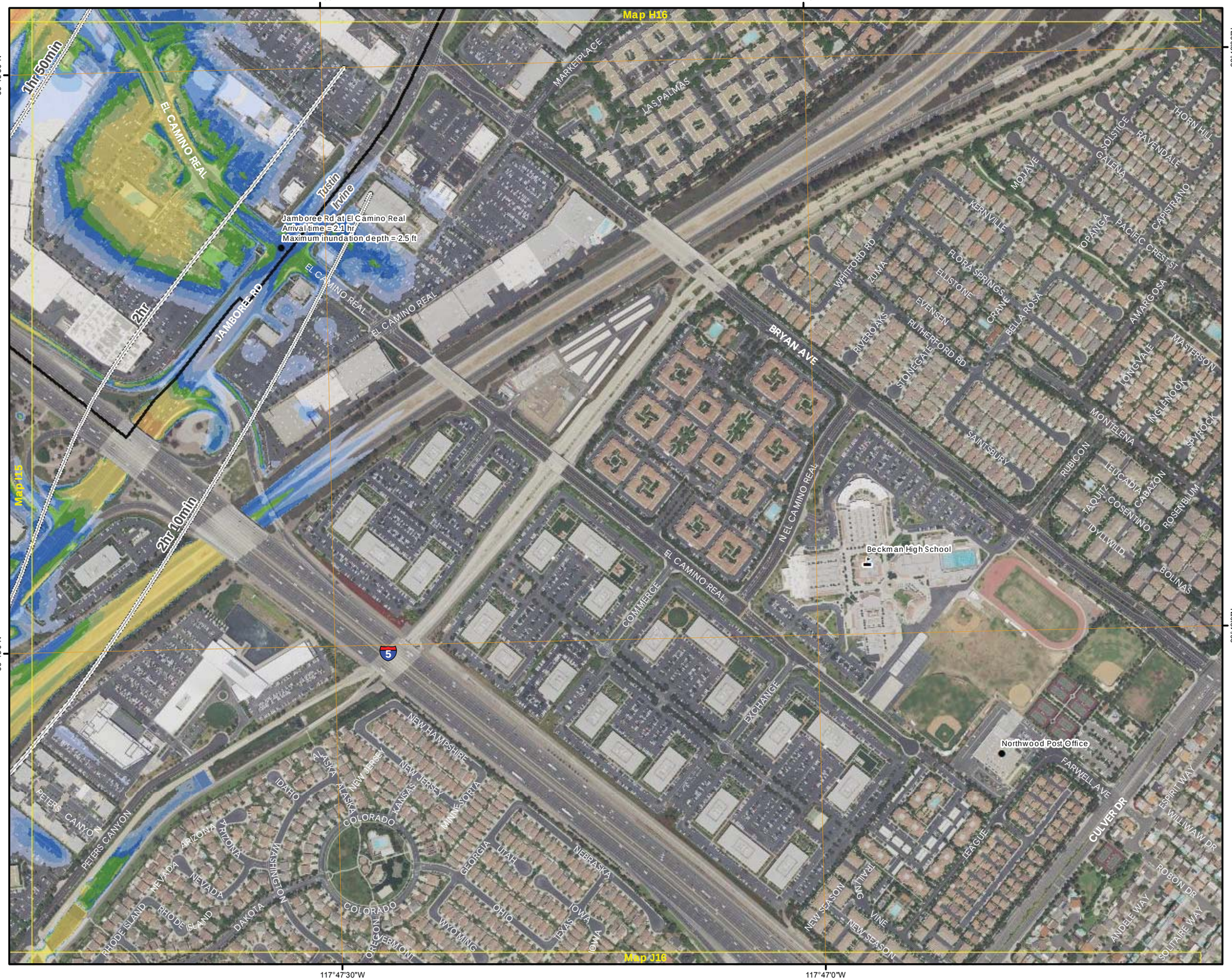
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 80 of 148

I16

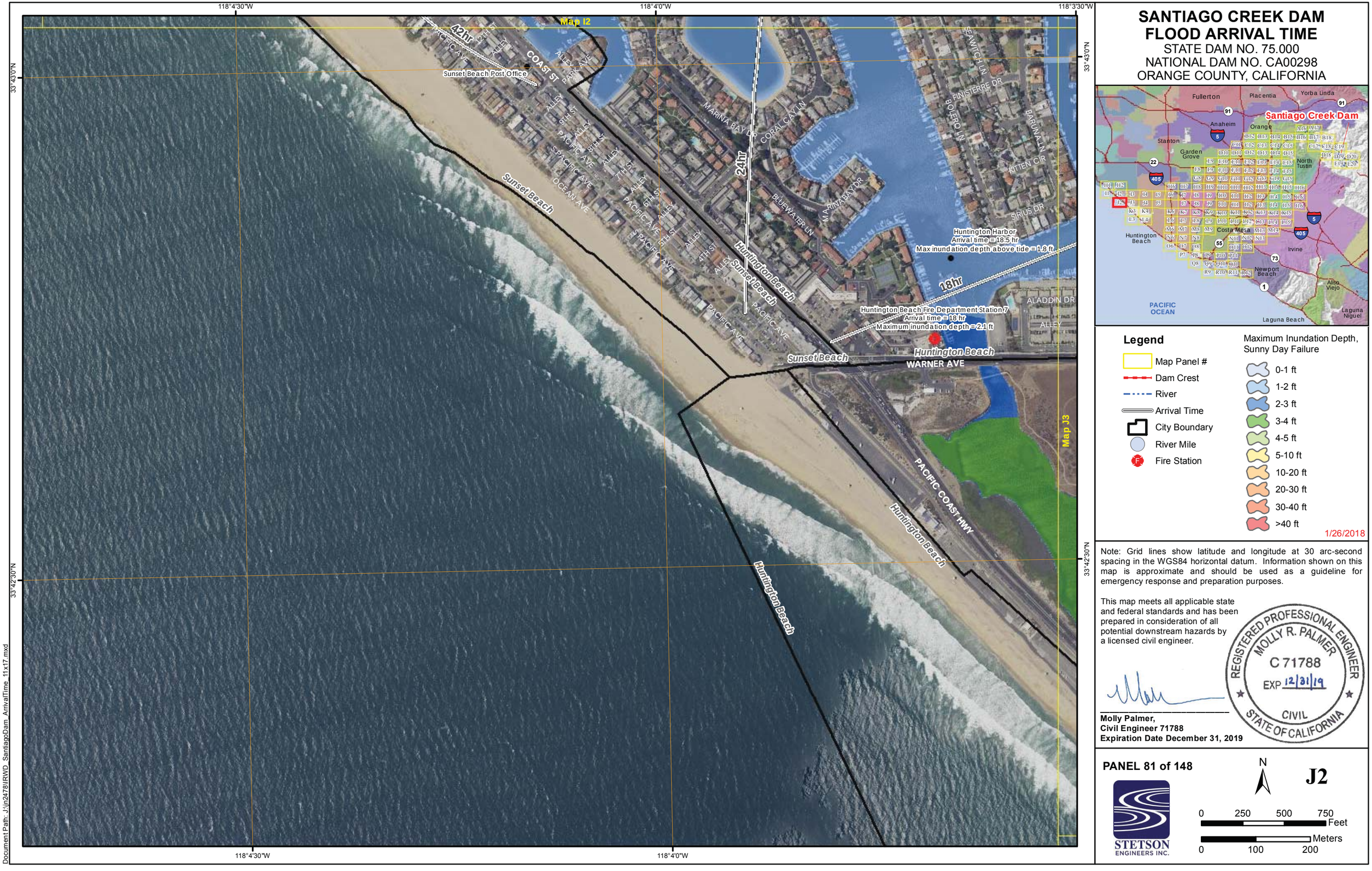
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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C 71788
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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 81 of 148

J2

N

0 250 500 750 Feet

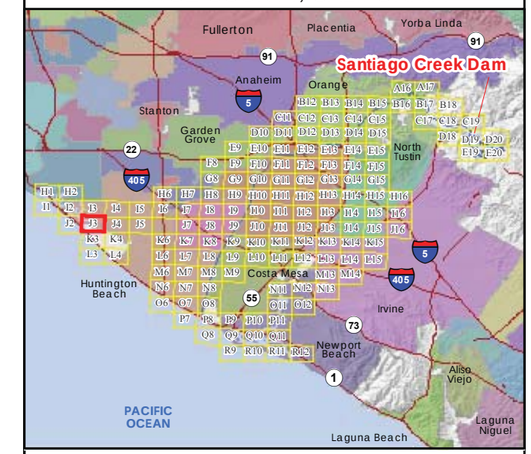
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 82 of 148

STETSON ENGINEERS INC.

N

J3

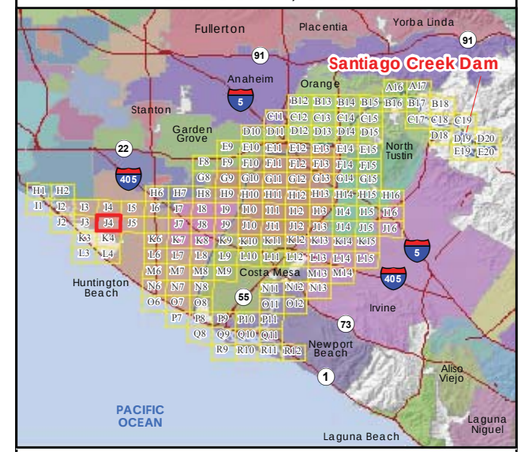
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 83 of 148

STETSON ENGINEERS INC.

N

J4

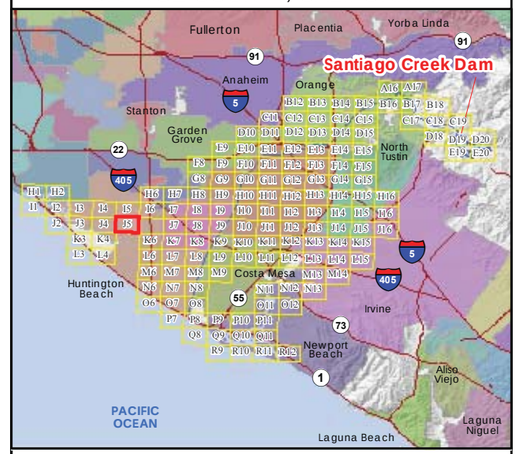
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 84 of 148

J5

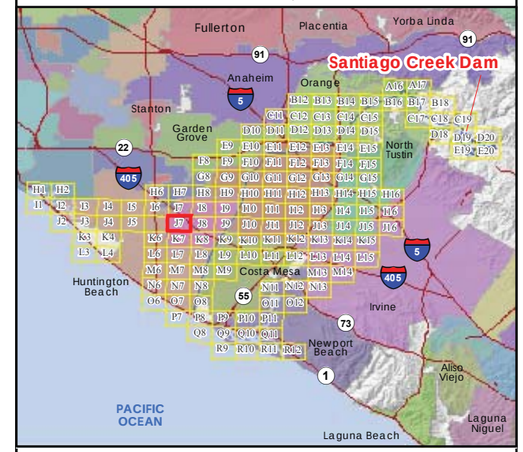
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 85 of 148

J7

N

0 250 500 750 Feet

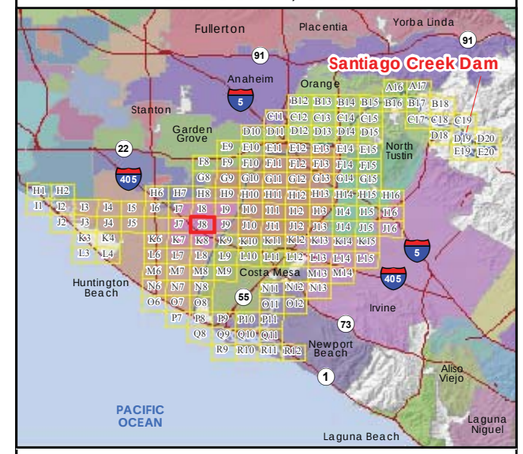
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 86 of 148

STETSON ENGINEERS INC.

N

J8

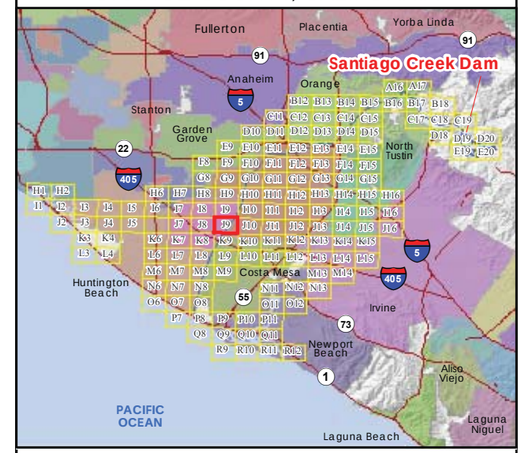
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 87 of 148

J9

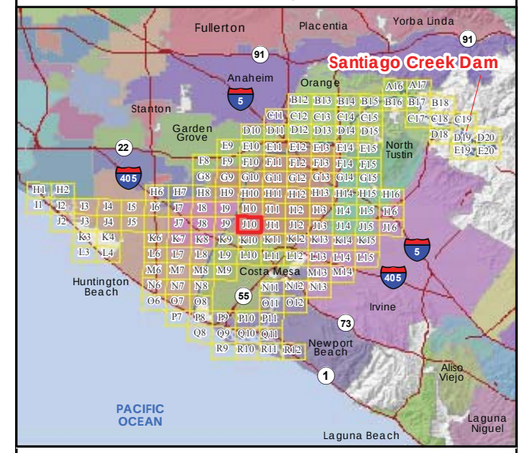
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 88 of 148

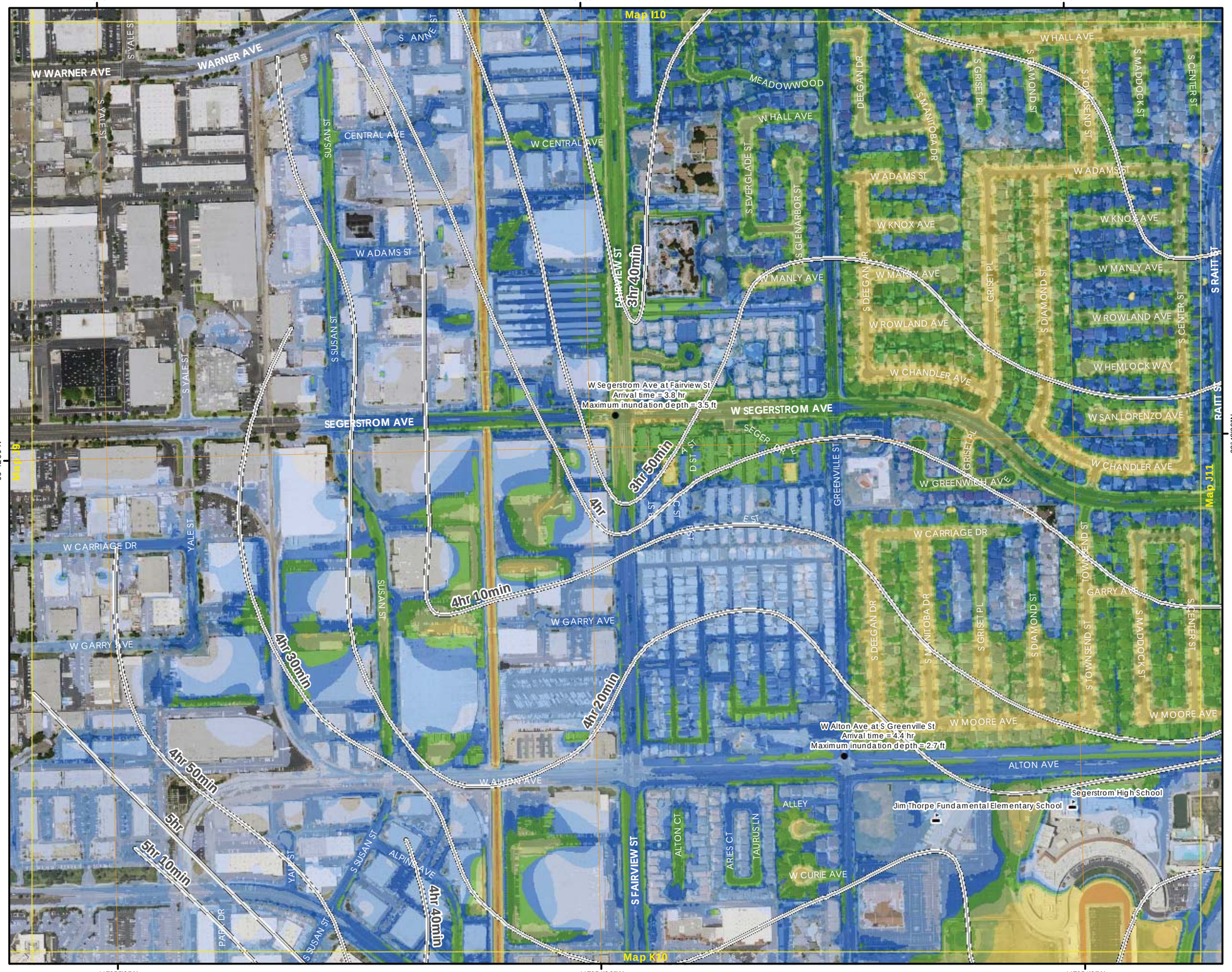
STETSON ENGINEERS INC.

N

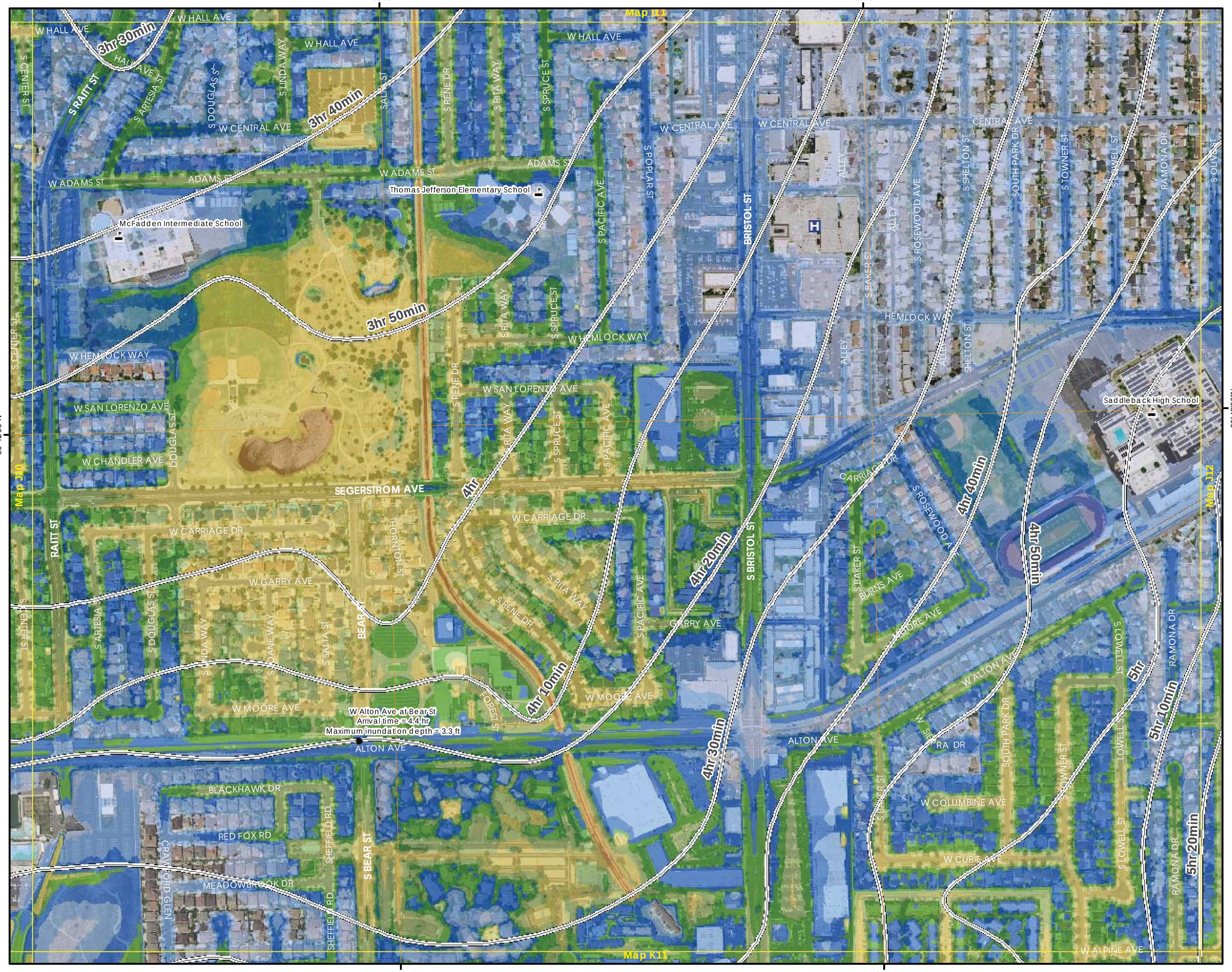
J10

0 250 500 750 Feet

0 100 200 Meters

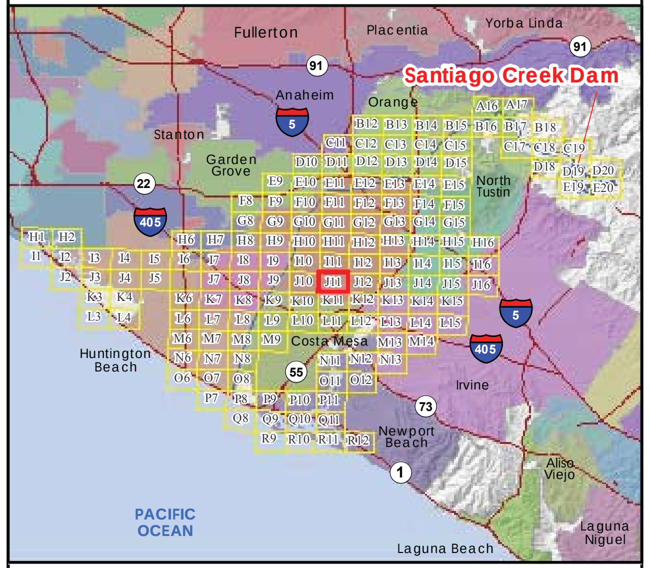


Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd



SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 89 of 148

N

J11

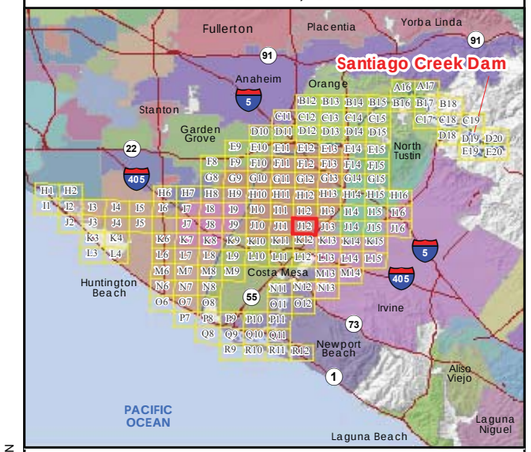
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 90 of 148

STETSON ENGINEERS INC.

