Sacramento County Correctional Facility Master Planning Services

Final Report: A Vision for the Future

Appendix C: Rio Cosumnes Correctional Center Hydrology and Flood Plain Mitigation Analysis

HMA DLRGROUP
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Rio Cosumnes Correctional Center
Floodplain/Hydrology Study

Findings and Recommendations Report
Sacramento, California

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Executive Summary

It is well known that the RCCC site has been subject to flooding in the past. Due to flooding in 2023, 1,075 individuals in custody were evacuated from RCCC due to the access roads being rendered impassable. Concurrently with the analysis of Strategic Development Approaches for the future, the county authorized the Planning Team to prepare a hydrology study related to mitigating the flood plain impact on RCCC and access thereto. The results of this study significantly impacted the determination of the appropriate range of Strategic Development Approaches.

- California's adoption of ASCE 24 Flood Resistant Design and Construction as part of Title 24, Part 2 requires flood protection to 2.0' above the BFE which is 22 feet per floodplain mapping resulting in flood proofing to a height of or placement of the ground floor at 24.0' .

- On average, the buildings are 4.5 feet below the proposed 24.0 foot critical facility flood protection elevation of 2'0" above Base Flood Elevation (BFE) of 22.0 feet, with some of the buildings 5' to 6' below the required 24.0 foot elevation.

- The Sacramento County Zoning Code, Title IX: Floodplain Management Ordinance indicates that if the cumulative cost of reconstruction, rehabilitation, addition, or alteration of a building, or any part thereof, equals or exceeds 50 percent of the market value of the building, including costs for the preceding five (5) year period, the building must comply with flood code requirements regarding flood proofing.

- Per Department of General Services Records, the current value of the RCCC property is $93M. Preliminary studies related to developing alternative approaches suggested that renovation and expansion at the RCCC site could exceed the current value by a factor of 10 percent – clearly triggering compliance with requirements under State and Federal codes as well as the Sacramento County Floodplain Management Ordinance to provide floodproofing to 2.0' above the BFE.

- Flood protection measures such as dry floodproofing, perimeter floodwalls, and deployable flood gates were evaluated as potential methods for reducing flood risk to existing facilities within the RCCC campus. Although these strategies may provide localized protection for individual facilities, they present several challenges at RCCC. Because the campus contains numerous buildings, utilities, access points, and support infrastructure, a comprehensive flood protection system would likely require multiple floodwalls, gates, and protected utility crossings to function effectively. Additionally, according to FEMA requirements and the referenced County Ordinance, any construction or mitigation measure must not have adverse impacts on the current flood and drainage patterns.

The findings and recommendations of the Floodplain/Hydrology study significantly impacted the proposed range of Strategic Development Approaches. The Planning Team recommended and the Executive Committee concurred that renovation and expansion of RCCC should not be considered in the analysis of Strategic Development Approaches. However, since RCCC is and has been the site of a secure detention and correctional facility for over 75 years and is generally accepted as the same by the public, it was determined that the site would be included in the

development of alternative approaches assuming that the facility is reconstructed on the property to meet FEMA requirements and the Floodplain Management Ordinance, including adjustments to both the Bruceville and Twin Cities Roads to provide two means of access during a 100-year flood event.

This decision, however, brought with it additional constraints related to oversight and review of permitting by FEMA for reconstruction on the RCCC site. These constraints included extended schedule requirements, added costs and uncertainty regarding availability of capacity at RCCC to provide adequate temporary housing to allow for expedited renovation of the Main Jail.

Overview

The Rio Cosumnes Correctional Center Floodplain/Hydrology study, also referred to as the RCCC Floodplain Study, evaluates floodplain conditions, regulatory constraints, and flood mitigation strategies for the Rio Cosumnes Correctional Center (RCCC) and the adjacent Kenneth Royal Firearms Training Facility (KRFTF) in Sacramento County, California. The purpose of the assessment is to understand how existing floodplain conditions may affect current operations, future facility improvements, and emergency access. The RCCC Floodplain Study includes a review of the Effective FEMA Floodplain Mapping, available topographic and survey data, historical flood information, staff interviews, and applicable federal, state, and local floodplain regulations.