N

J12

0 250 500 750 Feet
0 100 200 Meters

117°52'30"W 117°52'0"W 117°51'30"W
33°42'30"N

Map J11 Map J12 Map K12

W Dyer Rd
Arrival time = 4.2 hr
Maximum inundation depth = 0.5 ft

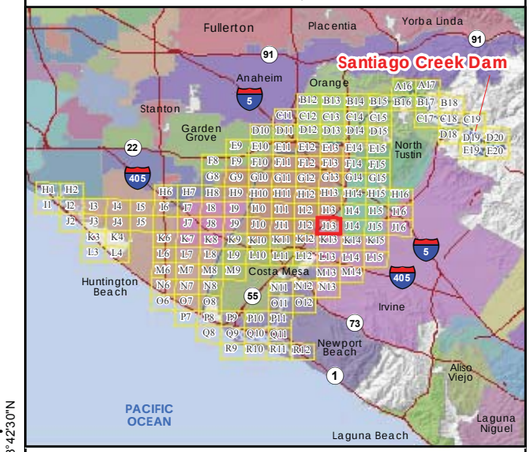
S Flower St
Arrival time = 5.4 hr
Maximum inundation depth = 4.6 ft

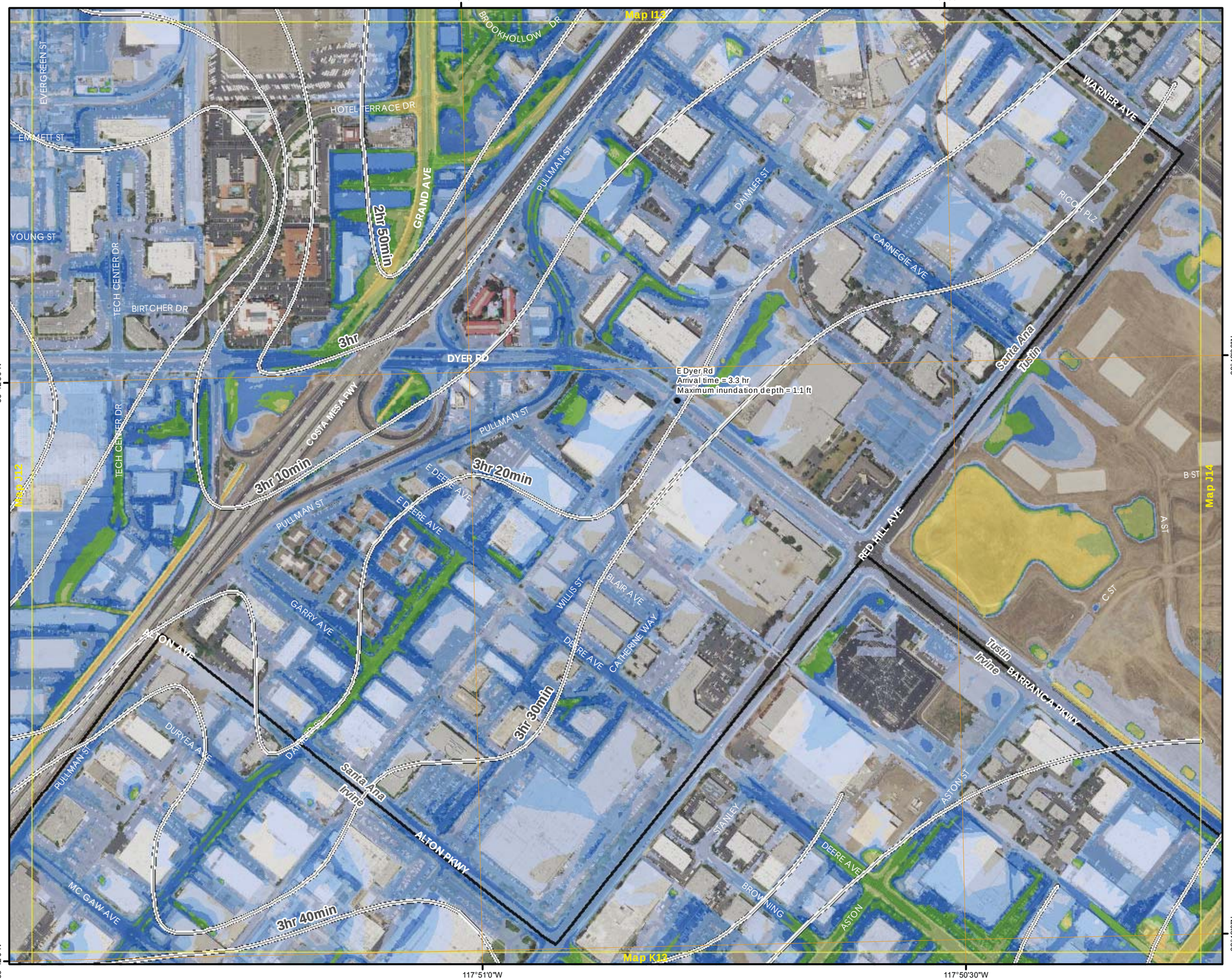
Douglas MacArthur Fundamental Intermediate School

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 91 of 148

J13

N

0 250 500 750 Feet

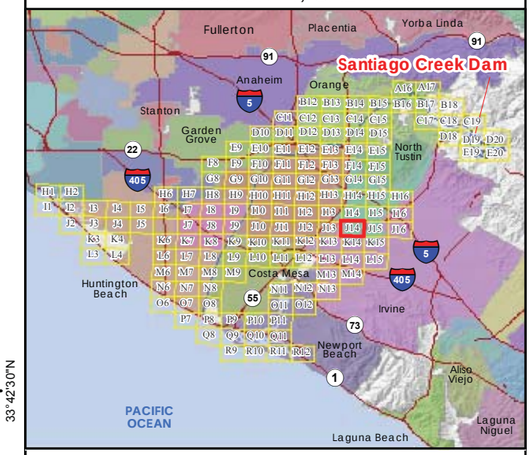
0 100 200 Meters

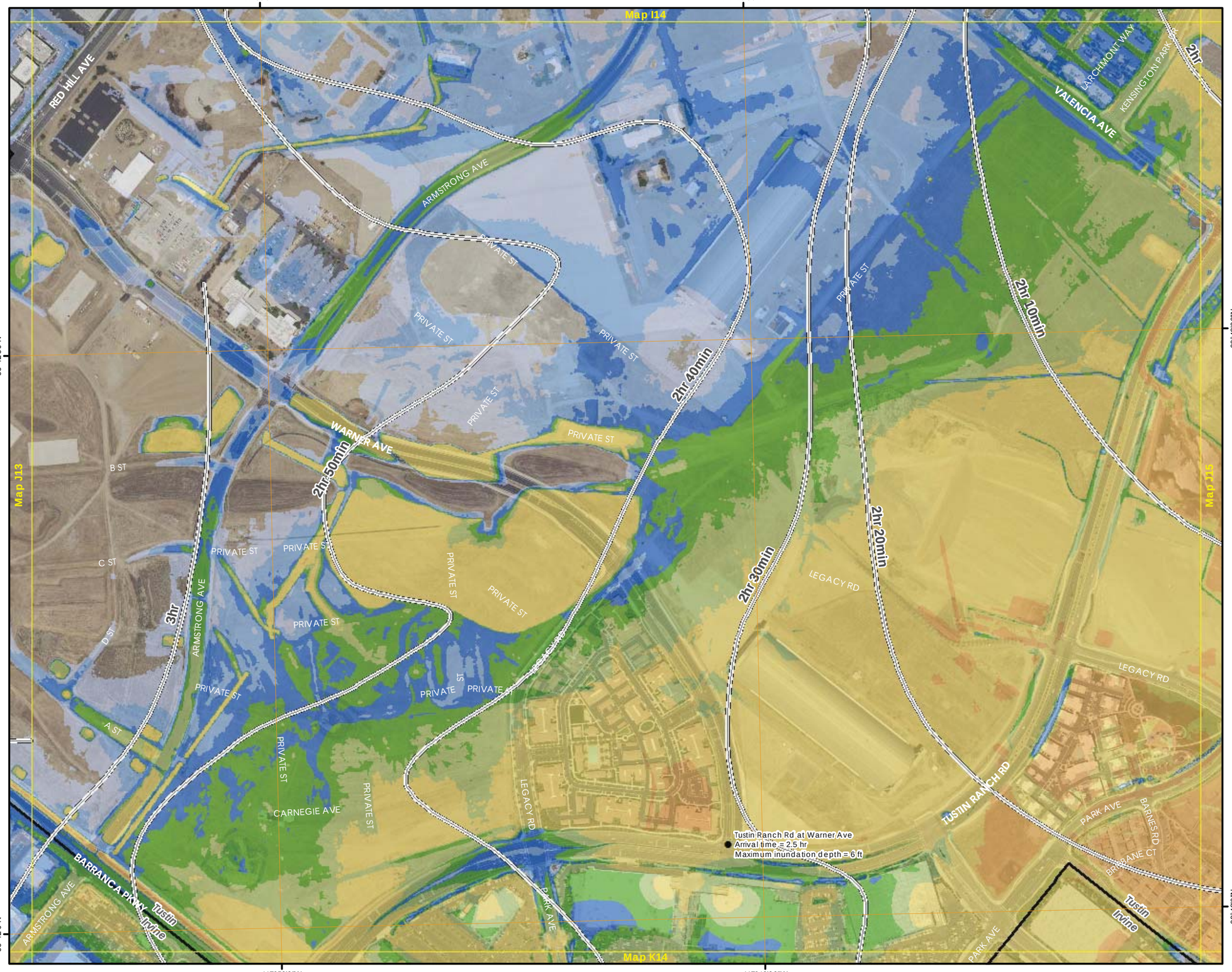
STETSON ENGINEERS INC.

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 92 of 148

J14

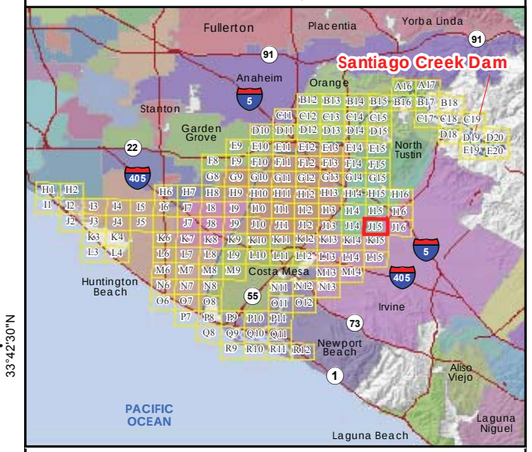
STETSON ENGINEERS INC.

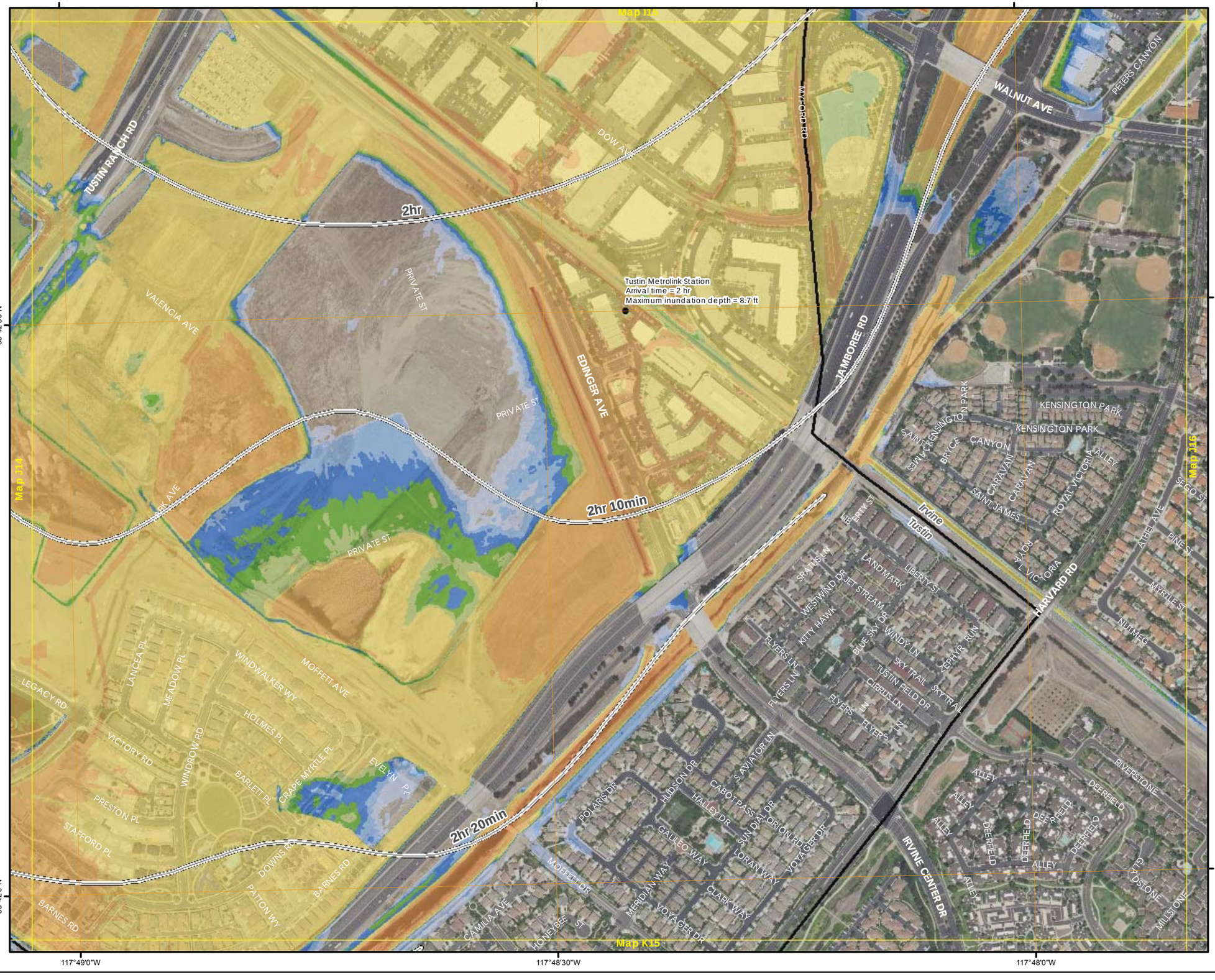
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 93 of 148

J15

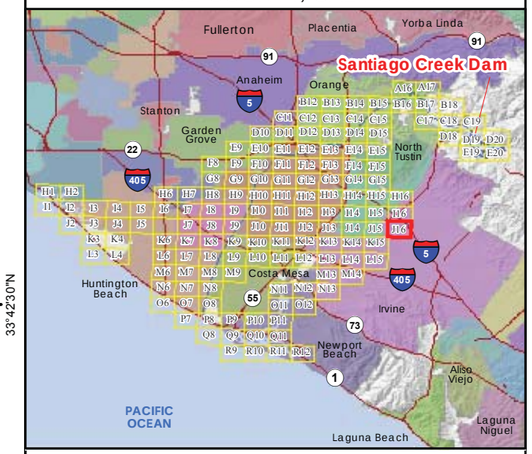
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 94 of 148

J16

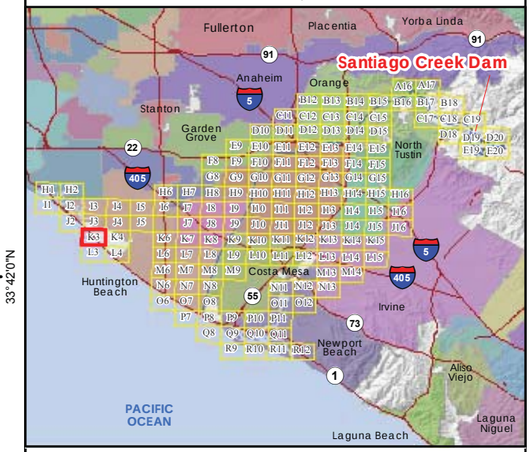
STETSON ENGINEERS INC.

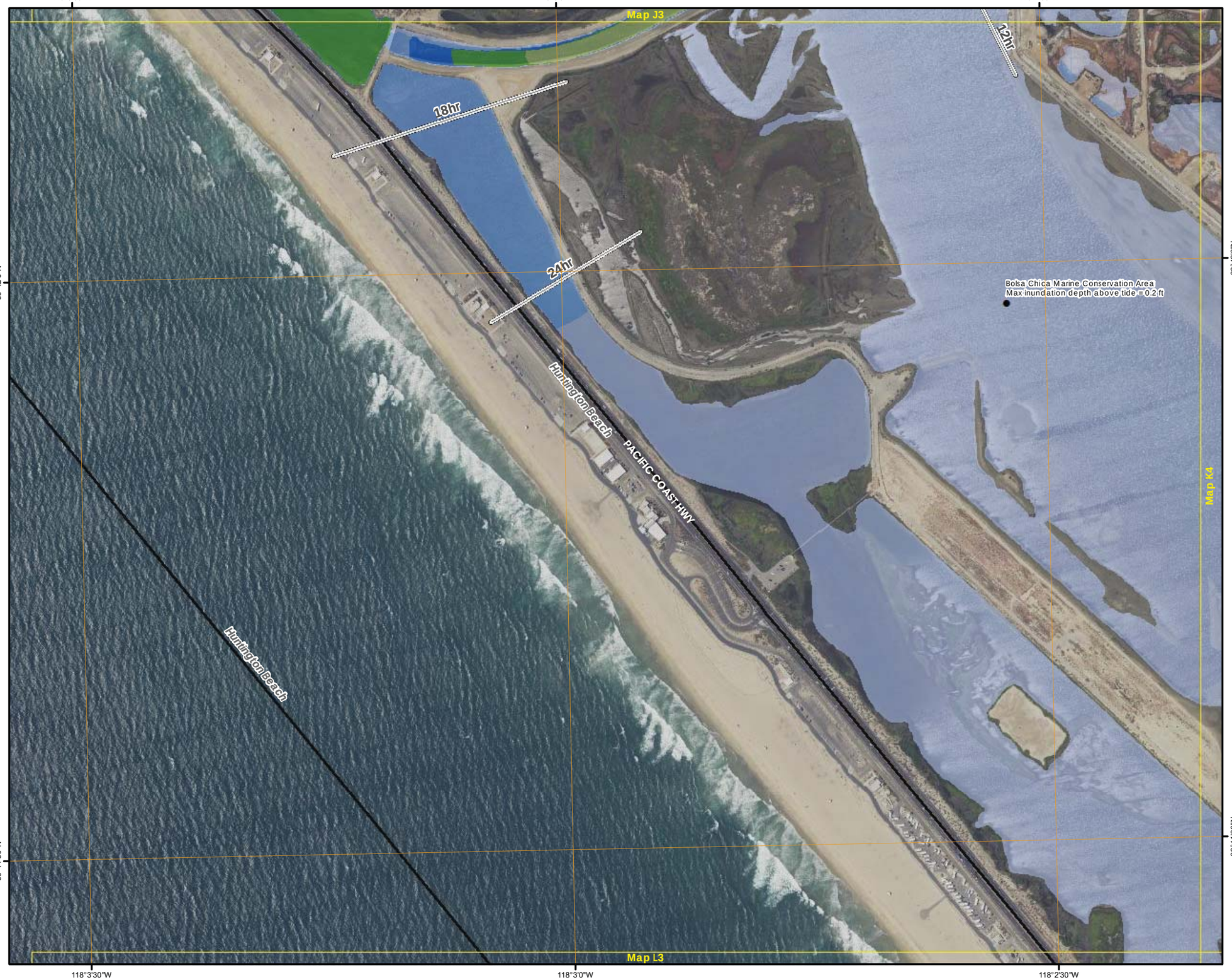
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 95 of 148

K3

N

0 250 500 750 Feet

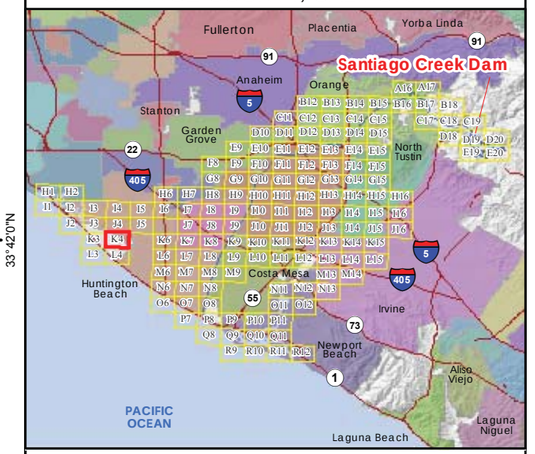
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 96 of 148

K4

N

0 250 500 750 Feet

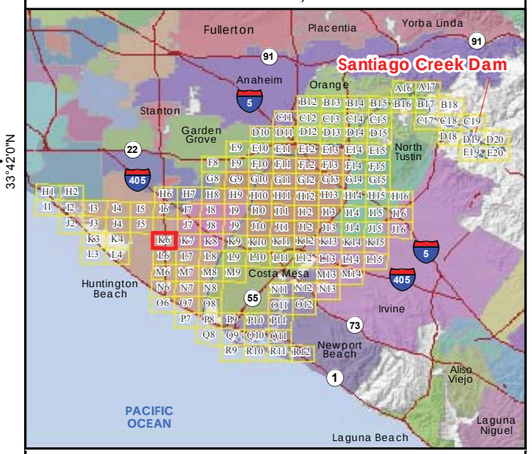
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 97 of 148

K6

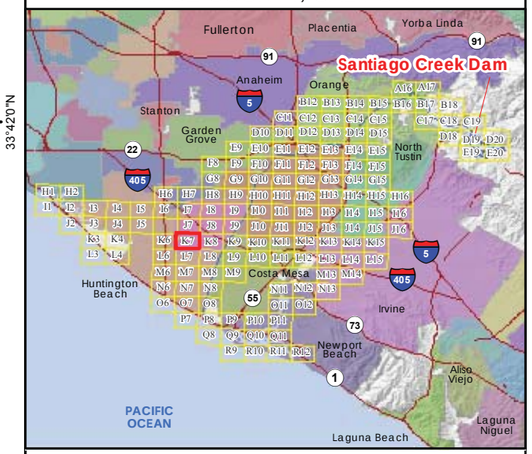
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 98 of 148

K7

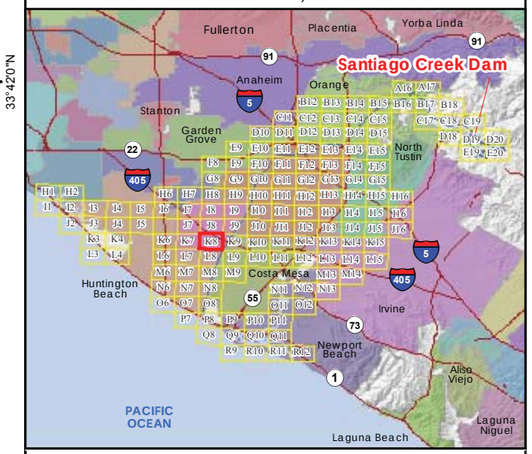
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 99 of 148

K8

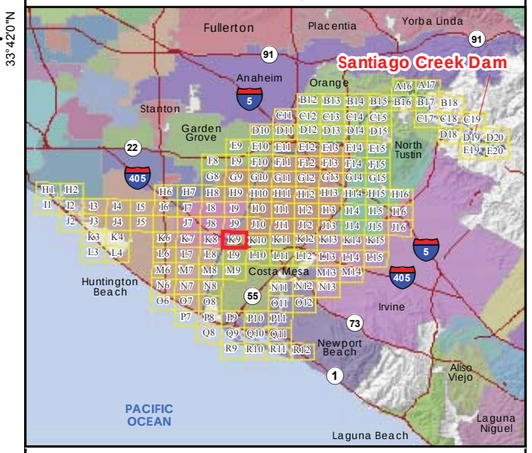
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 100 of 148

K9

STETSON ENGINEERS INC.

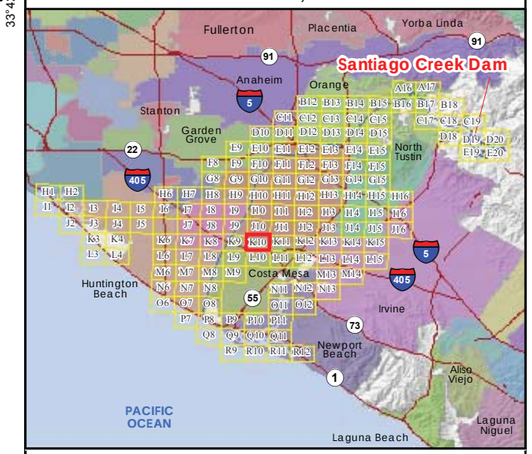
0 250 500 750 Feet
0 100 200 Meters

117°56'0"W
117°55'30"W
33°42'0"N
33°41'30"N
Map J9
Map K9
Map K10
Map L9
KALAMA RIVER AVE
NEWHOPE ST
MT WASHINGTON ST
CONDOR AVE
MT BALDY CIR
EUCLID ST
SCENIC AVE
HOWARD WY
CADILLAC AVE
TORONTO WY
HYLAND AVE
HARBOR GATEWAY N
BUSINESS PARK DR
HARBOR GATEWAY S
CORPORATE DR
METRO DR
SEGERSTROM AVE
Costa Mesa
Santa Ana
LAKE CENTER DR
SUNFLOWER AVE
Paul Mitchell the School - Costa Mesa
SUNLAND LN
HARBOR BLVD
VIRGINIA CIR
ELLIS AVE
Fountain Valley
Costa Mesa
NEVADA AVE
HAWAII CIR
ALABAMA CIR
ALASKA AVE
WYOMING CIR
MARYLAND CIR
NEW HAMPSHIRE DR
Interstate 405
Arrival time = 9 hr
Maximum inundation depth = 3 ft
405
9hr
6hr
SOUTH COAST DR
IOWA ST
ARIZONA LN
MISSOURI ST
INDIANA AVE
OHIO PL
WASHINGTON AVE
OREGON AVE
MINNESOTA AVE
NEBRASKA LN
IDAHO LN
DAKOTA AVE
COLORADO LN
MICHIGAN AVE
CALIFORNIA ST
California Elementary School
NEW YORK AVE
ILLINOIS ST
2hr30min
NEW MEXICO ST
MONTANA AVE
NEBRASKA PL
IDAHO PL
UTAH CIR
18.2
18.3
18.4
18.5
18.6
18.7
18.8
18.9
19
19.1
19.2

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 101 of 148

K10

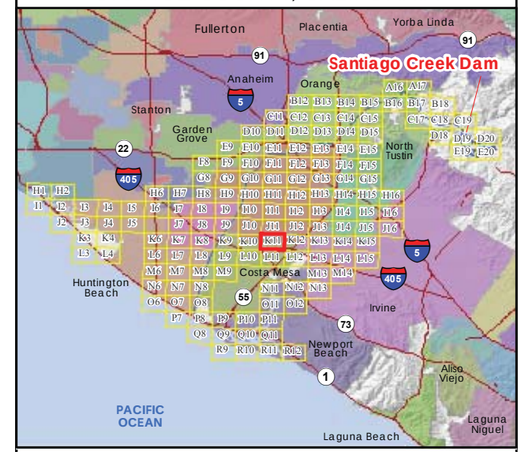
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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PANEL 102 of 148

K11

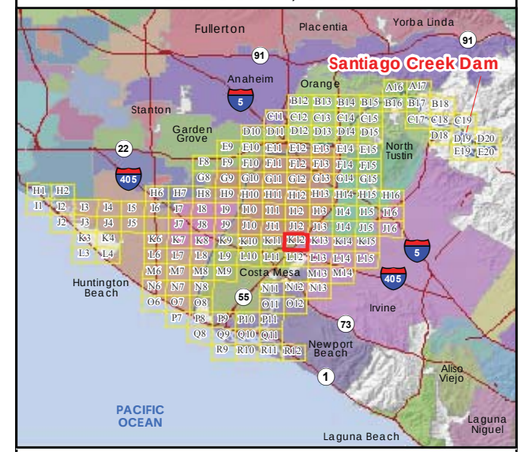
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 103 of 148

K12

STETSON ENGINEERS INC.

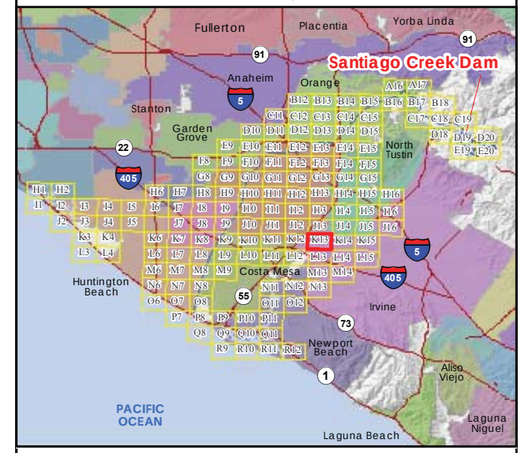
0 250 500 750 Feet

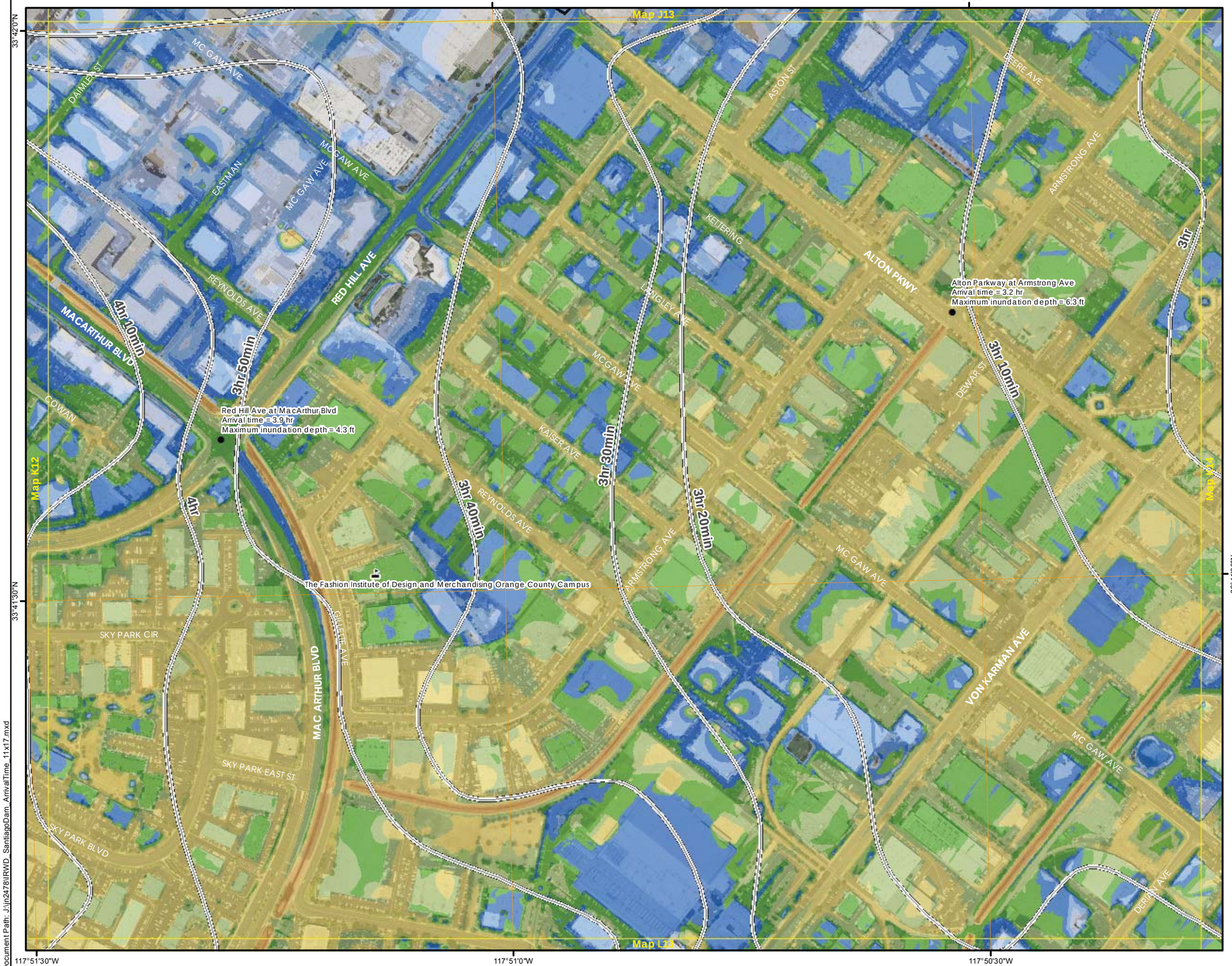
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 104 of 148

K13

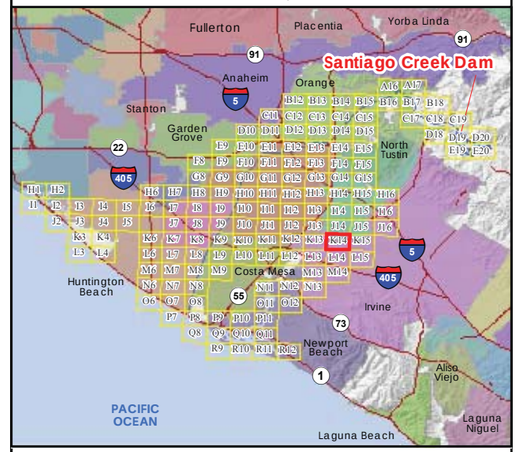
STETSON ENGINEERS INC.

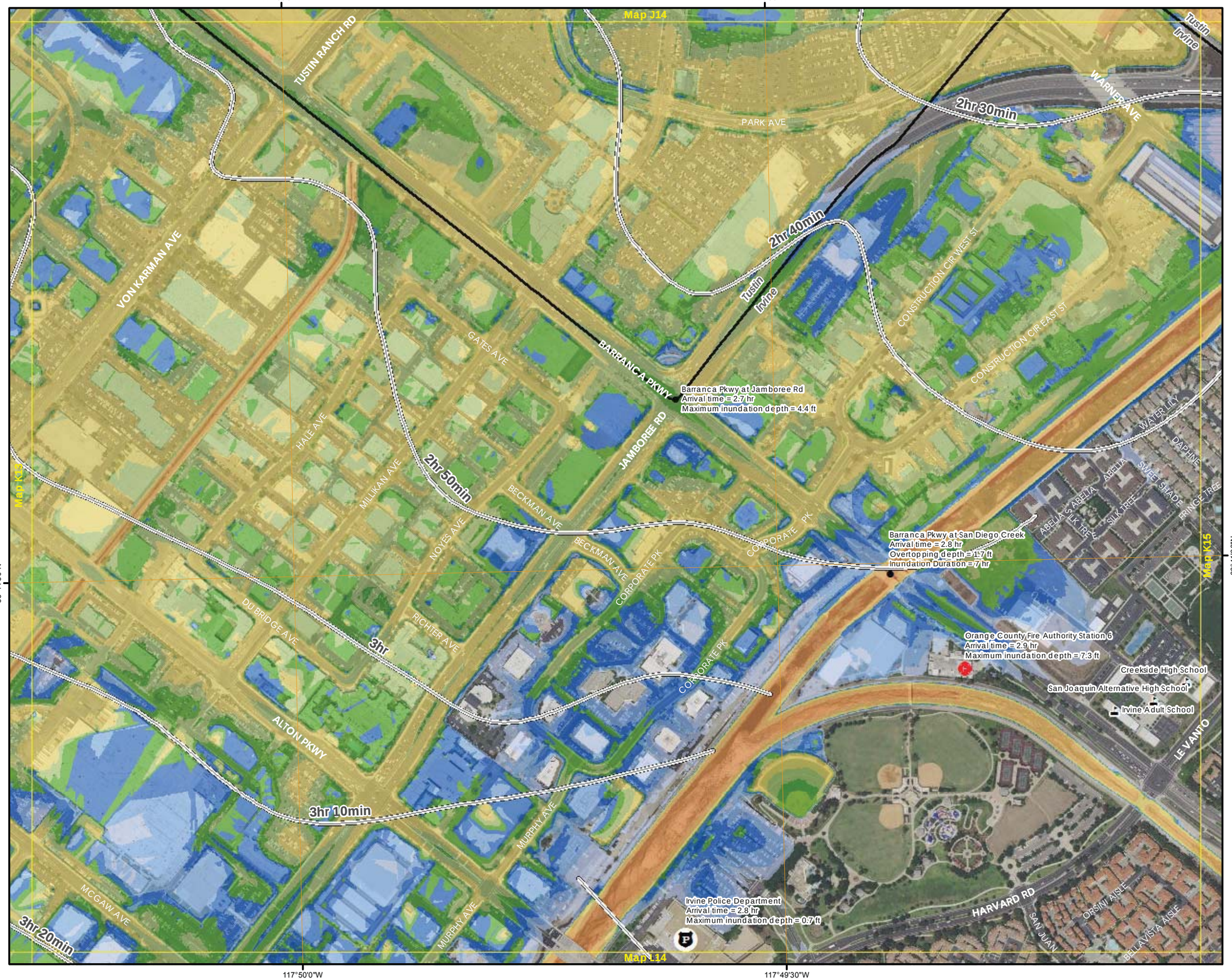
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 105 of 148

K14

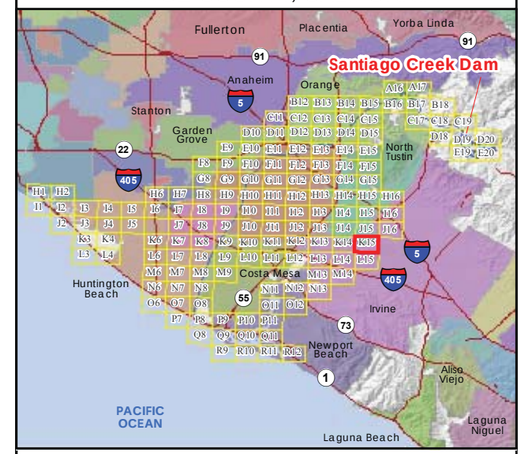
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 106 of 148

K15

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

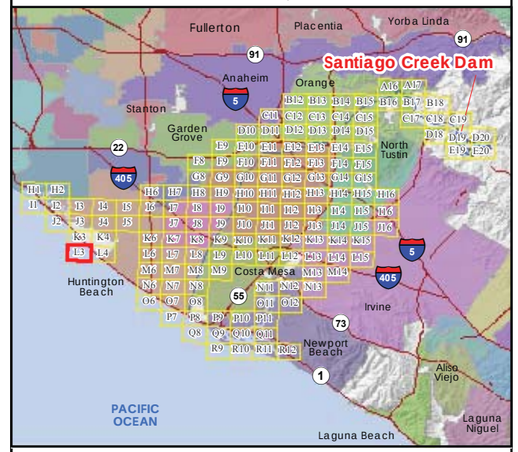
117°49'0"W 117°48'30"W 117°48'0"W
33°41'30"N

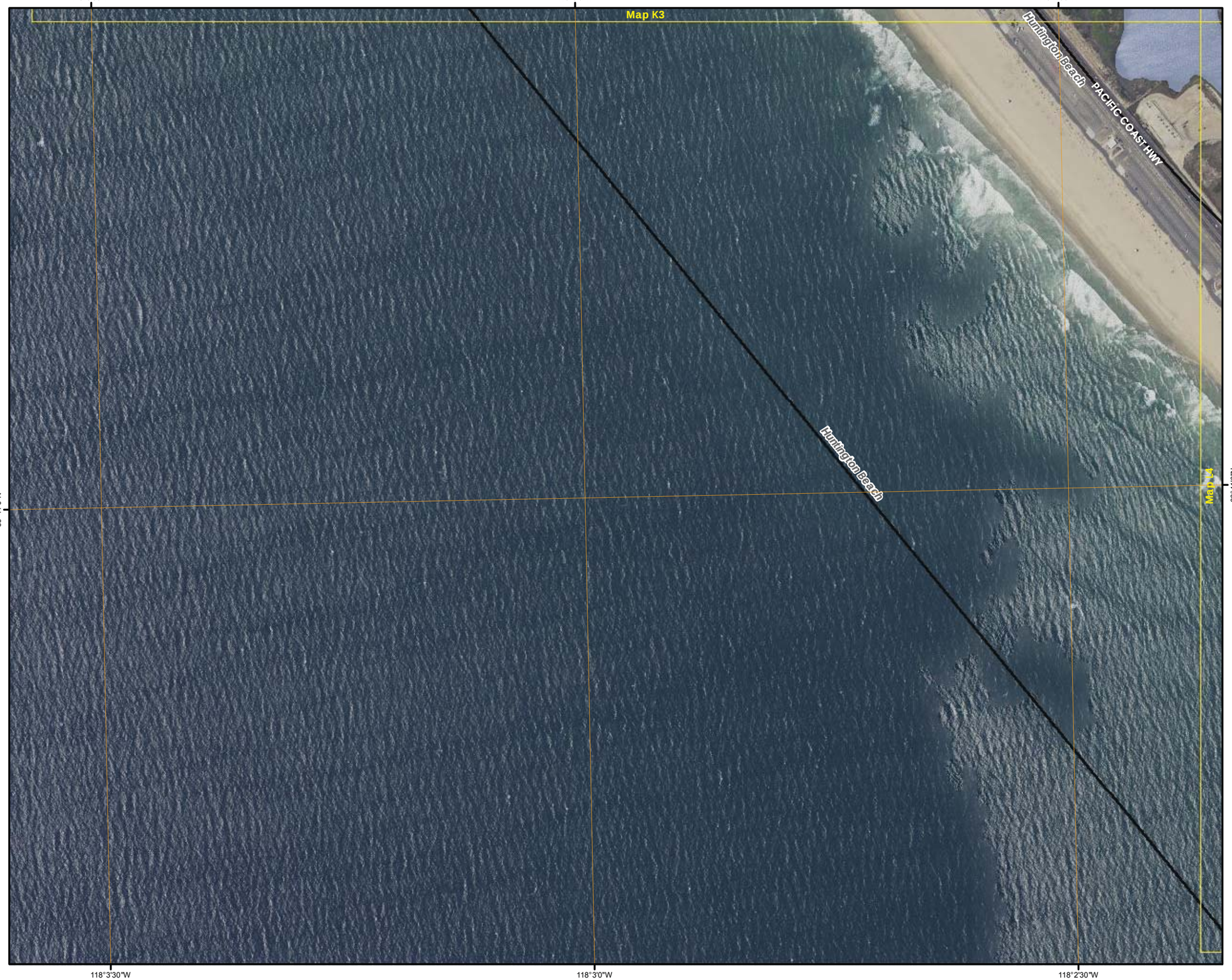
Map J15 Map K14 Map L15

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 107 of 148

N

L3

STETSON ENGINEERS INC.