Existing Conditions

RCCC is located within the Cosumnes River floodplain, an area influenced by flooding from the Cosumnes, Mokelumne, and Sacramento River systems. Effective FEMA mapping places portions of the site within Zones A and AE and establishes a regulatory Base Flood Elevation (BFE) of approximately 22.0 feet NAVD88 across much of the campus. Existing topographic information indicates that many site facilities have finished floor elevations below current flood protection requirements on average 2.5 feet below the BFE. As a result, future building replacements, major renovations, or substantial improvements may trigger floodplain federal, state, and local compliance requirements, including elevation or floodproofing measures.

Onsite Improvements

The RCCC Floodplain Study evaluates onsite mitigation approaches including elevating new facilities and constructing flood protection systems. While site grading, building elevation, and floodwall alternatives have the potential to reduce the on-site flood risk, these options will also require extensive hydraulic analyses, floodplain permitting, and demonstration of compliance with FEMA requirements and Sacramento County's “No Adverse Impact” criteria. In addition, large-scale fill and floodplain modifications could substantially increase project cost, permitting complexity, and implementation challenges.

Site Access

Based on site observations, staff interviews, and available flood information, the most significant operational vulnerability is the loss of access during major flood events rather than widespread flooding of existing facilities. Three potential routes that provide access above the 100-year flood elevation were evaluated along with documentation of the required analysis that would be needed to construct these improvements. Lambert Road to the north appears to provide the most reliable route during flood conditions and represents the most practical opportunity for improving facility resilience.

Summary
Based on available information, roadway access improvements combined with project-specific flood protection offer the most practical approach for improving long-term flood resilience. Because FEMA map revisions in this area are expected to require watershed-scale updates through a Physical Map Revision (PMR) process, pursuing a FEMA map revision solely to support RCCC improvements is not considered a practical implementation strategy. Instead, future improvements should focus on solutions requiring additional hydraulic analysis that can be permitted through Sacramento County's floodplain development permit and "No Adverse Impact" review process while maintaining reliable facility access during major flood events.

I. Introduction

A. General Description

The Rio Cosumnes Correctional Center and Firearms Training Range(RCCC) consists of a campus of buildings, training facilities, and supporting infrastructure situated on approximately 79 acres. Due to the facility's proximity to the Cosumnes, Mokelumne, and Sacramento Rivers, the correctional facilities are located within a FEMA floodplain and prone to flooding during high-risk events.

The site has a long operational history dating back to the 1940s, when portions of the property were originally developed for military-related purposes. Over time, the facilities were converted and expanded to serve as a correctional center. Because many of the existing buildings predate modern floodplain management regulations, FEMA flood mapping, the National Flood Insurance Program (NFIP), and contemporary environmental permitting requirements, the site was developed and “grandfathered in” under design standards that differ from those applied today.

Sacramento County has requested a flood risk assessment of the existing site and an evaluation of potential impacts and feasibility considerations for future facility upgrades within the flood-prone area.

B. Location

Rio Cosumnes Correctional Center is located in Elk Grove, California. The entrance is approximately 5,300 linear feet south of the intersection of Bruceville Road and Lambert Road. The surrounding area is primarily agricultural land except for a small airport southwest of the site. The location is approximately 2.3 miles west of the Cosumnes River. The Mokelumne River is about 3.4 miles south of the facility. The Sacramento River is approximately 8 miles west. Due to the proximity to all three rivers, hydraulics from each river impact the site’s floodplain. The primary impacts are from the Cosumnes River. Based on FEMA mapping information, the location is generally known to be flood prone. A vicinity map is shown on the next page.

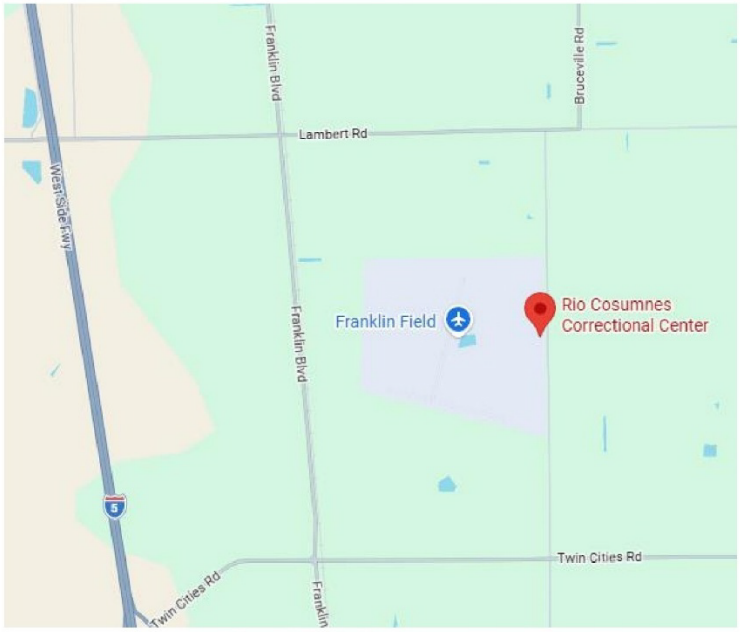


Figure 1-Vicinity Map

C. Study Approach and Organization

An assessment of floodplain conditions, regulatory constraints, and potential mitigation measures has been performed to support future planning and capital improvement decisions at RCCC.

This study begins with a review of the floodplain regulations, design criteria, and key definitions that govern improvements within the project area. Understanding these requirements provides the foundation for evaluating potential improvements and identifying applicable permitting constraints.

The report then summarizes the background information used to support improvements recommendations, including available floodplain mapping, previous studies, topographic data, site observations, and historical flooding information. The study limits the floodplain review to the 100-year flood event because that is the primary regulatory mechanism.

Using this information, the RCCC Floodplain Study evaluates three potential flood risk mitigation strategies: (1) site grading and facility elevation, (2) roadway improvements to maintain access during flood events, and (3) flood protection measures such as floodwalls and flood gates. Each alternative is assessed based on its effectiveness, regulatory feasibility, permitting requirements, and potential impacts to the surrounding floodplain.

The report concludes with a summary of key findings and recommendations intended to support future planning, facility improvements, and long-term flood resilience at RCCC.

II. Floodplain Regulations

The RCCC study area is subject to floodplain regulations administered at the federal, state, and local levels. FEMA requirements provide the foundation for floodplain management, while the State of California and Sacramento County have adopted additional regulations that are, in many cases, more restrictive than federal standards. Compliance with all applicable regulations is required for improvements within the floodplain. The following sections summarize the key criteria, regulatory requirements, and definitions that influence future improvements at RCCC.

A. Federal Emergency Management Agency (FEMA)

44 CFR 65.3 (Requirement to submit new technical data)
Requires local communities to notify the FEMA Administrator within six months of learning about physical changes that alter Base Flood Elevations. Communities must submit updated technical or scientific data, so flood insurance rates and management rules stay accurate.

Per previous correspondence with FEMA regarding this CFR and this area: "…a very large floodplain that includes levees along the Sacramento River that are no longer certified. The floodplain encompasses 8 to 10 FEMA Flood Insurance Rate Map (FIRM) panels and any revisions to the Base Flood Elevation (BFE) would require a Physical Map Revision (PMR)…To prepare for a Physical Map Revision for this large area…will include addressing non-certified/non-accreditable levees throughout study footprint."

In the context of the RCCC Floodplain Study, any improvements that modify the floodplain must adhere to the National Flood Insurance Program (NFIP) property owner notification protocols. Additionally, any modification to the floodplain, that cannot meet local permitting requirements, must proceed through the FEMA map revision process and could trigger a PMR requirement.

Definitions

CLOMR/LOMR- A Conditional Letter of Map Revision (CLOMR) and Letter of Map Revision (LOMR) are FEMA review processes used when a project alters the regulatory floodplain and cannot meet local floodplain permitting requirements, such as Sacramento County's "No Adverse Impact" standard. A CLOMR is obtained before construction to review proposed floodplain changes, while a LOMR is submitted after construction to revise the effective FEMA floodplain maps.

PMR- A Physical Map Revision is a regional-scale floodplain map update that typically focuses on an entire watershed, river system, or geographic area rather than an individual project site. The PMR process follows a comprehensive FEMA review and incorporates updated topographic data, hydraulic modeling, floodplain information, and stakeholder input to revise effective Flood Insurance Rate Maps (FIRMs). Because a PMR evaluates flood conditions across a broad area, it is generally more complex, time-consuming, and costly than a project-specific CLOMR/LOMR process.

Base Flood Elevation (BFE)- The regulatory water-surface elevation associated with the 1-percent annual chance (100-year) flood event. The BFE serves as the primary benchmark for floodplain management, building design, and flood protection requirements. FEMA uses the BFE to map flood hazards and establish minimum development standards within flood-prone areas.

B. State of California

The building classification for onsite facilities is determined by State of California Critical Facilities regulations.