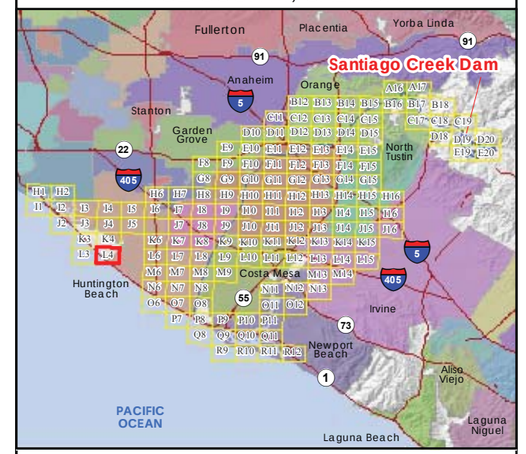
0 250 500 750 Feet

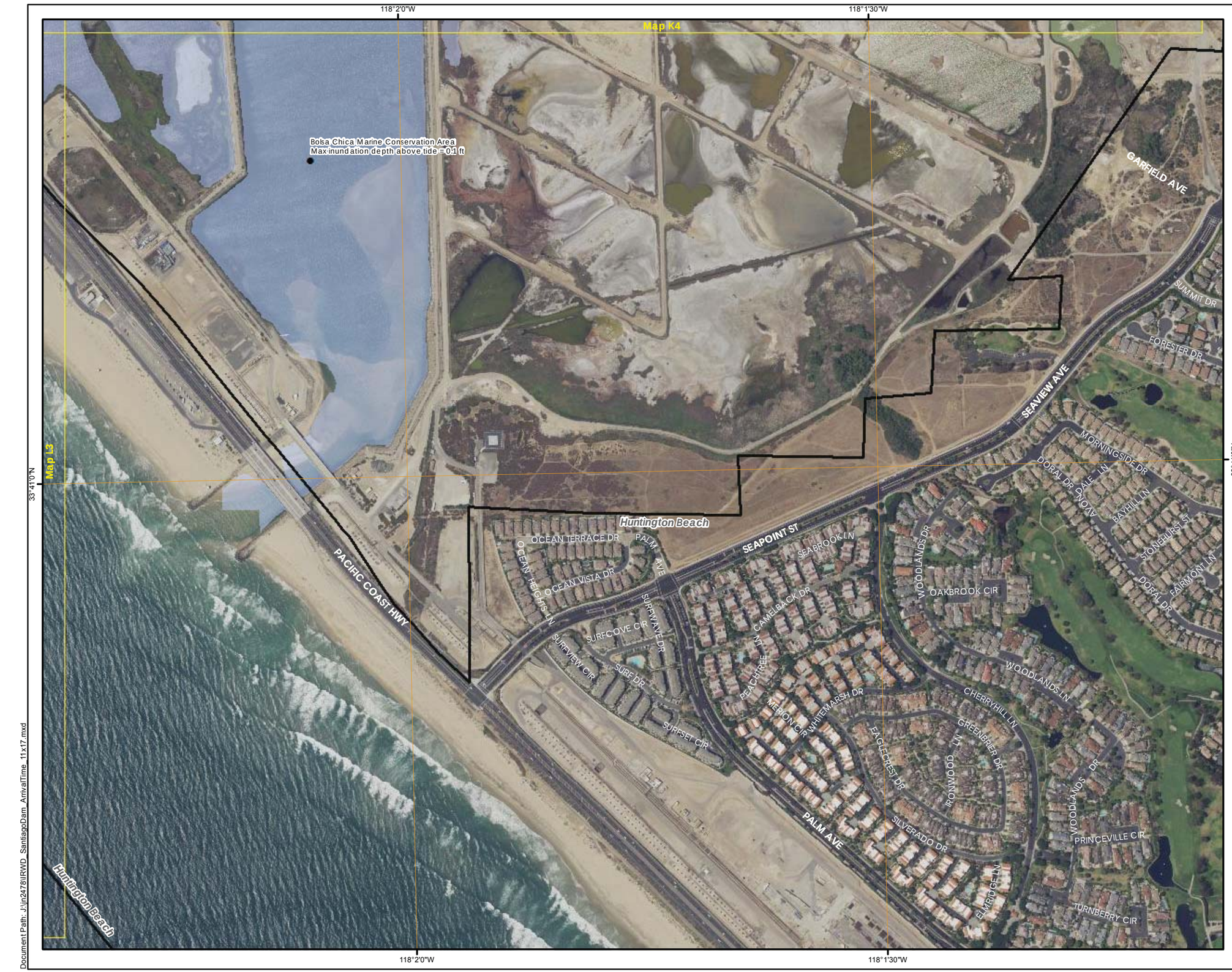
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 108 of 148

L4

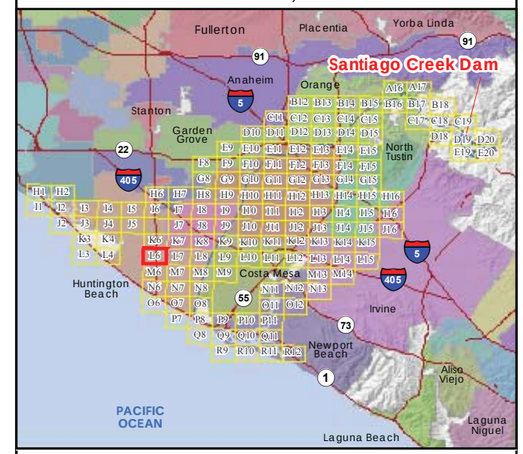
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 109 of 148

L6

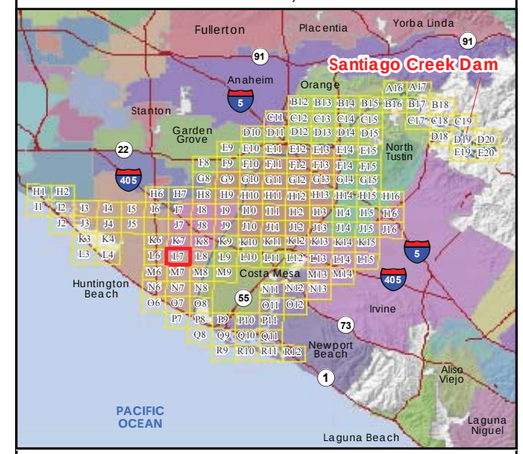
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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PANEL 110 of 148

STETSON ENGINEERS INC.

N

L7

0 250 500 750 Feet

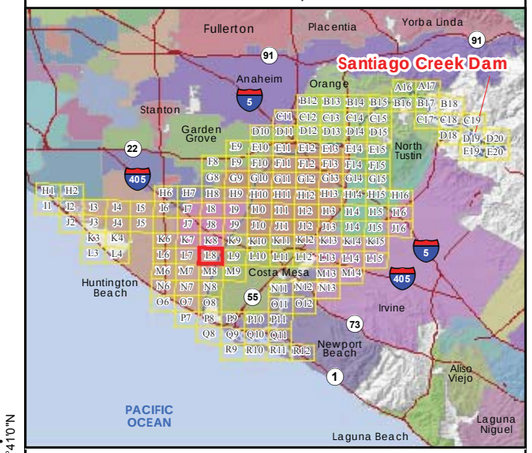
0 100 200 Meters

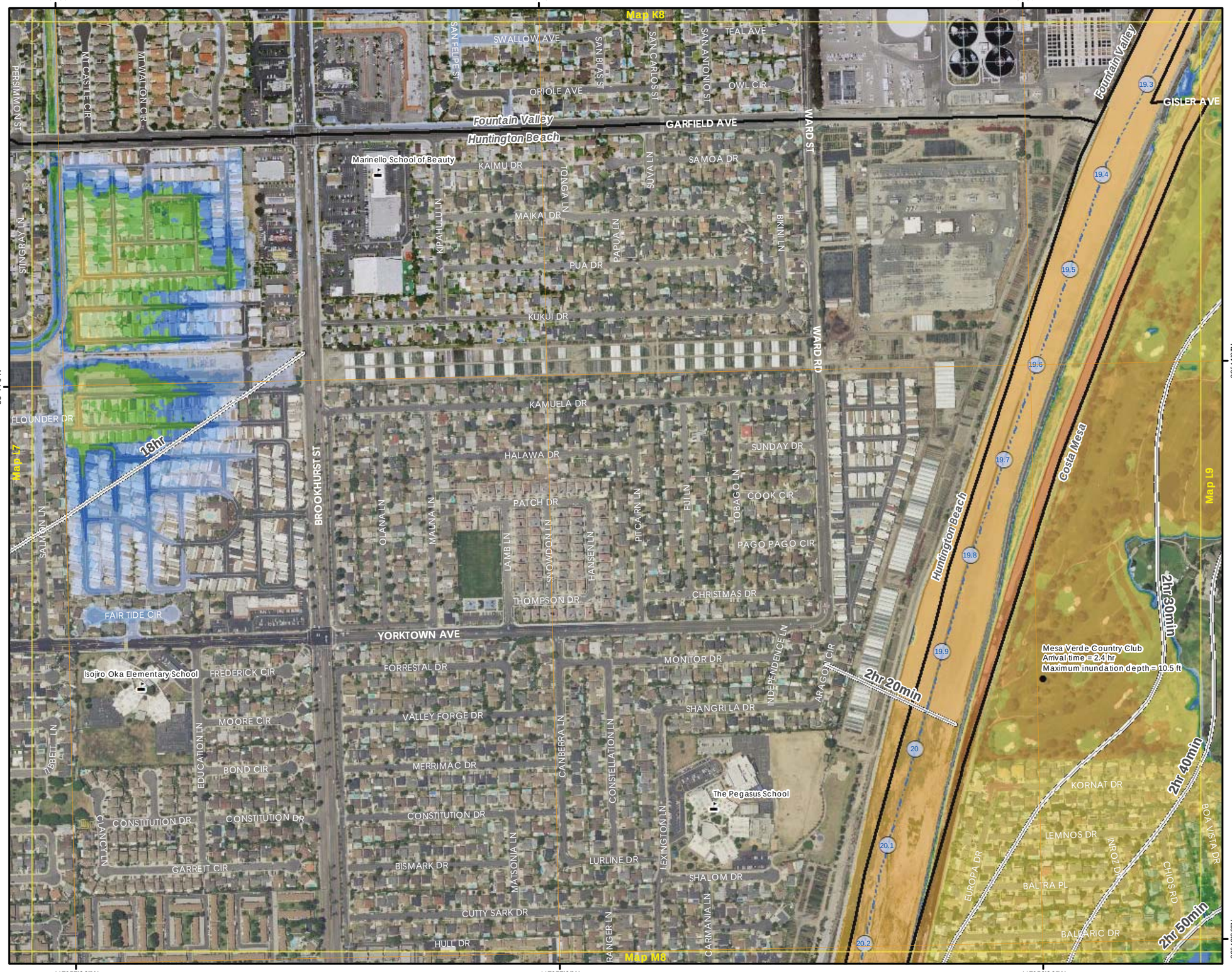
Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

117°58'30"W 117°58'0"W 117°57'30"W
33°41'0"N 33°40'30"N
Map K7 Map L6 Map L8 Map M7

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

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STATE OF CALIFORNIA

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PANEL 111 of 148

L8

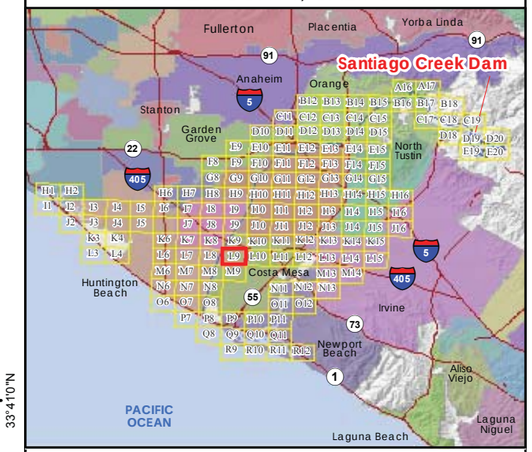
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 112 of 148

N

L9

STETSON ENGINEERS INC.

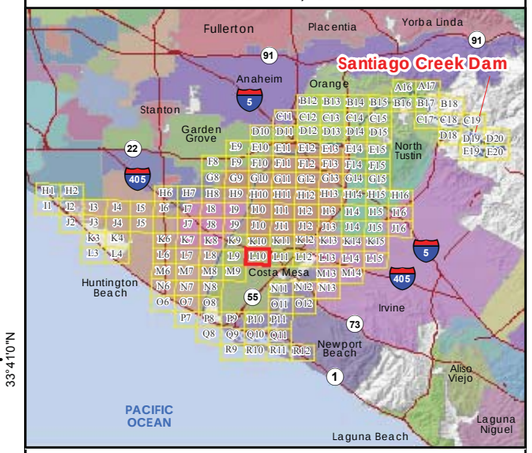
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 113 of 148

L10

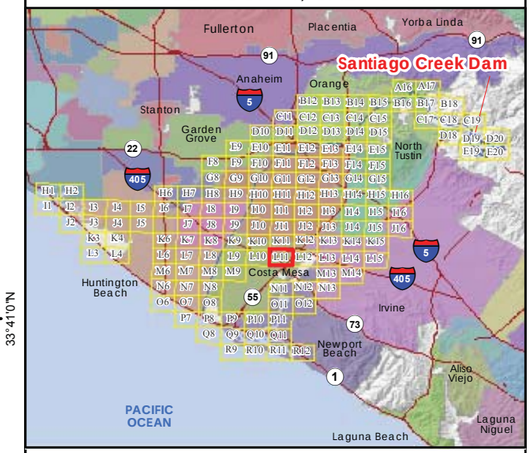
STETSON ENGINEERS INC.

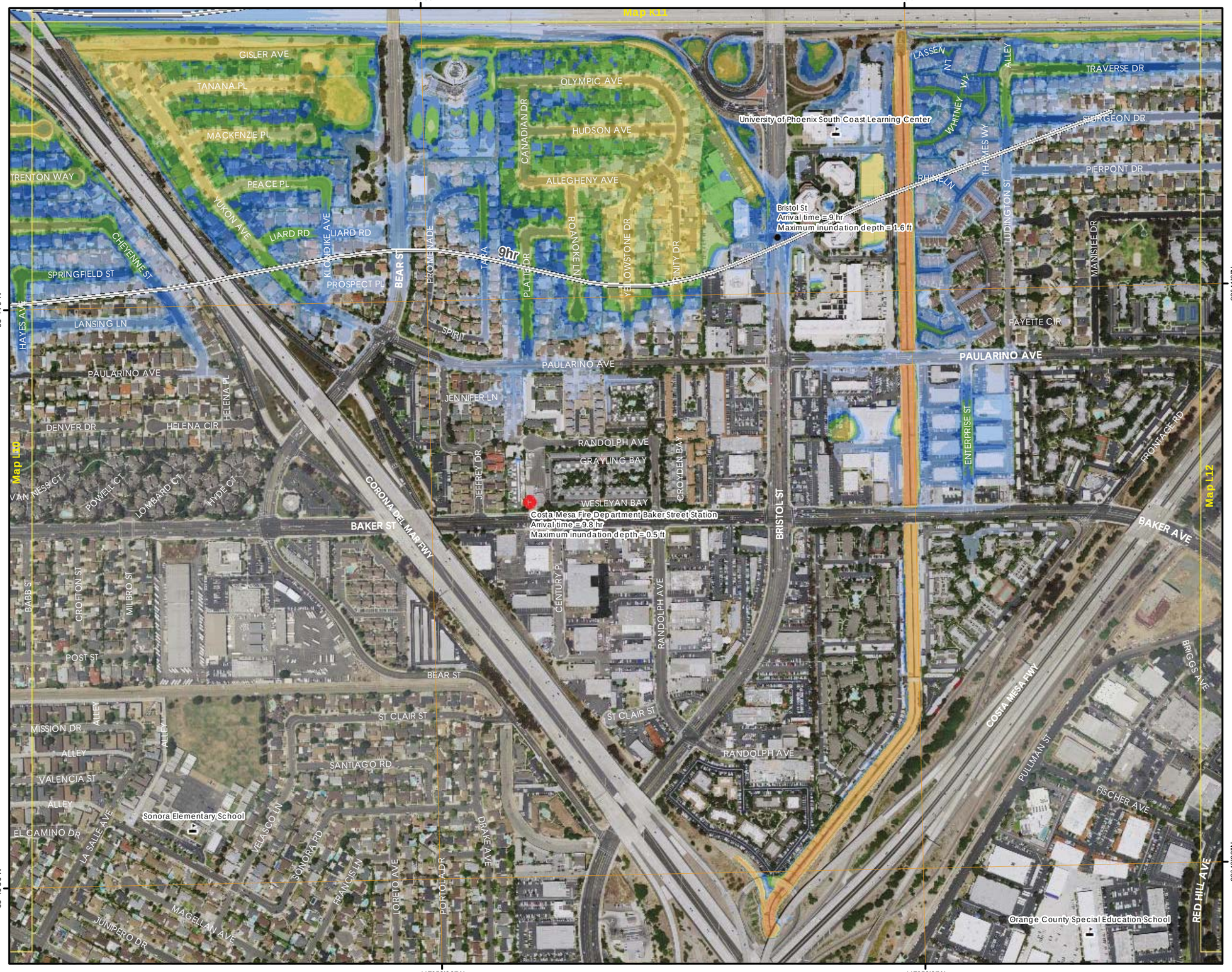
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 114 of 148

L11

STETSON ENGINEERS INC.