Critical Facilities: Correctional facilities are generally classified as critical facilities due to the difficulty of evacuating occupants and the potential consequences associated with flood damage and loss of operation. It is assumed RCCC buildings are considered critical facilities. Flood-resistant design requirements for these facilities are established through the California Building Code (CBC), Title 24, Part 2, which adopts ASCE 24, Flood Resistant Design and Construction. Under ASCE 24 Flood Design Class 3, critical facilities are required to meet a higher level of flood protection than typical non-residential structures. The required flood protection elevation is the highest of:

- Base Flood Elevation (BFE) + 2 feet (24 feet) measured relative to MSL and NAVD '88
- The locally established Design Flood Elevation (DFE) [1.5ft for Sacramento County]
- The 500-year flood elevation (not established for this reach of the Cosumnes River)

As a result, the minimum flood protection elevation for substantial improvements and new construction, including basements, is 2 feet above the 100-year BFE of 22 ft at RCCC (minimum flood protection elevation 24 ft).

C. Sacramento County

Sacramento County is the local agency responsible for administering floodplain permits within the project area. The 2025 Sacramento County Floodplain Management Ordinance documents floodplain criteria for the area. The primary requirement for obtaining a County Floodplain Development Permit, for a project the size of RCCC, is demonstrating compliance with the County's "No Adverse Impact" criteria, as defined in Sacramento County Code Title IX – Floodplain Management Ordinance.

"No Adverse Impact"

For permitting purposes, Sacramento County generally considers an adverse impact to occur when a project results in an increase in the Base Flood Elevation (BFE) of 0.1 foot or greater on upstream, downstream, or adjacent properties, consistent with the requirements and definitions contained within Sacramento County Code Title IX – Floodplain Management Ordinance, including the County's floodplain development permit review procedures and no-adverse-impact standards. At its most basic level, demonstrating "No Adverse Impact" relies on the impacted areas being outside the main conveyance area (ineffective) or demonstrating any fill volume is offset with cut or conveyance. Demonstrating compliance with these requirements through engineering and hydraulic analyses is typically the preferred permitting pathway for floodplain improvements and is generally required to obtain a Floodplain Development Permit pursuant to Sacramento County Code Title IX, Chapter 6 (Flood Hazard Reduction Regulations).

Substantial Improvements

Per the Sacramento County Floodplain Management Ordinance, improvements to existing insurable structures that exceed 50% of market value (Substantial Improvements) are required to have the lowest finished floor elevation (including basements) elevated or floodproofed above the 100-year BFE in accordance with applicable standards. Construction of new commercial buildings also requires the lowest finished floor elevation to be elevated or dry floodproofed above the 100-year BFE. In this case, because the facilities are considered critical, elevation and floodproofing are assumed to be 2' above the BFE. Elevating or floodproofing an existing building to satisfy modern floodplain requirements can be difficult to implement and may not be economically practical compared to replacement.

Substantial damage repairs are also regulated to this requirement. Sacramento County defines Substantial Improvements, as follows:

Sacramento County Zoning Code Title IX: Floodplain Management Ordinance Section 902-57 Substantial Improvements

Any reconstruction, rehabilitation, addition, or alteration of a building, or any part thereof, the cumulative cost of which equals or exceeds 50 percent of the market value of the building prior to the start of construction, as determined by independent appraisal. Start of construction is the point at which a building permit for the improvements is issued. Cumulative cost is calculated for the preceding five (5) year period from the date of building permit application. "Substantial improvements" includes repair of "substantial damage", regardless of the actual repair work performed. The term does not include either:

A. Any project for improvement of a building to correct existing violations or state or local, health, sanitary, or safety code specifications that have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or

B. Any alteration of a "historic building" provided that the alteration would not preclude the building's continued designation as a "historic building".

While the Sacramento County Floodplain Ordinance does not specifically define correctional facilities as non-residential structures, these buildings are typically treated as institutional or public facilities, not residential occupancy, even though occupants sleep there. From a building code and floodplain management perspective, correctional facilities are generally considered nonresidential structures. Therefore, the applicable floodplain standard would typically be Title IX – Section 906-03 (Nonresidential Elevation and Floodproofing). As discussed, correctional facilities are considered high risk and per California Building Code are classified as critical facilities, which require a higher level of protection.