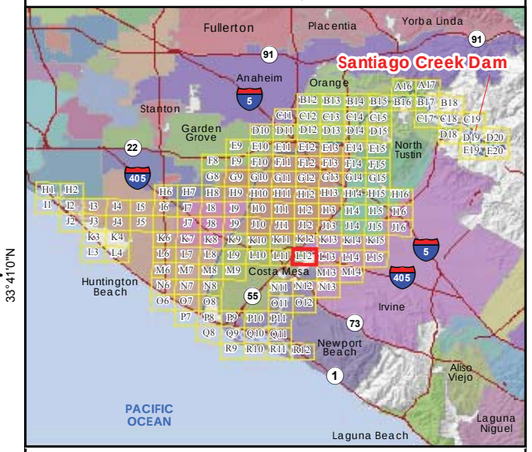
0 250 500 750 Feet

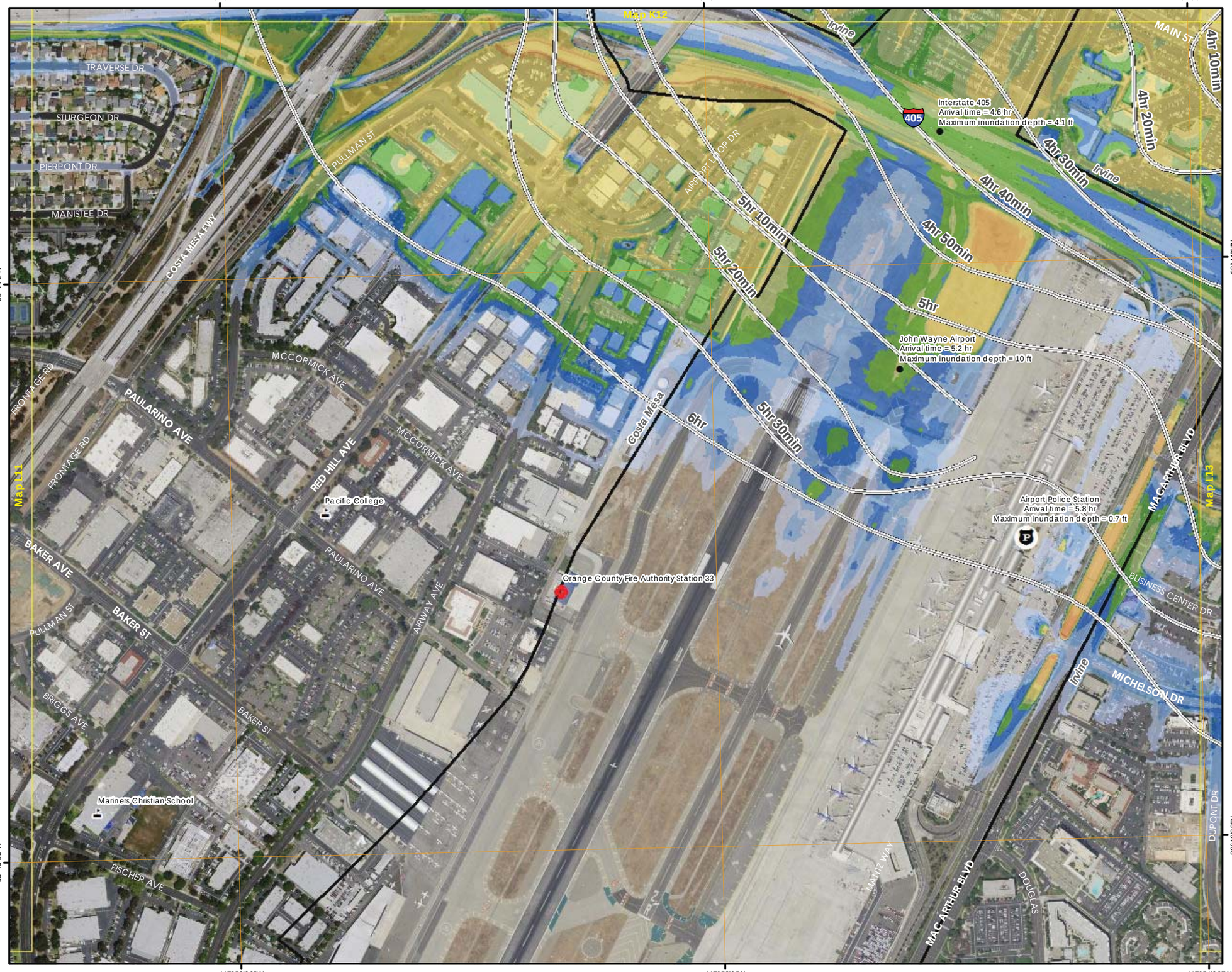
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 115 of 148

L12

STETSON ENGINEERS INC.

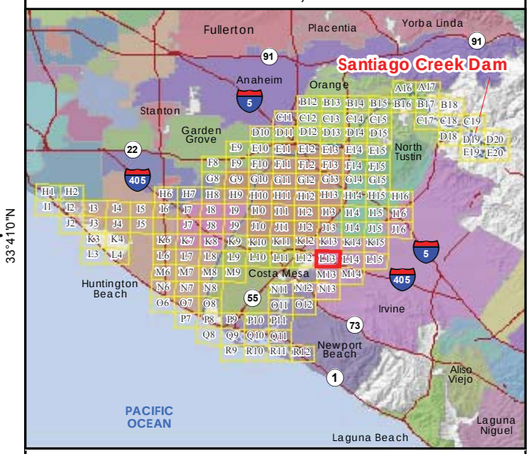
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 116 of 148

L13

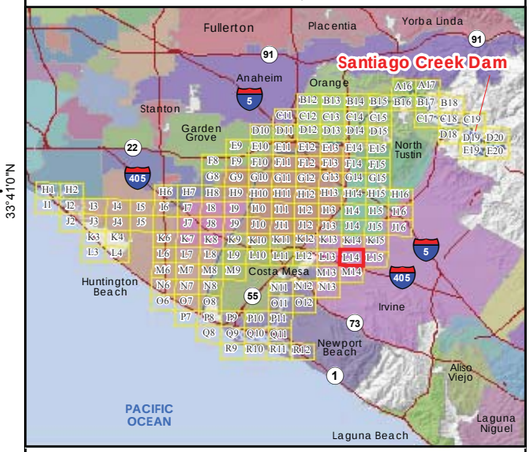
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Molly Palmer,
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Expiration Date December 31, 2019

PANEL 117 of 148

L14

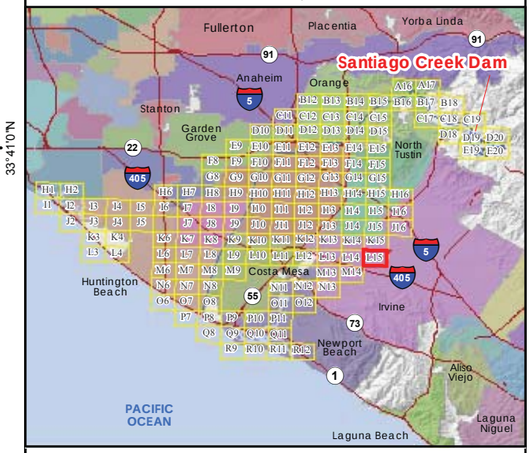
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 118 of 148

L15

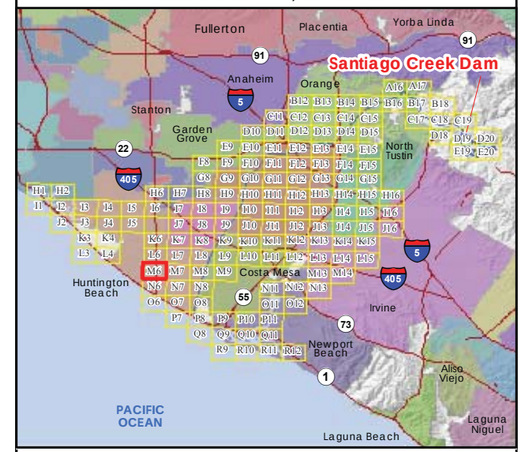
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 119 of 148

M6

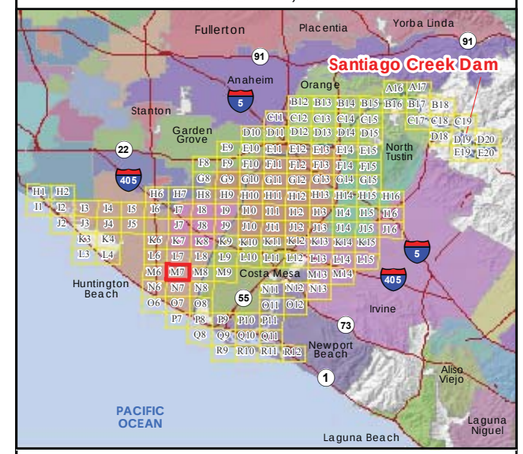
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 120 of 148

M7

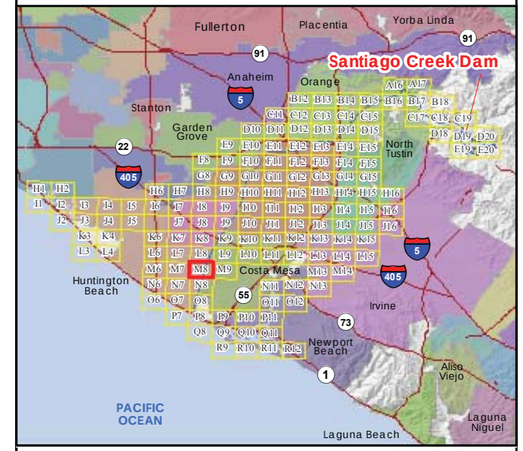
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\24781\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 121 of 148

M8

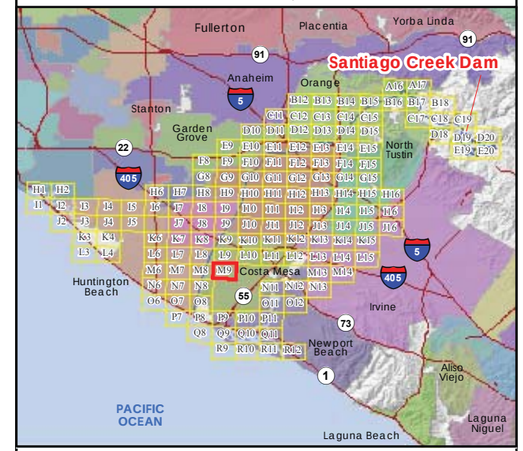
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 122 of 148

M9

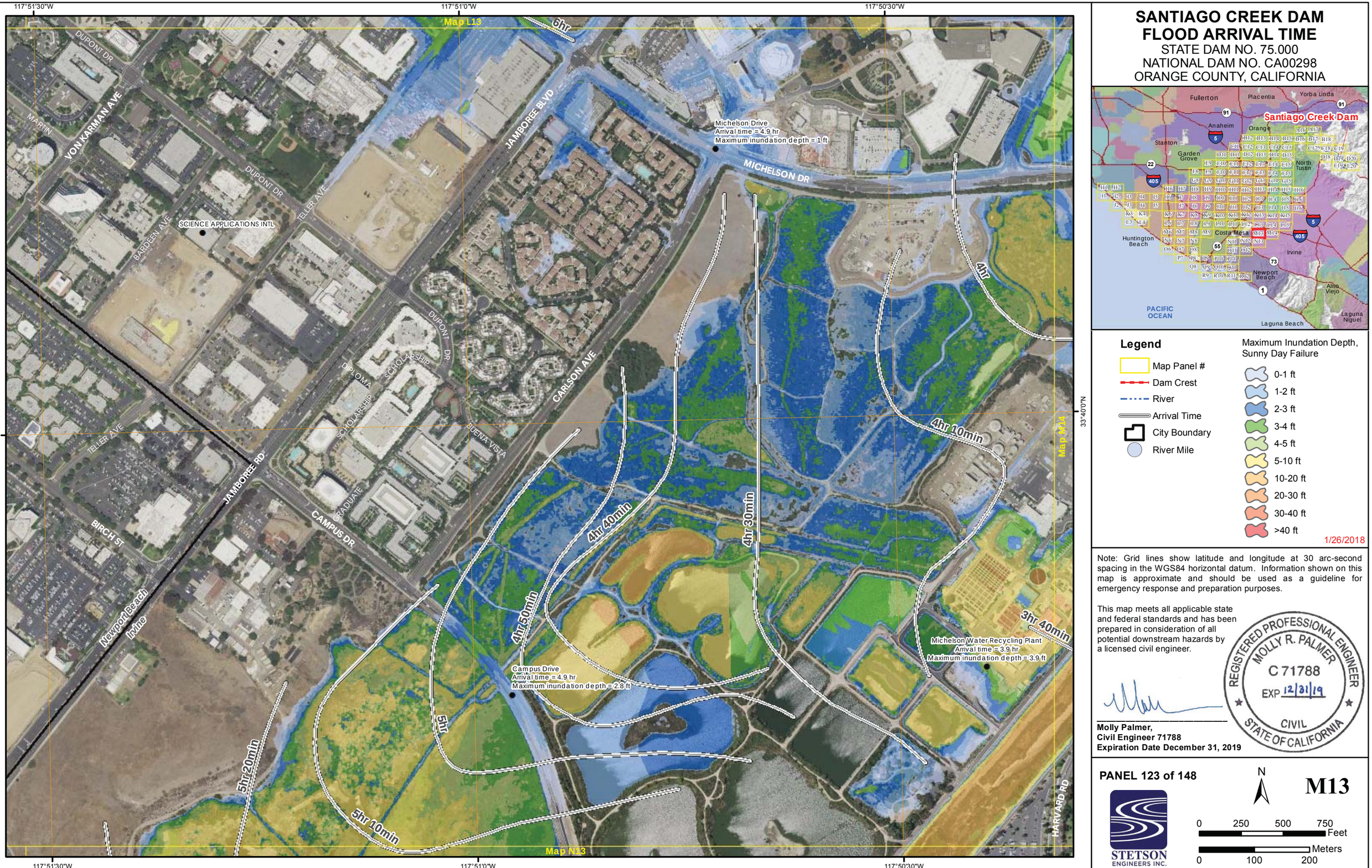
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 123 of 148

M13

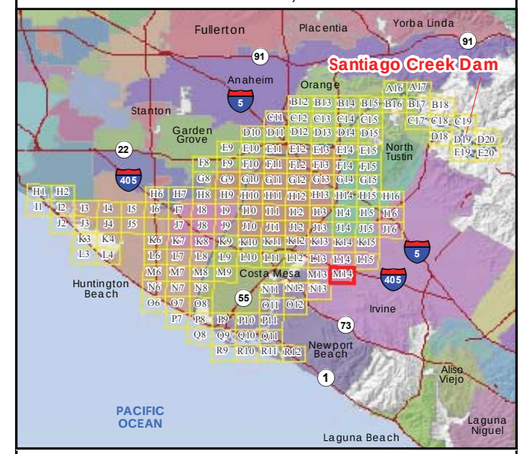
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 124 of 148

M14

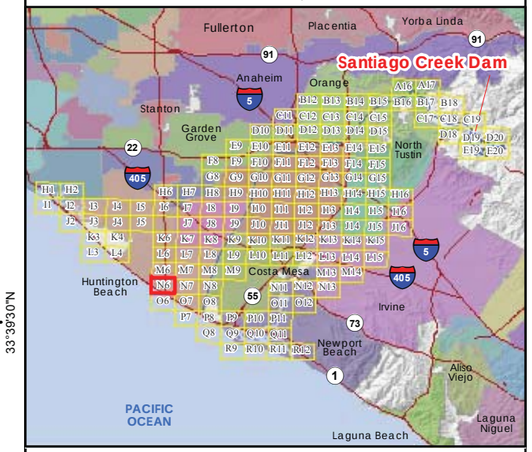
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 125 of 148

STETSON ENGINEERS INC.

N

N6

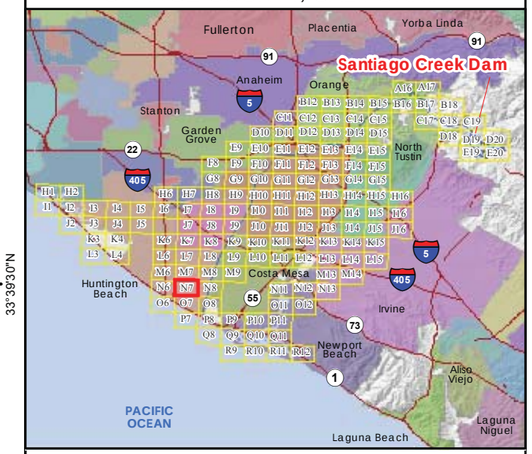
0 250 500 750 Feet

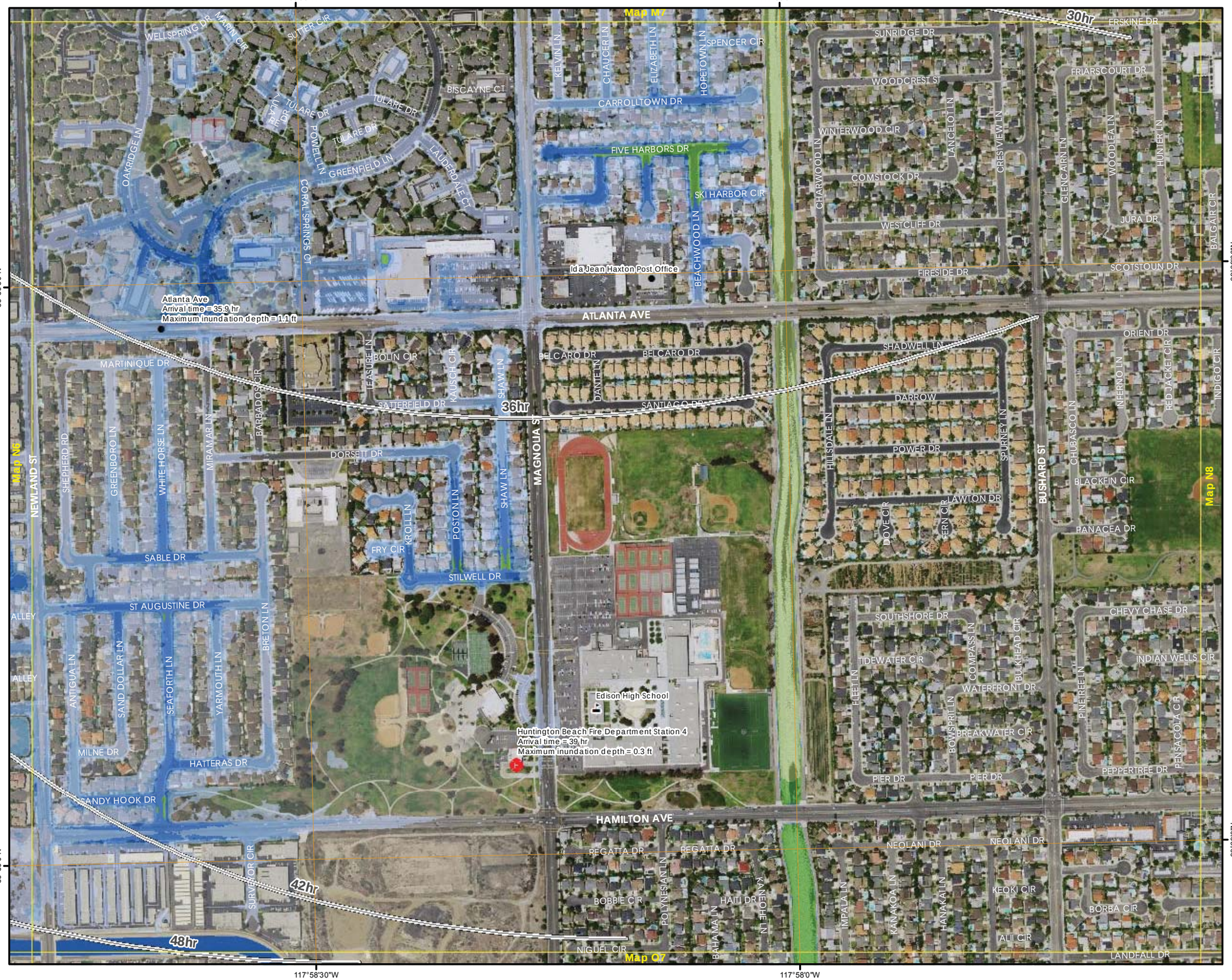
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 126 of 148

N7

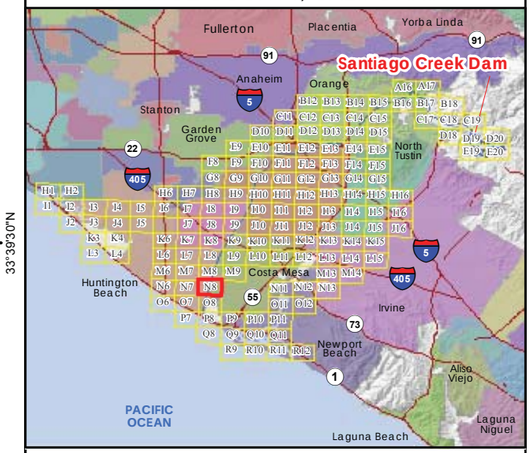
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 127 of 148

N

N8

STETSON ENGINEERS INC.

0 250 500 750 Feet

0 100 200 Meters

117°57'30"W 117°57'0"W 117°56'30"W

33°39'30"N 33°39'0"N

Map M8 Map N7 Map O8

3hr 10min 3hr 20min 3hr 30min 3hr 40min 3hr 50min

Fairview Park
Arrival time = 3.4 hr
Maximum inundation depth = 12.8 ft

Huntington Christian School
Brethren Christian Junior and Senior High School
Waldorf School of Orange County
Victoria Elementary School

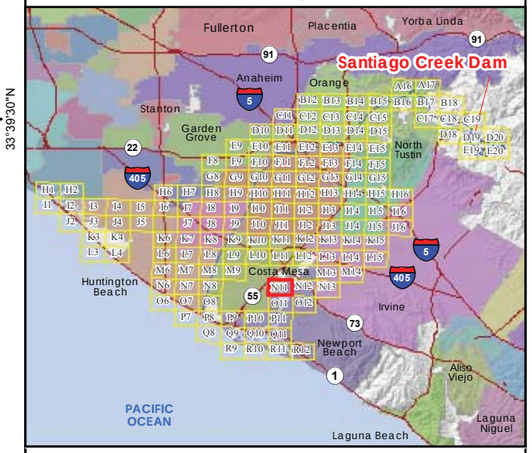
SILVER STRAND DR
CLIFF DR
STAR DR
SUNTAN CIR
LAPWORTH CIR
SIGNET CIR
DRAGON CIR
EL CAPITAN LN
CHANCE CIR
KITE DR
SCOTSTOUN DR
ATLANTA AVE
ORIENT DR
CORNERBROOK DR
DANA DR
SPRIT CIR
SPAR CIR
EFFINGHAM DR
BLUE REEF DR
MONTE CARLO CIR
PORT ROYAL CIR
JAMAICA CIR
VILLA PACIFIC DR
BROOKHAVEN CIR
BROOKBAY CIR
SUNSTAR CIR
VERDE MAR DR
HAMILTON AVE
CLEARBROOK DR
LANDFALL DR
ALLEY
NANCY LN
SEA BREEZE DR
W WILSON ST
WILSON ST
PACIFIC AVE
CANYON DR
STATE AVE
REPUBLIC AVE
CONGRESS ST
GOVERNOR ST
SANDI LN
VICTORIA ST
WESTWARD RD
RIDGECREST ST
SEA BLUFF DR
GLENEAGLES TE
AVIEMORE TE
SEA COVE LN
MEADOW VIEW LN
OAK ST
LINDEN PL
GROVE PL
SEA TERRACE LN
UNKNOWN
Costa Mesa
Huntington Beach
BROOKHURST ST
AMERICAN AVE
UNION AVE

21.2 21.3 21.4 21.5 21.6 21.7 21.8 21.9 22 22.1

Document Path: J:\jn\2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 128 of 148

N

N11

STETSON ENGINEERS INC.

0 250 500 750 Feet

0 100 200 Meters

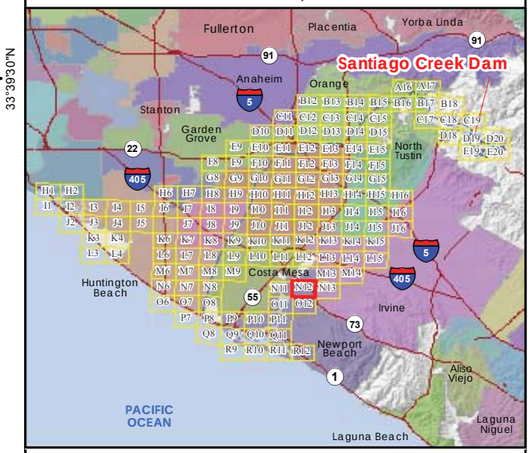
117°53'30"W
117°53'0"W
33°39'30"N
33°39'0"N

Newport Beach Fire Department Station 7
International Montessori Academies Newport Beach Elementary School
Back Bay High School
Monte Vista High School
Newport Bay
Arrival time = 6.1 hr
Max inundation depth above tide = 2.5 ft
6hr
5hr 50min
Map N12
Map O11

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 129 of 148

N12

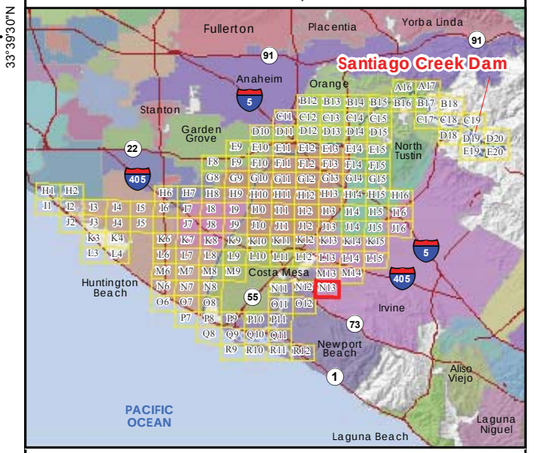
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\URWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 130 of 148

N13

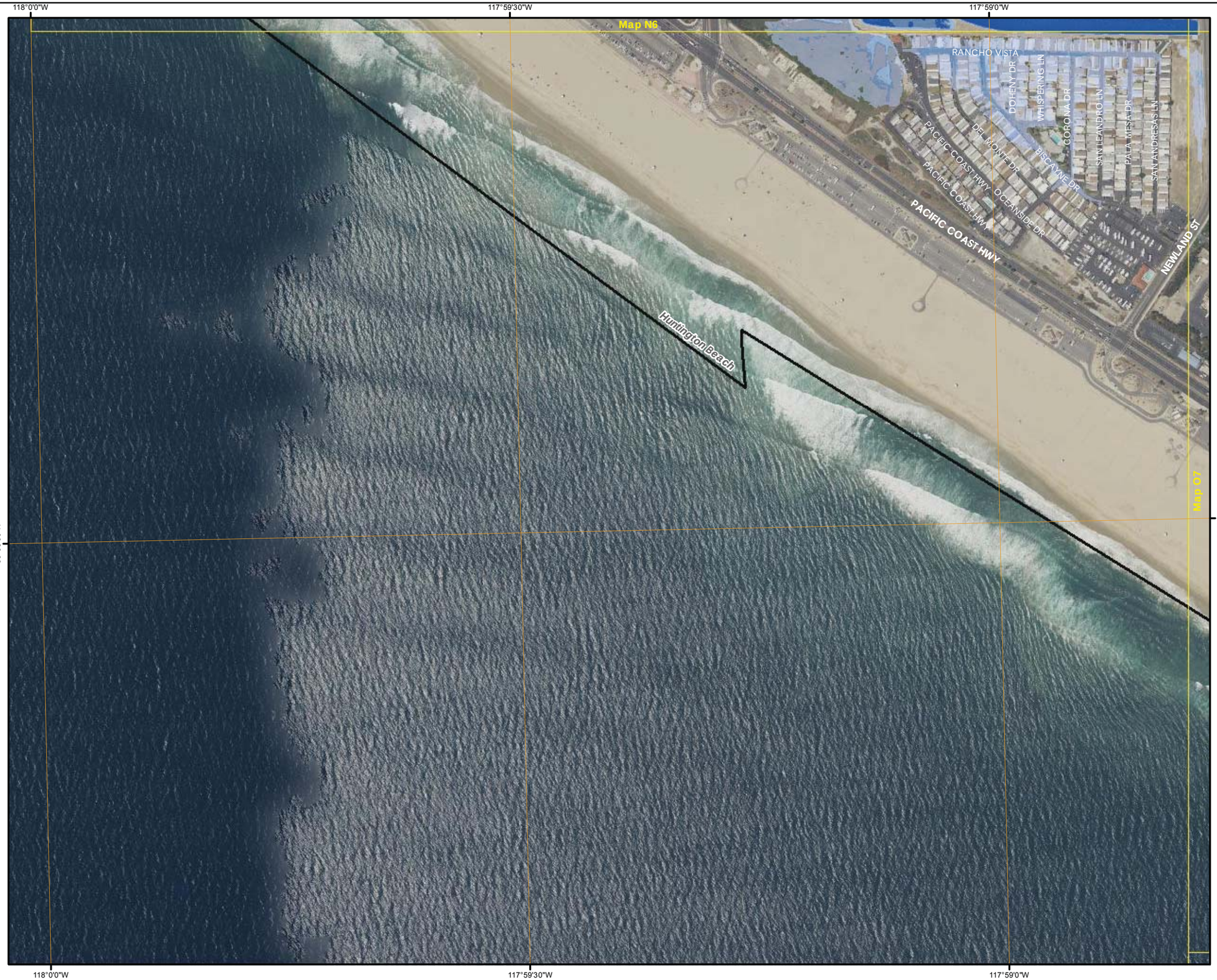
STETSON ENGINEERS INC.

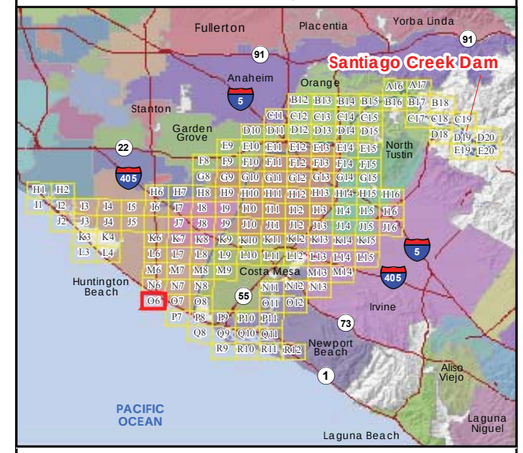
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 131 of 148

O6

N

0 250 500 750 Feet

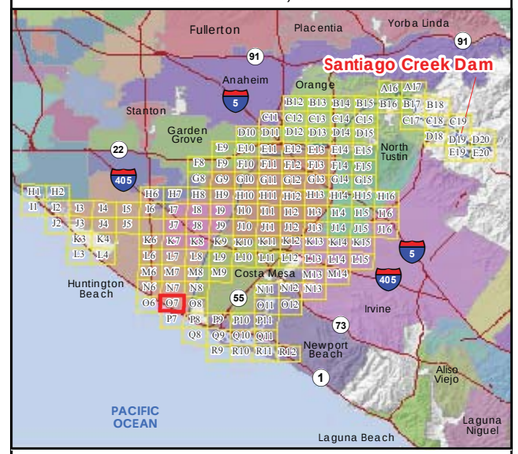
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 132 of 148

O7

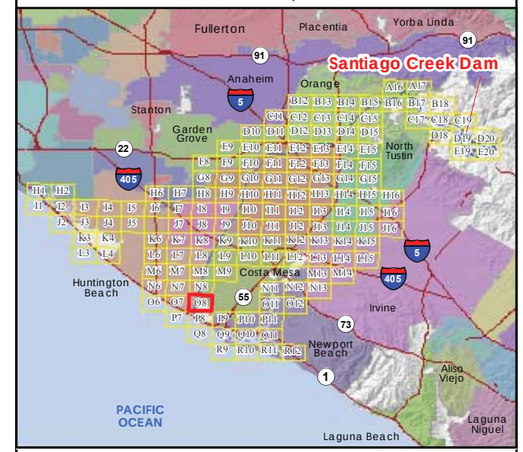
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 133 of 148

O8

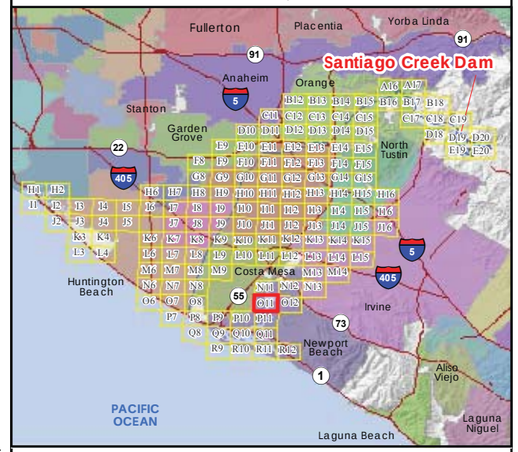
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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PANEL 134 of 148

O11

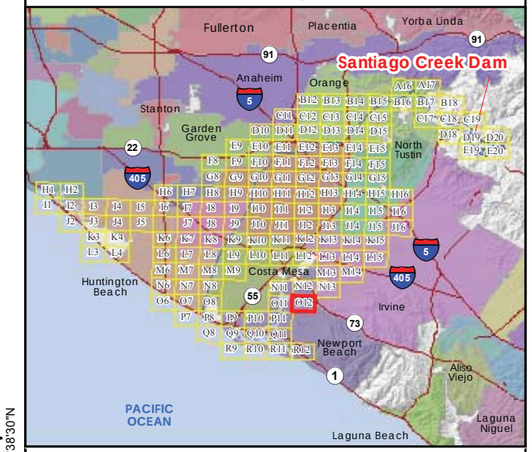
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 135 of 148

O12

STETSON ENGINEERS INC.

0 250 500 750 Feet

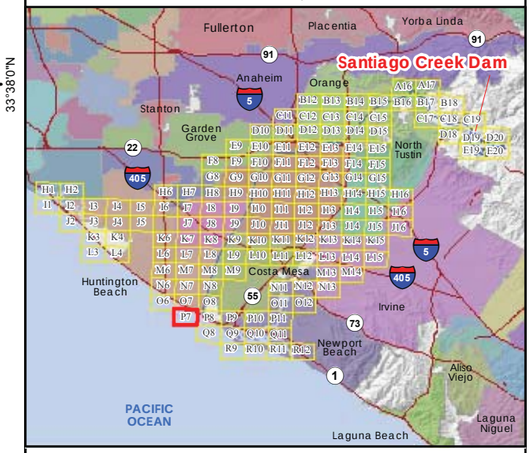
0 100 200 Meters

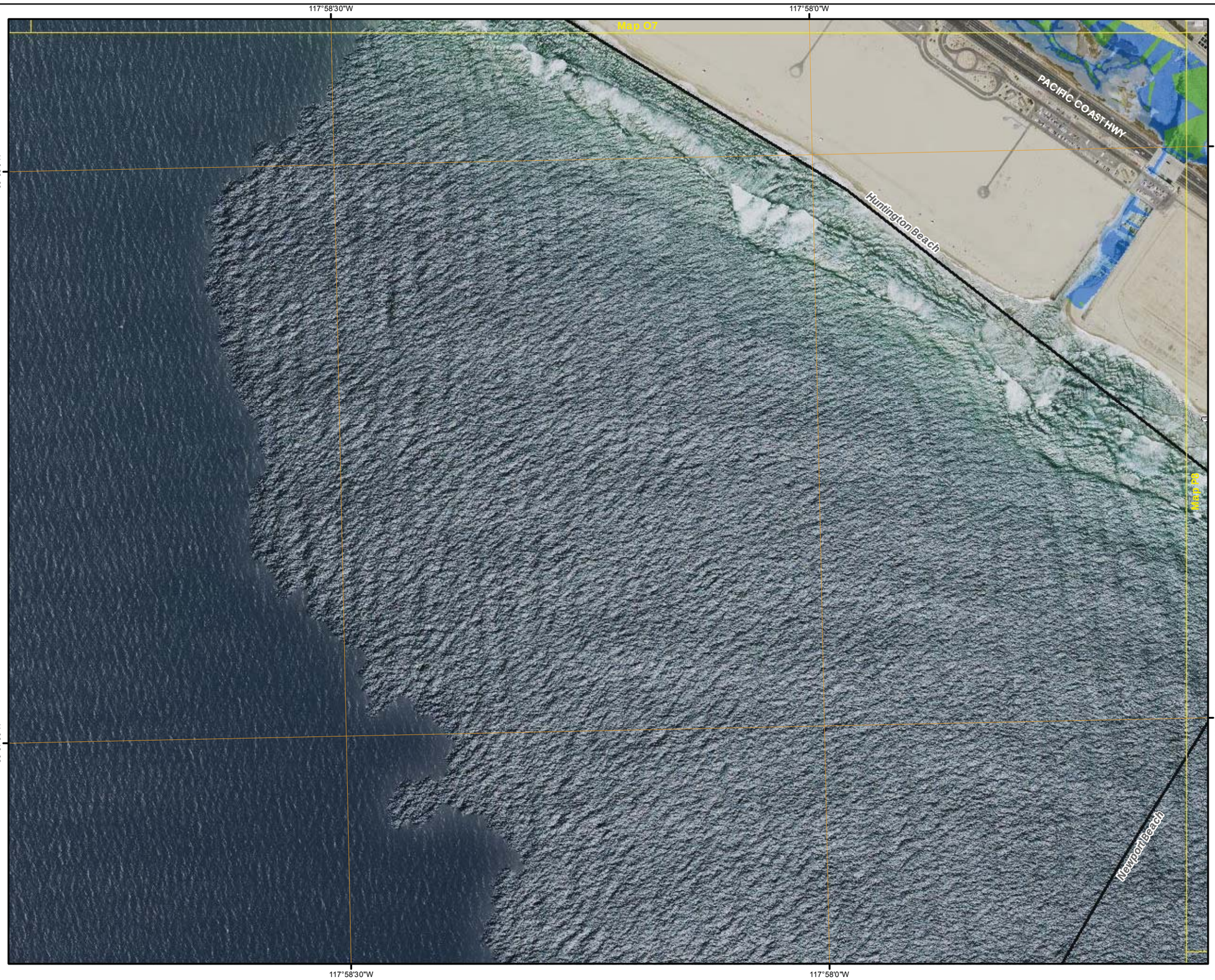
117°52'30"W
117°52'0"W
33°38'30"N
33°38'0"N
Map M11
Map M12
5hr 40min
Eastbluff Elementary School
Interior Designers Institute
Newport Beach Post Office
Newport Christian School
BACKBAY DR
VISTA ORNADA
ONDA
VISTA PARADA
PLAYA
PERLA
VISTA QUINTA
QUEDADA
VISTA DEL ORO
VISTA ROMA
VISTA SUERTE
CANCHA
VISTA UMBROSA
VENTAJA
RAQUETA
LAVER WAY
VISTA TRUCHA
CATALPA ST
CASSIA ST
CAROB ST
CEIBA PL
CELTIS PL
CERCIS PL
CORTE CALETA
CORTE MARIN
LA VIDA
CORTE PORTOFINO
CORTE HERMOSA
AMALFI
BASTIA
MILANO DR
NAPLES
SALERNO
VALENCIA
CORSICA DR
LA SALUD
MALLORCA DR
CORELLA
Newport Beach
Irvine
EASTBLUFF DR
CAMPHOR ST
BISON AVE
JAMBOREE RD
CAMELBACK ST
LA FELICIDAD
MARSALA
LAURENT MARSALA DR
VISTA DEL SOL
BIXIA ST
BAMBOO ST
BUNYA ST
BLACKTHORN ST
BUCKEYE ST
ALTA VISTA DR
BISON ST
CITRUS PL
VISTA GRANDE
VISTA FLORA
VISTA HUERTA
VISTA HOGAR
VISTA LAREDO
BELLIS ST
ALEPPO ST
ALDER PL
ALMOND PL
ARALIA ST
ARBUTUS ST
ALBA ST
BASSWOOD
HARTFORD DR
WESTPORT
SPANISH BAY DR
LONG BAY DR
EDGEWOOD DR
SINGLE TREE DR
COUNTRY CLUB DR
HILLSDALE DR
JUPITER HILLS DR
COURSE DR
CROOKED STICK DR
BIGHORN DR
OAK TREE DR
THUNDERBIRD RD
HONORS PL
BELCOURT DR NORTH
LEESBURY CT
CHESHIRE CT
MACARTHUR BLVD
BAYSWATER
RESIDENCIA
VILAGGIO
GLENEAGLES DR

Document Path: J:\jn\24781\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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C 71788
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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 136 of 148

P7

N

STETSON ENGINEERS INC.

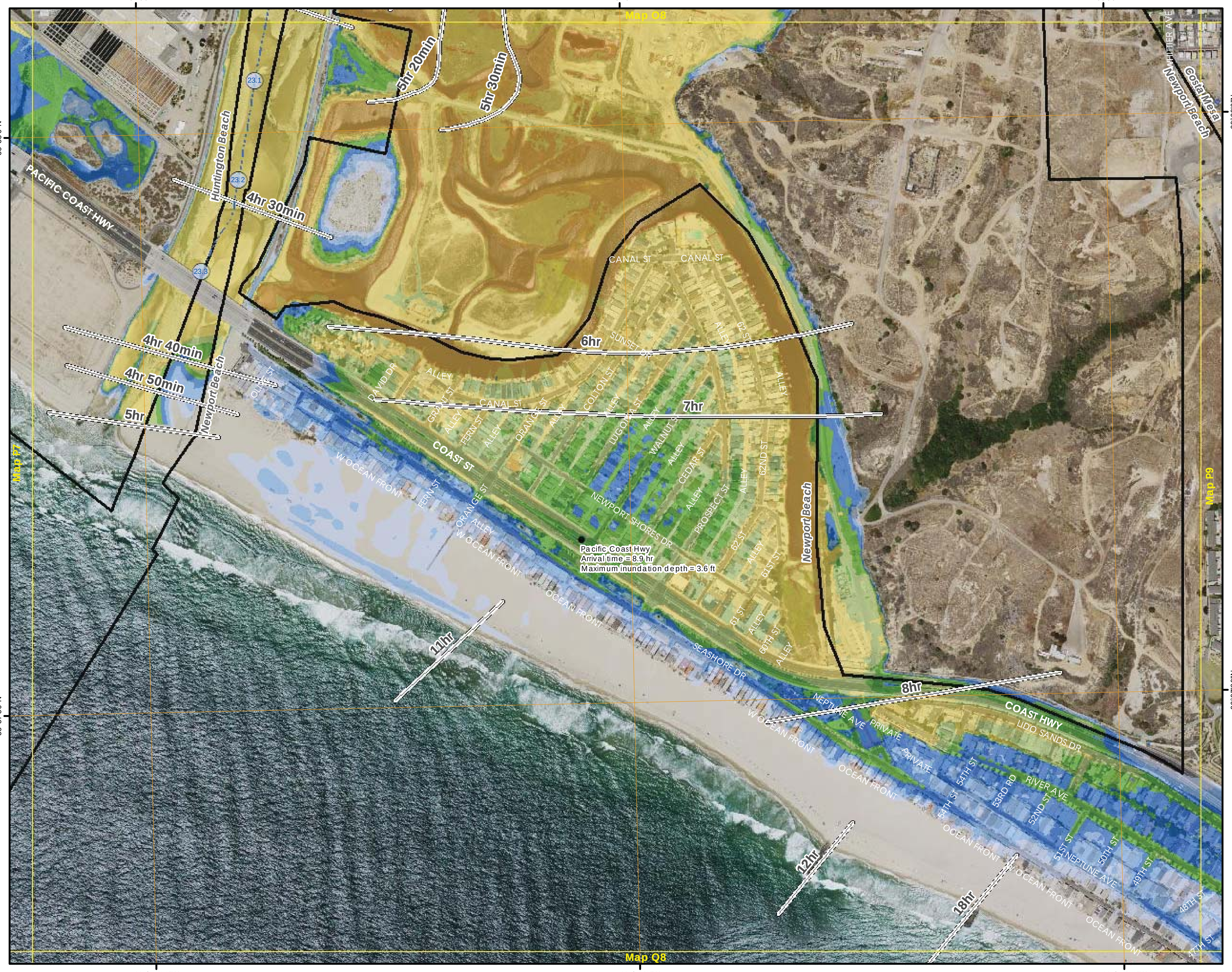
0 250 500 750 Feet

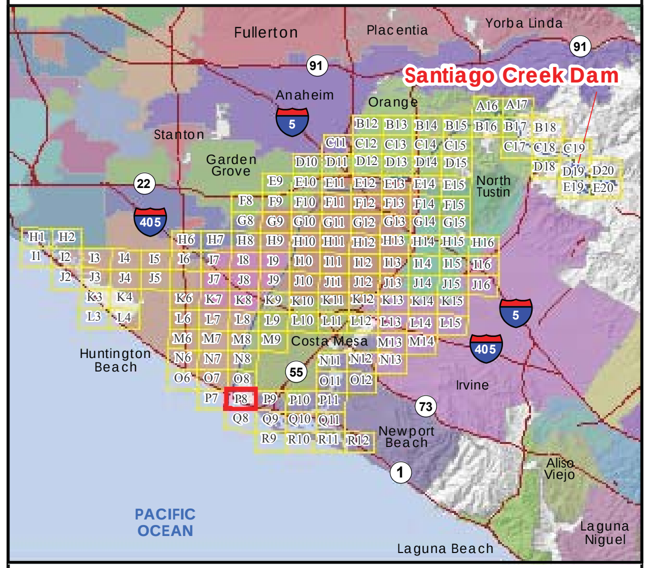
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 137 of 148