III. Background Information

Development of this floodplain evaluation relied on a combination of historical studies, site records, engineering drawings, floodplain mapping, staff interviews, and publicly available geographic data. Together, these resources provide the technical foundation for understanding existing site conditions, historical development patterns, flood risks, and regulatory considerations that may influence future improvements at RCCC. The documents are listed below.

A. Provided By Kitchell and DLR

1. ***2010 Kitchell RCCC Final infrastructure Study Report:*** The RCCC Infrastructure Study evaluated existing and projected utility infrastructure capacity at the RCCC in anticipation of a correctional center population increase. This document provides background information on site utilities, stormwater infrastructure, facility development history, and overall site conditions relevant to future floodplain improvement planning. Refer to Appendix B.

2. ***2011 Nacht & Lewis Architects RCCC Master Plan:*** The RCCC Master Plan was prepared to guide future RCCC expansion based on updated assessments of projected housing, infrastructure, and operational needs. It concluded that previous population growth projections were no longer reliable due to multiple factors affecting inmate population trends, making future growth rates difficult to predict. However, the report did determine that the County must begin facility improvements as soon as possible. The report is useful for understanding how site planning assumptions evolved and provides additional context for evaluating future floodplain-related improvements. Refer to Appendix B.

3. ***1959 Rickey & Brooks RCCC As-Builts Original Construction Drawings Set:*** This drawing set contains record drawings associated with the original construction of the Sacramento County Branch Jail, now known as the Rio Cosumnes Correctional Center (RCCC). These drawings provide a baseline record of the original facility design and construction. Refer to Appendix B.

4. ***RCCC Photographs:*** The provided images contain a site layout map and a low-resolution aerial photograph of the RCCC campus. The materials provide visual documentation of existing site conditions, facility layout, and surrounding features. Refer to Appendix B.

5. ***RCCC Site Utilities:*** This dataset consists of CAD (.dwg) files documenting the major utility systems serving the RCCC campus. The files include preliminary utility drawings and a site plan showing the locations and configurations of water, sewer, storm drainage, electrical, and other site infrastructure. The available drawings were last updated in 2002.

6. ***2025 Updated RCCC Site Plan:*** This document set includes three PDF files and one CAD (.dwg) file depicting the updated RCCC site plan. The plans incorporate revised building numbering and key references and provide an updated representation of campus facilities and site features as of December 2025. Refer to Appendix B.

7. ***CAD Files Data***: This dataset consists of CAD (.dwg) files containing topographic, utility, and survey information for the RCCC site. The files include surface contours, surveyed site features, and utility data used to support site planning, engineering evaluations, and design activities. The survey information provided did not include datum reference information or surveyor information. The vertical datum appeared to be NAVD88. The horizontal datum was unknown project coordinates.

8. **MWT Study-** The McCormack-Williamson Tract (MWT) Levee Modification and Habitat Development Project Hydraulic Impact Analysis (CBEC Eco Engineering, 2024) evaluated updated floodplain conditions within the Cosumnes and Mokelumne River systems following the major flood events of 2017 and 2023. The study incorporated post-flood levee repairs, proposed levee modifications, updated topographic information, and refined

hydraulic modeling to establish a new 2023 baseline condition. Results indicate that floodplain conditions in the vicinity of RCCC differ from those reflected in the current FEMA mapping, with several nearby locations, including the RCCC site, showing reduced Base Flood Elevations (BFEs). The report also explains the complications of the CLOMR/LOMR permitting path. Because the MWT analysis represents some of the most current and detailed hydraulic modeling available in the region, it provides valuable insight into present-day flood risks and supports further evaluation of flood protection requirements and resilience planning for RCCC. Any information from the MWT Study used to update RCCC floodplain modeling or permitting will require further study due to the distance from RCC and the preliminary nature of the study modeling near RCCC. HEC-RAS modeling used for the study was provided to Martin/Martin. Refer to Appendix C.

B. Geographic Data

Floodplain Exhibits were created in Civil3D using a combination of information provided in the RFP, regulatory FEMA data, and the geographic information outlined below. The exhibits are found in Appendix A.

1. **USGS Topography** - USGS topographic data was obtained from the National Map Viewer on June 30, 2026. The dataset consists of September 2010 elevation data with a vertical resolution of approximately one-third arc second. The data was used to evaluate general topographic conditions within the project area and to develop preliminary estimates of fill requirements associated with the roadway access alternatives.

2. **Nearmap Imagery** - Nearmap aerial imagery dated June 15, 2026, was used as the primary aerial photography source for this study. The imagery served as a background layer for mapping exhibits and supported the evaluation of existing site conditions, roadway corridors, drainage features, and other elements considered during the analysis.

C. Regulatory FEMA Data

The effective FEMA floodplain mapping across the RCCC and Firearms Training Range is primarily driven by riverine flooding from the Cosumnes River. Historically, the river corridor has been heavily influenced by agricultural development and now functions as a constrained flood conveyance system affected by a combination of certified and non-certified levees. The Cosumnes River originates in the Sierra Nevada and is one of the last remaining unregulated rivers on the western slope of the range. Numerous non-engineered levees exist along the river that provide varying degrees of flood protection but are not recognized by FEMA as accredited flood control features. These levees are susceptible to overtopping and breaching during major flood events, as occurred during the 2017 and 2023 flood events.

The facility lies between floodplains for the Mokelumne River and Cosumnes River. The facilities are mapped on **FEMA FIRM 06067C0450H.** The RCCC and Firearms Training Range are located within FEMA Zone A and Zone AE flood hazard areas associated with the Cosumnes River. A portion of the site, which includes the entrance and Bruceville Road, is in a Zone A floodplain. Zone A represents an approximate-study floodplain where Base Flood Elevations (BFEs) have not been established, while Zone AE represents a detailed-study area floodplain with published BFEs. Based on the effective FEMA mapping, the regulatory BFE across the RCCC and Firearms Training Range is approximately 22.0 feet NAVD 88. This elevation is derived from hydraulic analyses used to support the effective Flood Insurance Rate Map (FIRM) and does not account for flood protection provided by existing non-accredited levees. Refer to Appendix C.

The Sacramento County Flood Insurance Study (FIS) Report provides information on the methodology and data used to develop Flood Insurance Rate Maps (FIRMs) for the area as well as the floodplain information used in the FIS. Based on the FIS, 100-year peak flow rates for each of the nearby Rivers are provided below:

FLOW SUMMARY TABLE

RIVER ID	DRAINAGE AREA (SM)	100-YEAR FLOW(CFS)	HYDRAULIC MODELING METHODOLOGY	HYDROLOGIC MODELING METHODOLOGY
COSUMNES RIVER	820	70,600	HEC-2, NETWORK	HEC-1
MOKELUMENE RIVER	1,000	28,200	HEC-2, NETWORK	HEC REGIONAL FREQUENCY
SACRAMENTO RIVER	23,500	120,000	DATA NOT AVAILABLE	PEARSON TYPE III DISTRIBUTION

Figure 2-Flow Summary Table

D. Historic Flooding

Significant floods occurred in 1986, 1997,2006, 2017, and 2023. Based on interviews with RCCC staff, significant flooding during the 2017 and 2023 storm events affected Bruceville Road between Twin Cities Road and Lambert Road rather than causing widespread flooding within the RCCC property itself. Staff observations indicate that floodwaters generally propagate from south to north because of levee breaches along the Cosumnes River, which is corroborated by the MWT study modeling. During these events, the greatest impacts were observed near the Bruceville Road/Twin Cities Road intersection, while comparatively less flooding occurred near the Bruceville Road/Lambert Road intersection. Nevertheless, both intersections were reported to be largely impassable during peak flood conditions.

Based on these observations, the flooding observed on the RCCC property during the 2017 and 2023 events does not appear to be consistent with the 100-year depth or extent of inundation shown within the effective FEMA 1% annual-chance (100-year) floodplain. However, the 1997 flood represents the all-time record crest and corresponds to an approximate FEMA 150-year event. Flood depth readings shown below, recorded at the nearby Mokelumne river at Benson's Ferry flood gage, provide insight into the severity of each event.

Event	Flood Stage at Benson's Ferry (ft)
1997 - Highest Flow on Record	21.69
2017 -Roadway and Access	20.56
22/23 - Roadway and Access	20.23

Figure 3 -Benson's Ferry Readings

While access to the site was significantly disrupted by flooding of surrounding roadways during the 2017 and 2023 events, historic photos and interviews with staff suggests that floodwaters within the RCCC property were less severe than those anticipated under the regulatory 100-year flood condition. Confirmation of this conclusion would require more detailed hydraulic analysis to compare current conditions with the effective FEMA BFEs.