N

P8

0 250 500 750 Feet

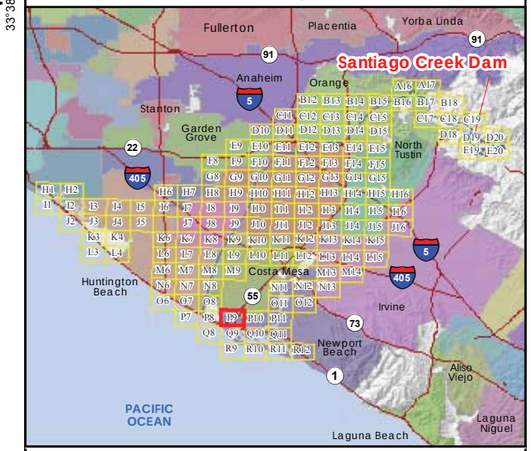
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\n2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Communications Facility
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 138 of 148

P9

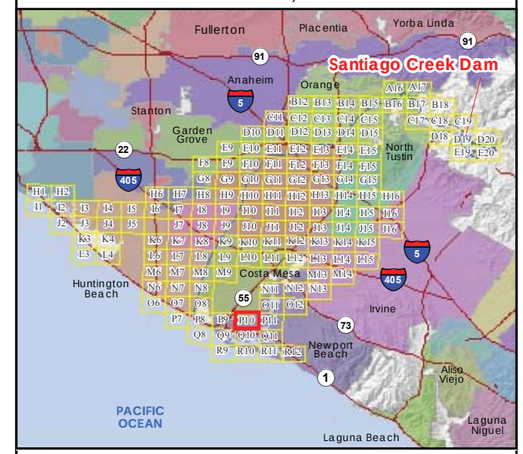
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station
- Medical Facility

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 139 of 148

P10

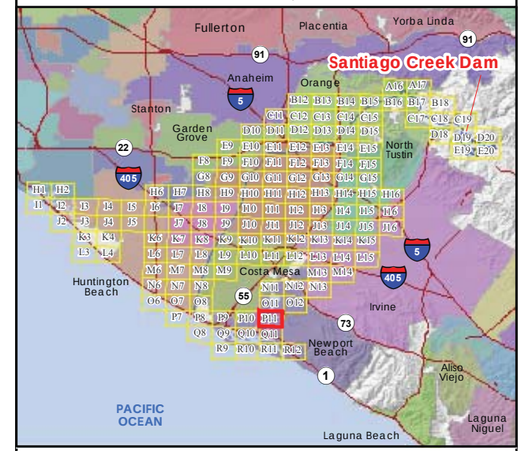
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station
- Police Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 140 of 148

P11

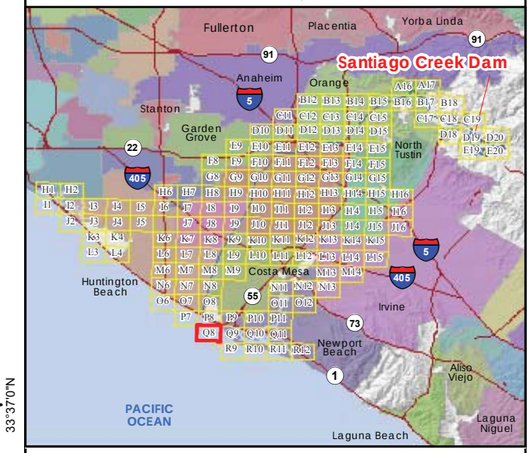
STETSON ENGINEERS INC.

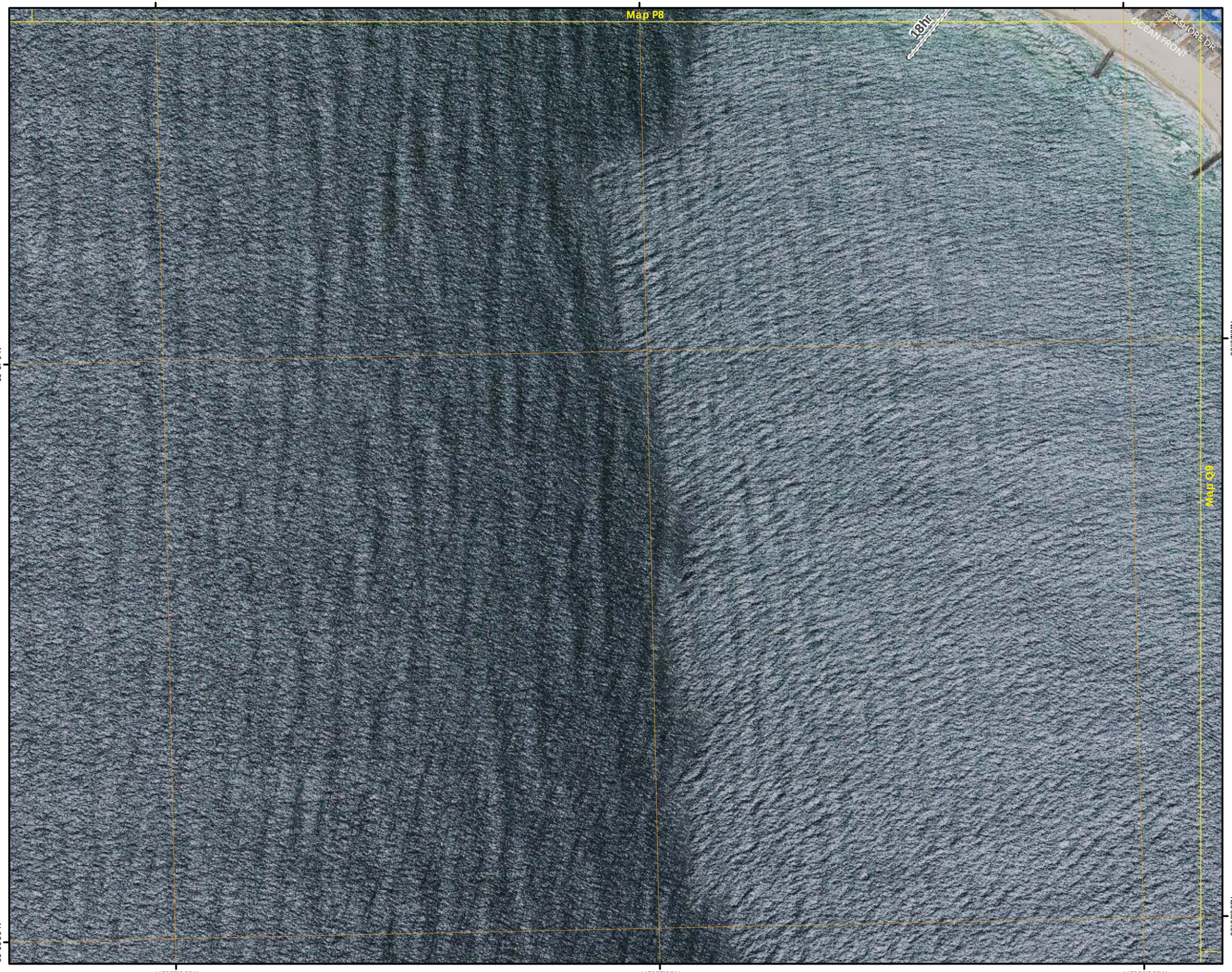
0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

Note: Grid lines show latitude and longitude at 30 arc-second spacing in the WGS84 horizontal datum. Information shown on this map is approximate and should be used as a guideline for emergency response and preparation purposes.

This map meets all applicable state and federal standards and has been prepared in consideration of all potential downstream hazards by a licensed civil engineer.

REGISTERED PROFESSIONAL ENGINEER
MOLLY R. PALMER
C 71788
EXP 12/31/19
CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 141 of 148

Q8

N

0 250 500 750 Feet

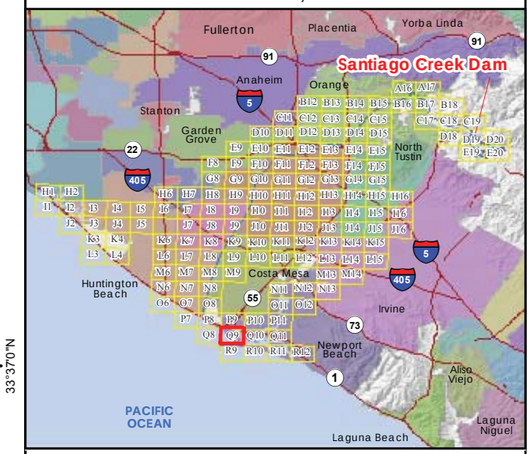
0 100 200 Meters

STETSON ENGINEERS INC.

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 142 of 148

Q9

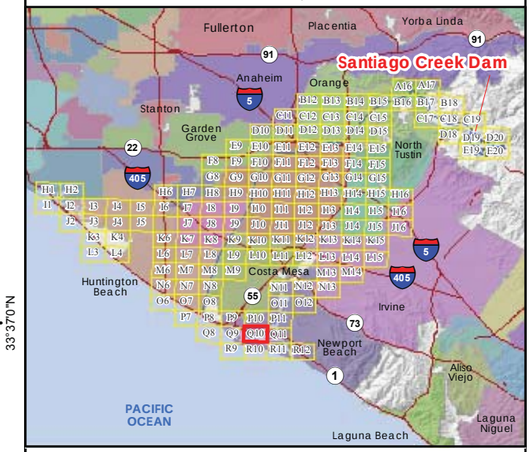
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

Molly Palmer,
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Expiration Date December 31, 2019

PANEL 143 of 148

Q10

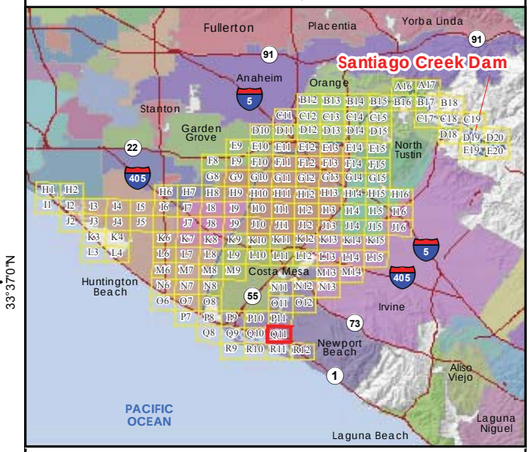
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 144 of 148

Q11

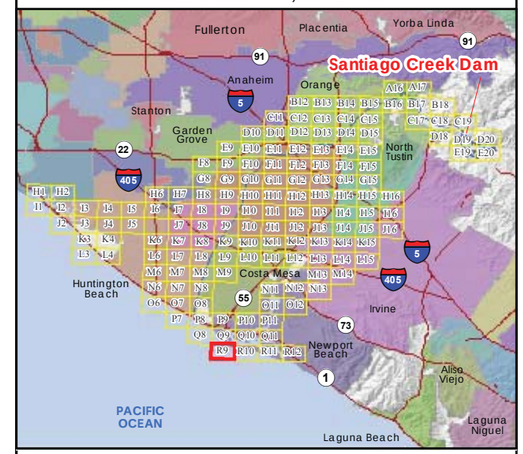
STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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Expiration Date December 31, 2019

PANEL 145 of 148

R9

STETSON ENGINEERS INC.

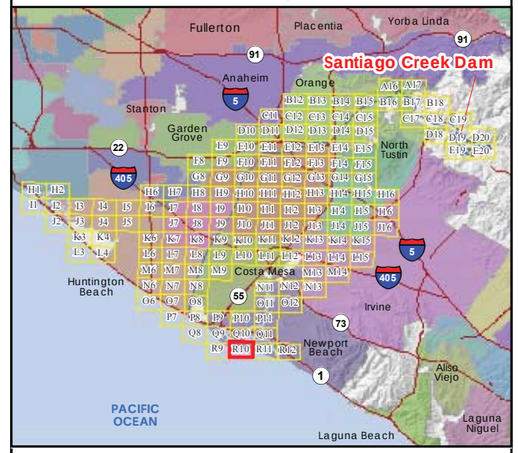
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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PANEL 146 of 148

R10

STETSON ENGINEERS INC.

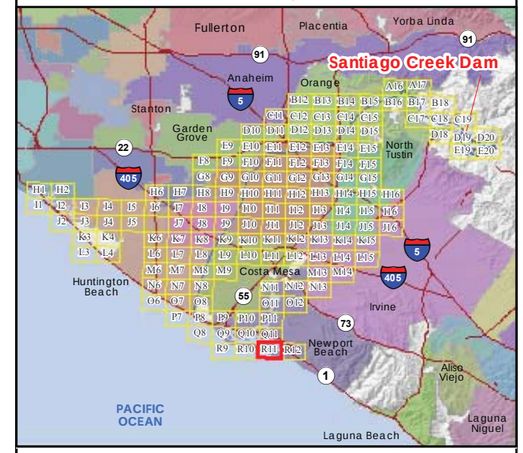
0 250 500 750 Feet

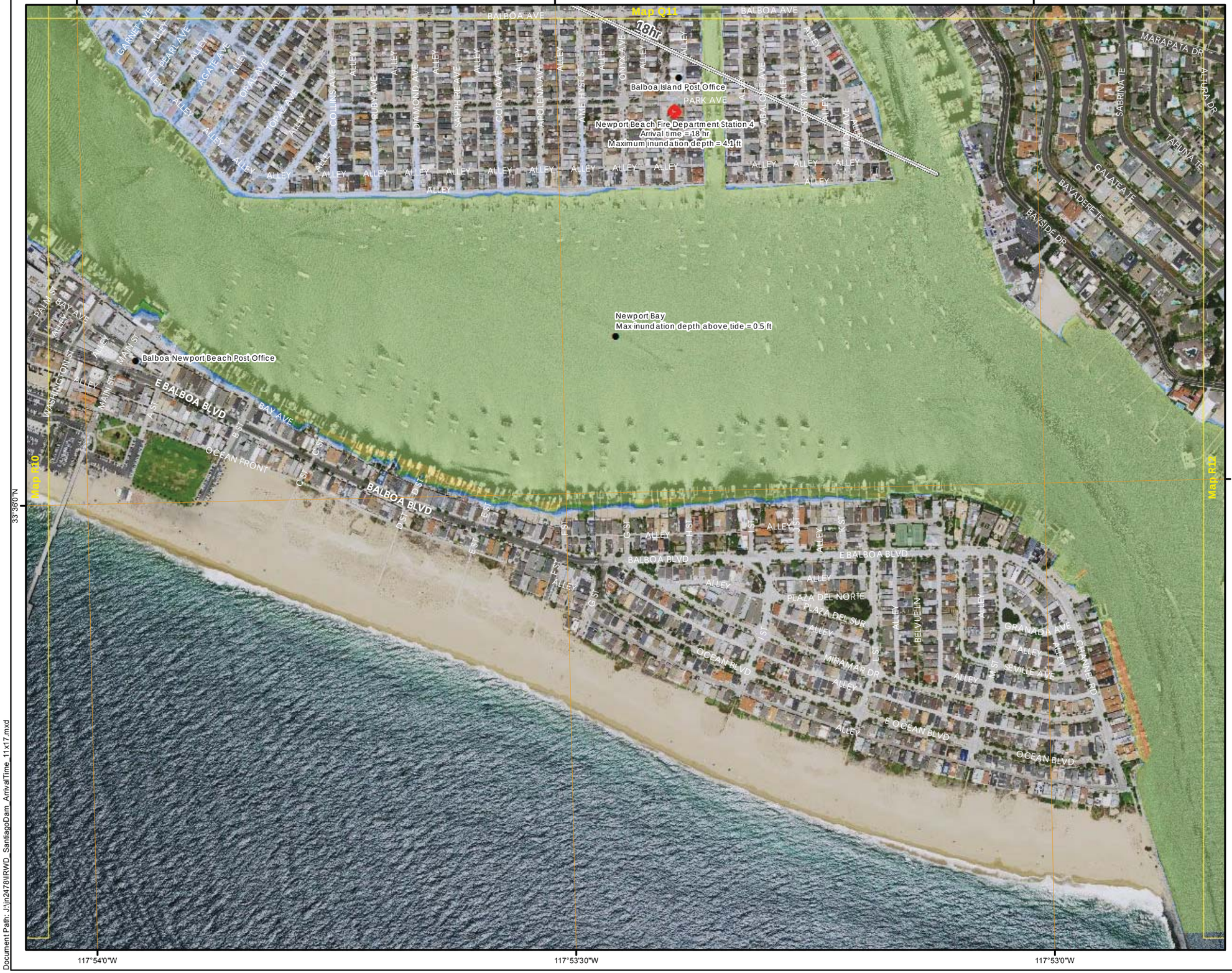
0 100 200 Meters

Document Path: J:\jn\24780\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA





Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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CIVIL
STATE OF CALIFORNIA

Molly Palmer,
Civil Engineer 71788
Expiration Date December 31, 2019

PANEL 147 of 148

N

R11

STETSON ENGINEERS INC.

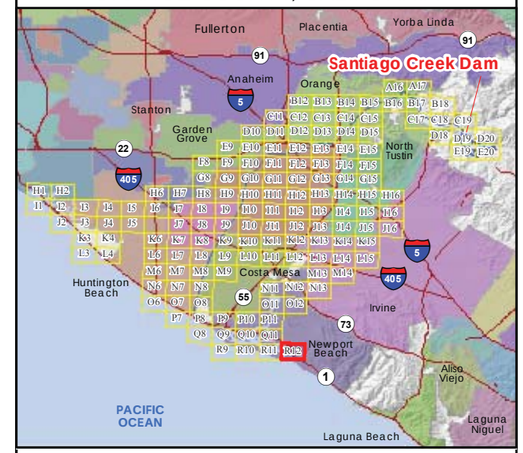
0 250 500 750 Feet

0 100 200 Meters

Document Path: J:\jn2478\RWD_SantiagoDam_ArrivalTime_11x17.mxd

SANTIAGO CREEK DAM
FLOOD ARRIVAL TIME

STATE DAM NO. 75.000
NATIONAL DAM NO. CA00298
ORANGE COUNTY, CALIFORNIA



Legend

- Map Panel #
- Dam Crest
- River
- Arrival Time
- City Boundary
- River Mile
- School
- Fire Station

Maximum Inundation Depth, Sunny Day Failure

- 0-1 ft
- 1-2 ft
- 2-3 ft
- 3-4 ft
- 4-5 ft
- 5-10 ft
- 10-20 ft
- 20-30 ft
- 30-40 ft
- >40 ft

1/26/2018

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STATE OF CALIFORNIA

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Expiration Date December 31, 2019

PANEL 148 of 148

R12

STETSON ENGINEERS INC.

0 250 500 750 Feet
0 100 200 Meters

Document Path: J:\jn2478\IRWD_SantiagoDam_ArrivalTime_11x17.mxd

PART III: Appendices

Appendix A: EAP Status Report (for Non-FERC dams)

EAP Status Report for Santiago Creek Dam, DSOD No. 75.000

Annual EAP Review Performed:

Annual Update Sent to Plan Holders:

Annual Notification Exercise:

Prepared by:

Mail this document, or something similar, to the Cal OES Emergency Action Planning Division:

Dam Safety Planning Chief
Dam Emergency Action Planning Division
3650 Schriever Avenue
Mather, CA 95655

OR to send it electronically to the Division at eap@caloes.ca.gov.