IV. Existing Site Conditions

A. Flooding

Based on the available topographic survey information and supplemental USGS elevation data, most, if not all, insurable structures within the RCCC property appear to have finished floor elevations below the effective FEMA regulatory BFE of 22.0 feet NAVD 88. Ranging from a 22.2 feet to an 18.2 feet estimated finished floor elevations, on average the buildings are 2.5 feet below the base flood elevation. Refer to the 100-Year Heatmap exhibit in Appendix A. A few structures, near the entrance, appear to be elevated above surrounding grade and may have finished floor elevations that exceed the effective BFE; however, confirmation would require additional site-specific survey data and finished-floor elevation verification.

Figure 4, on the next page, is a screenshot of the heatmap. It compares existing site grades and estimated building elevations to the BFE elevation. The legend shows the difference between the topographic elevation and the BFE elevation. Darker colors indicate more elevation differences.

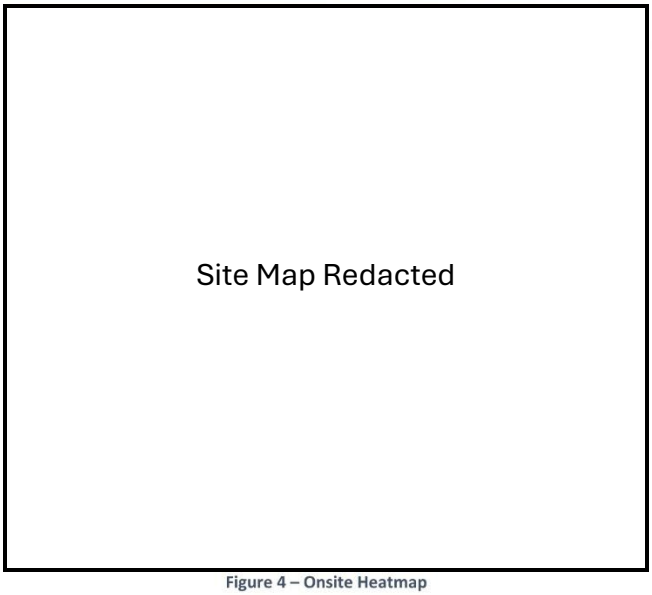


Figure 4 – Onsite Heatmap

B. Site visit

On July 9, 2026, Martin/Martin conducted a field visit of the Rio Cosumnes Correctional Center and the Kenneth Royal Firearms Training Facility to observe existing site conditions, verify information obtained during the desktop review, and gain a better understanding of facility operations during flood events. Activities conducted during the visit included a visual assessment of the campus, roadway network, drainage features, and surrounding floodplain conditions, as well as discussions with facility staff regarding historical flooding, access limitations, and operational impacts. Select field measurements of drainage infrastructure and building depth above grade were also collected to compare existing conditions with available mapping, survey information, and FEMA floodplain data. Key photographs from the site visit can be found in Appendix C.

Site observations indicated that much of the campus is relatively flat, with drainage generally conveyed southwest through a combination of overland flow paths, roadside ditches, and storm drainage infrastructure. Staff reported that the facility has remained operational during recent flood events, including the 2017 and 2023 floods, although access routes were impacted by flooding in the surrounding area. Discussions during the site visit reinforced the importance of maintaining reliable access to the facility during flood conditions and provided valuable context

regarding historical flood behavior, existing infrastructure constraints, and areas that may warrant consideration as part of future flood resilience planning.

C. Access Routes

Review of available USGS topographic data and FEMA floodplain mapping suggests that access from the north via Lambert Road and Bruceville Road may provide the most reliable route to RCCC during major flood events. Portions of Bruceville Road south of the facility and the Twin Cities Road corridor appear to be more susceptible to inundation based on existing floodplain information. Observations obtained during staff interviews generally support these findings, with facility personnel reporting that access from Lambert Road has historically remained the most passable during flood events, while access from Twin Cities Road has frequently been impacted by flooding.

V. Mitigation Alternatives

A. Site grading or elevation strategies for facility replacement

Because the RCCC facilities are considered critical facilities, future development, substantial improvements, or replacement of existing structures will be required to comply with the flood-resistant construction provisions of the California Building Code and ASCE 24. Under current criteria, critical facilities are required to provide flood protection with the lowest finished floor elevated by a minimum of 2 feet above the effective Base Flood Elevation (BFE). Based on the effective FEMA mapping, the applicable BFE across much of the RCCC campus is approximately 22 feet NAVD 88, resulting in a minimum design elevation of approximately 24 feet NAVD 88.