Appendix B: Record of EAP Revisions

Revision #	Date	Sections Reviewed or Revisions Made	By Whom
1	4/27/2020	Preliminary Draft for Local Agency Review	IRWD
2	10/14/2020	Updated Draft for Local Agency Review; notification charts updated per discussion with OCSD EMD	IRWD
3	11/25/2020	Updated contact information and notification charts with information received from local agencies	IRWD
4	2/12/2021	Updated EAP in response to CalOES comments in review report No. 1 dated 1/22/2021; updated notification charts to add Caltrans phone number; updated CalOES incident form (Appendix I)	IRWD
5	5/21/2021	Added Transportation Corridor Agencies (Toll Roads) contact info to notification charts and table in section 3.2. Updated IRWD Public Affairs contact info.	IRWD
6	3/7/2022	Annual EAP Update with updated contact information; Sections revised include: Dam contact information; document date; Sections 3.1 (notification charts), 3.2, 6.5, 7.8, 8.2. Appendices B and C. Added dam keeper info to sections 3.1 and 3.2.	IRWD
7	11/28/2022	Annual EAP Update with updated contact information; Sections revised include: Dam contact information; document date; Sections 1.3, 2.1, 2.3, 3.1 (notification charts), 3.2, 5.1, 5.4, 6.1. Appendices B and C.	IRWD

Revision #	Date	Sections Reviewed or Revisions Made	By Whom
8	12/22/2023	Annual EAP Update with updated contact information; Revisions include: Removed dam keeper from plan (retired); added figure showing alternate access route; added description of County Alert Warning Plan; referenced IRWD's public communications plan; updated language for CA State Warning Center responsibilities; added list of impacted public safety agency buildings; added Appendix K "Anatomy of a Dam" figure to explain dam terminology; updated plan holders	IRWD
9	1/7/2025	Annual EAP Update with updated contact information; Revisions include: Removed Serrano Water District as joint dam owner; updated phone notification scripts to shorten and improve clarity; reformatted notification flowcharts to improve clarity; revised IRWD responsibilities according to current staffing; added written notification scripts to Appendix E; updated plan numbers	IRWD
10	10/24/2025	Annual EAP Update with updated contact information; no other revisions made	IRWD

Appendix C: Record of Plan Holders

Copy Number	Organization	Person Receiving Copy
1	Cal OES	Dam Safety Planning Division
2	California Highway Patrol, Santa Ana Office	Sgt. Anselmo Templado Capt. Gustavo Torres Lt. Scott Stoos Lt. Kris Ulibarri
3	Caltrans District 12 Office	Bala Nanjappa John Bybee
4	Costa Mesa Fire and Rescue	Chief Dan Stefano
5	Costa Mesa Police Department	Delcie Hynes, Emergency Services Manager
6	DSOD	Cameron Lancaster, Area 9 Engineer
7	DWR Flood Operations Center	State-Federal Flood Operations Center
8	Fountain Valley Fire Department	Chief Tim Saiki
9	Fountain Valley Police Department	Chief Rodney Cox
10	Garden Grove Police Department	Chief Amir El Farra Royce Wimmer, Emergency Manager
11	Huntington Beach Police Department	Chief Eric Parra
12	Huntington Beach Emergency Management	Brevyn Mettler, Emergency Services Coordinator
13	Irvine Police Department	Robert Simmons, Manager, Emergency Services
14	Irvine Ranch Water District	John Fabris, IRWD Communications
15	Irvine Ranch Water District	Bryan Clinton, Operations Manager
16	Irvine Ranch Water District	Steve Choi, Director of Safety and Security; IRWD EAP Coordinator
17	Irvine Ranch Water District	Jacob Moeder, P.E., Engineering Department

Phone numbers and email addresses have been removed from this publicly posted copy of this Emergency Action Plan. That information is available from Irvine Ranch Water District's district secretary: Phone 949-453-5300, Email Comments@IRWD.com

18	Irvine Ranch Water District	Jose Zepeda, Director of Water and Recycling Operations
19	National Weather Service	Weather Forecasting Office
20	Newport Beach Fire Department	Chief Jeff Boyles
21	Newport Beach Police Department	Katie Eing, Emergency Services Coordinator
22	Newport Beach Utilities Department	Casey Parks, Utilities Superintendent
23	Orange County Fire Authority	Chief James Henery, Division 6
24	Orange County Fire Authority	Chief Kevin Fetterman, Division 4
25	Orange County Fire Authority	Chief Nick Freeman, Division 2
26	Orange County Fire Authority	Mike Sheehan, Division Chief, Command and Emergency Planning
27	Orange County Parks	Eric Rubery, Operations Support Manager
28	Orange County Public Works	Giatho Tran, P.E., Senior Civil Engineer Trevor Richardson, Assistant Emergency Manager
29	Orange County Sheriff's Department	Michelle Anderson, Emergency Management Director
30	Orange County Sheriff's Department	Captain Miquel Sotelo
31	Orange County Sheriff's Department	Anthony Patella, Captain- North Ops/Villa Park
32	Orange County Sheriff's Department	Marcuz Perez, Captain, Emergency Communication Bureau
33	Orange County Sheriff's Department, Emergency Management Division	Mayra Wheeler, Senior Emergency Management Program Coordinator Kevin McArthur, Assistant Emergency Manager
34	Orange Fire Department	Chief Sean deMetropolis
35	Orange Police Department	Chief Adam Jevec
36	Orange City Manager's Office/Emergency Management	Megan Berumen, Emergency Manager
37	Santa Ana Police Department	Steve Rhyner, Emergency Operations Coordinator

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38	Seal Beach Police Department	Chief Michael Henderson Brian Gray, Emergency Services Coordinator
39	Transportation Corridor Agencies (Toll Roads)	Michelle Miller, Chief External Affairs Officer
40	Tustin Police Department	Pat Hurtado, Emergency Operations Coordinator Stephen Foster, Emergency Operations Coordinator
41	Villa Park (City of Villa Park)	Steve Franks, City Manager Mahrooz Ilkhanipour, City Engineer
42	Westminster Police Department	Jared Kent, Emergency Services Coordinator
43	Water Emergency Response Organization of Orange County	Vicki Osborn, Director of Emergency Management

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Appendix D: Contact Log

After determining the emergency level, use the contact log to document notifications made in accordance with Section 3 of the EAP.

CONTACT LOG

Dam Name: SANTIAGO CREEK DAM		**Date:**	
NID #: CA00298	**DSOD Dam #:75.000**	**FERC #: N/A**	
DSOD Region: SOUTH		**County: ORANGE**	
Emergency Level:		**Incident/Exercise:**	
After determining the emergency level, immediately contact the following agencies/entities. The person making the contact should initial and record the time of the call and who was contacted at each agency/entity.			
Agency/Entity	**Person Contacted**	**Contact Time**	**Contacted By**

Appendix E: Pre-Scripted Messages

The following pre-scripted messages are for use during notifications for Santiago Creek Dam.

High Flow Emergency Level <u>Phone</u> Notification Script

This is _____. [your name and position]

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **<u>High Flow</u>** condition but is not in danger of failing.

High flows at the dam began at _____ (time) on _____ (date).

The current flow into the reservoir is ___ cfs.
The current flow out of the reservoir is ___ cfs.

You have/will receive a text or email with additional details. We'll provide updates when there are any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

High Flow Emergency Level <u>Written</u> Notification Script

IRWD has identified an emergency condition at Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County.

IRWD has activated the Emergency Action Plan for this dam and is determining this to be a **<u>High Flow</u>** condition. The Santiago Creek Dam is *not* in danger of failing.

At _____ (time) on _____ (date), IRWD observed unusually high flows at the dam.

The high flows are the result of _____.

The current flow out of the reservoir is ___ cfs.

The current flow into the reservoir is ___ cfs.

The current water surface elevation in the reservoir is ___ ft.

The dam is not predicted to fail because of this condition. IRWD will provide updates detailing any changes in flow or dam condition and will notify you when the high flow situation is resolved.

Please take the following actions: _____
_____
_____.

An IRWD representative can be contacted at: _____.

Non-Failure Emergency Level Phone Notification Script

This is _____. [your name and position].

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **Non-Failure** condition and is not in danger of failing.

IRWD activated the EAP because _____.
(description of condition)

You have/will receive a written notification with additional details. We'll provide updates detailing any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

Non-Failure Emergency Level Written Notification Script

IRWD has identified an emergency condition at Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County.

IRWD has activated the Emergency Action Plan for this dam and are determining this to be a **Non-Failure** condition. The Santiago Creek Dam is *not* in danger of failing.

At _____ (time) on _____ (date), IRWD observed _____.

The current flow into the reservoir is ___ cfs.
The current flow out of the reservoir is ___ cfs.

The dam is not predicted to fail because of this condition. IRWD will provide updates detailing any changes in flow or dam condition and will notify you when the situation is resolved.

Please take the following actions: _____
_____
_____.

An IRWD representative can be contacted at: _____.

Potential Failure Emergency Level Phone Notification Script

This is _____ [your name and position].

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **Potential Failure** condition and may be in danger of failing.

IRWD is responding to _____ [describe event] that could result in dam failure as early as _____.

Please reference the inundation maps and prepare to evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. In the event of a failure, portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area.

The Orange County Sherriff's Department is the PSAP for this emergency.

You have/will receive a written notification with additional details. We'll provide updates detailing any changes in flow or dam condition. What is the best way to contact you with additional updates? [record contact information].

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

Potential Failure Emergency Level Written Notification Script

IRWD has activated the Emergency Action Plan for Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County. The dam is under a **Potential Failure** condition. The Santiago Creek Dam may be in danger of failing.

At _____ (time) on _____ (date), IRWD observed _____.

The current flow into the reservoir is ___ cfs.
The current flow out of the reservoir is ___ cfs.

IRWD is implementing predetermined actions to respond to this rapidly developing situation that could result in dam failure.

The dam could potentially fail as early as_____.

Please prepare to evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. In the event of a failure, portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets

throughout the area. If the dam fails, high flows can be expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay.

Reference the inundation map in your copy of the Emergency Action Plan for detailed inundation areas.

The Orange County Sherriff's Department is the Primary Safety Answering Point for this emergency and will be coordinating the emergency response.

IRWD will advise you when the situation is resolved or if the situation gets worse.

An IRWD representative can be contacted at the following number: _____.

Imminent Failure Emergency Level Phone Notification Script

This is an emergency. This is _____ [your name and position].

Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County, is failing. The downstream area must be evacuated immediately.

Repeat, Santiago Creek Dam is failing; evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. Portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area. High flows are expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay. Do not approach channels where high flow is expected.

Reference the inundation map in your copy of the Emergency Action Plan for specific evacuation areas.

The Orange County Sherriff's Department is the PSAP for this emergency.

You have/will receive a written notification with additional details for this **Imminent Failure** condition.

I can be contacted at _____. [preferred contact method]

If you can't reach me, please use _____. [alternate contact method]

The next status report will be provided in approximately 30 minutes. What is the best way to contact you with additional updates? [record contact information].

Imminent Failure Emergency Level Written Notification Script

THIS IS AN EMERGENCY. This is _____ [your name and position].

Santiago Creek Dam No. 75.000, located at Irvine Lake in Orange County, is failing.

The downstream area must be evacuated immediately:

Evacuate the low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa. Portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area. High flows are expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay. Do not approach channels where high flow is expected.

IRWD has activated the Emergency Action Plan for Santiago Creek Dam. The dam is under an **Imminent Failure** condition. The Santiago Creek Dam is failing.

At _____ on _____, IRWD observed _____.
(time) (date)

The current flow into the reservoir is ___ cfs.
The current flow out of the reservoir is ___ cfs.

Reference the inundation map in your copy of the Emergency Action Plan.

The Orange County of Sherriff's Department is the Primary Safety Answering Point for this emergency and will be coordinating the emergency response.

IRWD will advise you when the situation is resolved or if the situation gets worse.

An IRWD representative can be contacted at the following number: _____.

The next status report will be provided in approximately 30 minutes.

Imminent Failure Level Public Message

The following pre-scripted message may be **used for emergency management authorities to communicate the Imminent Failure of the dam with the public**:

Attention: This is an emergency message from _____ [emergency management agency]. Listen carefully. Your life may depend on immediate action.

Santiago Creek Dam, located at Irvine Lake in Orange County is failing. Repeat. Santiago Creek Dam, located at Irvine Lake in Orange County is failing.

If you are in or near this area, proceed immediately to high ground. The low-lying portions of south Orange, Santa Ana, Tustin, Fountain Valley, and north Costa Mesa may be flooded. Portions of I-5, I-405, CA-22, CA-55, and CA-57 are expected to be inundated along with many surface streets throughout the area, and access may be limited. High flows are expected in Santiago Creek, Santa Ana River, San Diego Creek, and Upper Newport Bay. Do not approach channels where high flow is expected.

If you are in or near this area, proceed immediately to high ground away from low lying areas.

Repeat message.

Appendix F: Emergency Incident Log

Name:	Job Title:
Incident Start Date:	Incident Start Time:
Incident Description:	
Initial Incident Level:	
Incident Detection:	
When did you detect or learn about the incident?	
How did you detect or learn about the incident?	

LOG ALL NOTIFICATION AND ACTIVITY IN THE TABLE BELOW

Date	Time	Action/Incident Progression	Action Taken By

Appendix G: Emergency Termination Log

Dam Name: SANTIAGO CREEK DAM	County: ORANGE
Dam Location: 33.7863, -117.7252	Stream/River: SANTIAGO CREEK
Date/Time:	
Weather Conditions:	
General Description of Emergency Situation:	
Area(s) of Dam Affected:	
Extent of Damage to Dam and Possible Causes:	
Effect on Dam Operation:	
Initial Reservoir Elevation/Time: Maximum Reservoir Elevation/Time: Final Reservoir Elevation/Time:	
Description of Area Flooded Downstream/Damage/Loss of Life:	
Justification for Termination of Dam Safety Emergency:	
Other Data and Comments:	
Report Prepared By (Printed Name and Signature): Date:	

Appendix H: After Action Report

Background

Event Details

Type of Event:
Location:
Incident Period:
Brief Description of Event:

Response Activities

Summary of Successes

Summary of Recommended Improvements

Organizations Contributing to this Report

Appendix I: Cal OES Warning Center Dam Incident Report

DAM INCIDENT – CALIFORNIA STATE WARNING CENTER

EVENT TYPE:	○ **DRILL** ○ **ACTUAL EVENT**	
DATE:		**TIME:**

CALLER INFORMATION		
NAME/AGENCY:	**PHONE #:**	
ALTERNATE CONTACT:	**PHONE #:**	

DAM INFORMATION		
DAM NAME: Santiago Creek Dam	**DSOD DAM #:** 75.000	**FERC:** none
DSOD HAZARD CLASSIFICATION: EXTREMELY HIGH		

LOCATION OF DAM	
DSOD REGION: ○ **NORTHERN** ○ **CENTRAL** ⊗ **SOUTHERN**	
PHYSICAL ADDRESS: 5305 E Santiago Canyon Road, Orange, CA 92869	
LATITUDE: : 33.7863	**LONGITUDE:** -117.7252
COUNTY: ORANGE	**DOWNSTREAM JURISDICTIONS:** County of Orange (unincorporated areas), City of Orange, City of Villa Park, City of Garden Grove, City of Santa Ana, City of Tustin, City of Westminster City of Fountain Valley, City of Costa Mesa, City of Huntington Beach City of Irvine, City of Newport Beach, City of Seal Beach
NEAREST CITY OR POPULATED AREA: Unincorporated Orange County, City of Orange	
NEAREST OR AFFECTED HIGHWAY OR CROSS ROADS: 241 near Santiago Canyon Rd	
RIVER OR CREEK THAT FLOWS INTO RESERVOIR: Santiago Creek	

SITUATION	
ACTIVATION OF EAP:	○ Yes ○ No
EMERGENCY LEVEL:	○ High Flow ○ Non-Failure ○ Potential Failure ○ Imminent Failure

EMERGENCY TYPE:

☐ Earthquake	☐ Sand Boils
☐ Embankment Cracking or Settlement	☐ Security Threats
☐ Embankment Movement	☐ Seepage, Springs, Piping
☐ Erosion of Spillway	☐ Sinkholes
☐ Instrumentation Reading (Abnormal)	☐ Storm Event
☐ Outlet System Failure	☐ Other: List Below
☐ Sabotage/Vandalism	

OTHER:

RESERVOIR LEVEL:	☐ Full	☐ Partially Full	☐ Empty
	Approximate % Full (Acre-Feet):		
WHEN/HOW EVENT WAS DETECTED:			
OBSERVER IN POSITION:	○ Yes ○ No		
ADDITIONAL DETAILS:			

Appendix J: Acronym List

CAS ..... Critical Appurtenant Structure
Cal OES ..... California Governor's Office of Emergency Services
Caltrans ..... California Department of Transportation
CHP ..... California Highway Patrol
cfs ..... cubic feet per second
DSOD ..... Division of Safety of Dams
DWR ..... Department of Water Resources
EAP ..... Emergency Action Plan
EMD ..... Orange County Sheriff's Department, Emergency Management Division
EOC ..... Emergency Operations Center
EOP ..... Emergency Operations Plan
FEMA ..... Federal Emergency Management Agency
FERC ..... Federal Energy Regulatory Commission
HSEEP ..... Homeland Security Exercise and Evaluation Program
I-5 ..... Interstate 5
I-405 ..... Interstate 405
IC ..... Incident Commander
ICP ..... Incident Command Post
IRWD ..... Irvine Ranch Water District
MWRP ..... Michelson Water Recycling Plant
NAVD88 ..... North American Vertical Datum of 1988
NID ..... National Inventory of Dams
NIMS ..... National Incident Management System
NWS ..... National Weather Service
OA ..... Operational Area
OAC ..... Operational Area Coordinator
OCFA ..... Orange County Fire Authority
OCPW ..... Orange County Public Works
OCSD ..... Orange County Sheriff's Department

PIM ..... Public Information Manager

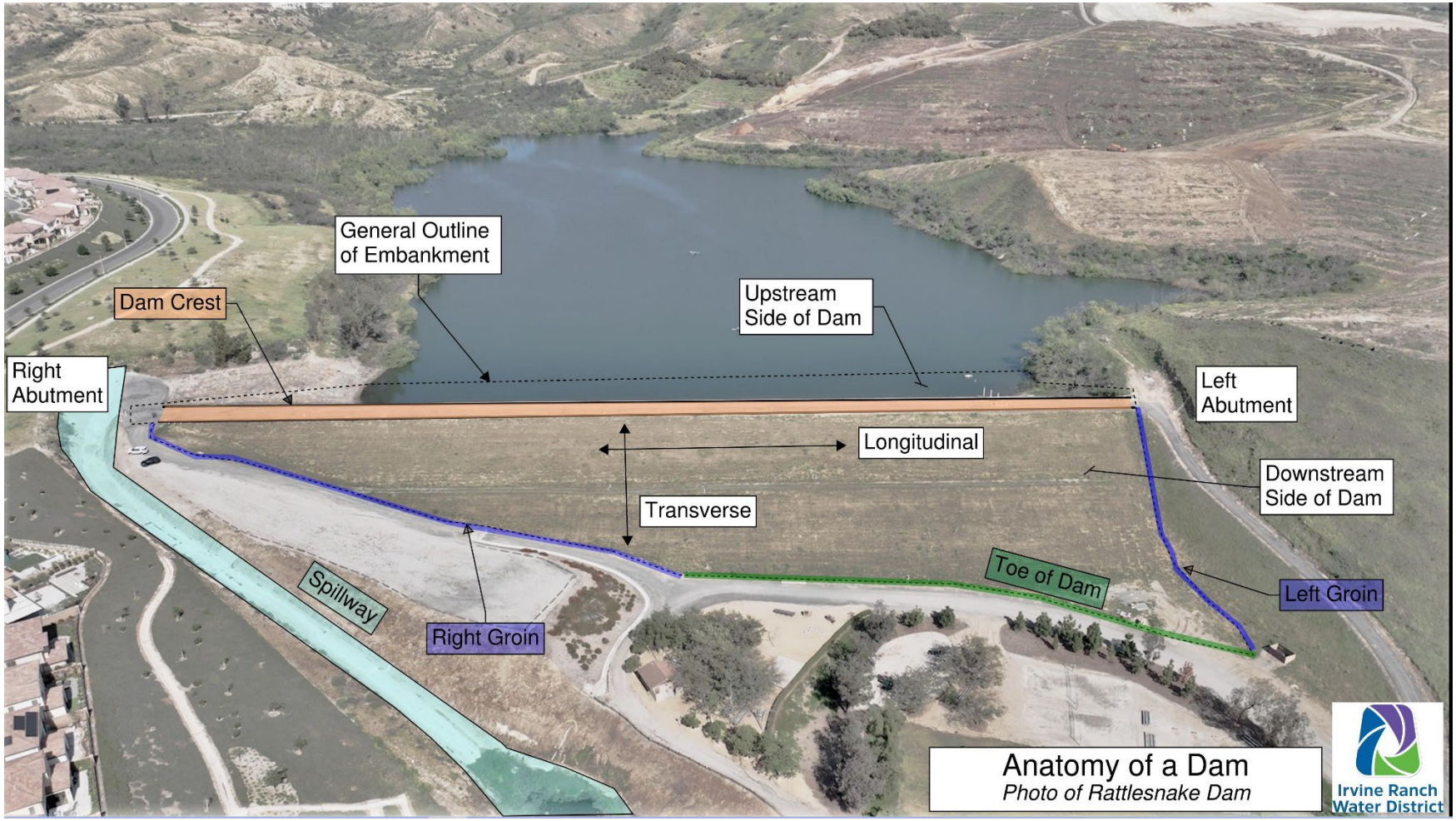
PSAP ..... Public Safety Answering Point

SCADA ..... supervisory control and data acquisition

SEMS ..... Standardized Emergency Management System

WEROC ..... Water Emergency Response Organization of Orange County

Appendix K: Anatomy of a Dam Figure


General Outline of Embankment
Dam Crest
Upstream Side of Dam
Right Abutment
Left Abutment
Longitudinal
Transverse
Downstream Side of Dam
Spillway
Right Groin
Toe of Dam
Left Groin
Anatomy of a Dam
Photo of Rattlesnake Dam
Irvine Ranch Water District