Initial review, based on the survey data provided, indicates that many existing facilities are below the required elevation. Because the topographic data is not certified, the facilities will need to be surveyed by a professional land surveyor to verify elevations. While elevating or replacing existing or new structures may satisfy floodplain compliance requirements, associated site improvements—including accessible routes, sidewalks, utility connections, parking areas, and emergency access routes would also need to be modified to maintain functionality and ADA compliance. As a result, building elevation strategies would likely require substantial site grading and placement of engineered fill across significant portions of the campus.

The Existing Grade vs. Floodplain Compliant Elevation table in Appendix A summarizes the estimated elevation deficiencies for each building relative to the required minimum finished floor elevation. On average the buildings are 4.5 feet below the proposed 24.0 foot critical facility elevation. Approximate earthwork quantities are summarized in the Estimated Fill Volume Table in Appendix A.

Expansion of facilities onto the adjacent Franklin Field property was evaluated as a potential development and phasing opportunity. Based on available topographic information and current floodplain requirements, new facilities constructed within this area would generally require finished floor elevations averaging approximately 9 feet above existing grade to satisfy current flood protection criteria. The substantial amount of fill needed to elevate building pads, supporting infrastructure, utilities, and access routes would likely result in significant construction costs and floodplain permitting challenges. The 14 acre Kenneth Royal Firearms Training Facility was also not considered a viable location for expansion, as this area is located significantly lower than RCCC. As a result, development of the Franklin Field or Kenneth Royal Firearms Training Facility property may be less practical than alternatives that utilize existing developed areas with lower flood protection deficiencies.

The preferred permitting approach for site grading and fill activities would be a Sacramento County Floodplain Development Permit demonstrating compliance with the County's "No Adverse Impact" criteria. This approach would require hydraulic analyses comparing existing and proposed conditions to demonstrate that the project does not increase Base Flood Elevations by 0.1 foot or more on upstream, downstream, or adjacent properties. Based on the MWT Study HEC-RAS model, portions of the RCCC site are represented as a floodplain storage area rather than a primary flow conveyance corridor. This suggests that future improvements may have a reduced potential to increase flood elevations compared to projects located within active flood conveyance areas; however, detailed hydraulic analyses would still be required to demonstrate compliance with Sacramento County's "No Adverse Impact" criteria. The placement of fill will reduce the overall flood storage volume within the property, which would likely need to be offset with cut excavation to offset the volumetric impact. A preliminary hydraulic study of the proposed grading, designed to a 50% construction level, would determine if the "No Adverse Impact" criteria can be met.

If compliance with the County's "No Adverse Impact" standard cannot be demonstrated, a FEMA Conditional Letter of Map Revision (CLOMR) followed by a Letter of Map Revision (LOMR) would likely be required. The CLOMR/LOMR process would require documentation showing that any changes to flood elevations are contained within the site and do not result in adverse impacts to existing insurable structure or adjacent properties outside the study area. Based on discussions with Sacramento County staff, the CLOMR/LOMR pathway may involve a Physical Map Revision(PMR). Because a PMR involves a broader geographic area, additional agency coordination, and more extensive hydraulic analyses, it typically represents a more complex, time-consuming, and costly permitting pathway. However, based on results from the MWT study, if a PMR or CLOMR/LOMR were completed before construction activities, the regulatory BFE could potentially be lowered by an estimated 1.0 to 1.5 feet. In short, the CLOMR/LOMR path is not recommended outside of the PMR process due to the complicated hydraulics associated with existing certified and non-certified levees, as well as the broad nature of the flooding that occurs within this area.

Building elevation requirements:

For most Critical facility construction:

- Lowest finished floor must be at least 2 feet above the Base Flood Elevation (BFE) in Zones AE, AH, and local flood hazard areas.
- Building pads for slab-on-grade structures must be at least 1 foot above the BFE.

Fill and grading:

Projects must demonstrate that they:

- Do not adversely impact upstream, downstream, or neighboring properties.
- Maintain flood storage capacity
- Meet FEMA and County hydraulic requirements.
- May require a FEMA Conditional Letter of Map Revision (CLOMR) or PMR if flood elevations are affected.
- Documentation of compliance with the Endangered Species Act (ESA) is required to initiate a CLOMR or PMR application.

B. Access During Flooding

Three alternative routes which would provide access above the BFE were studied. The routes would be required to elevate the roadway profile above the BFE. Alternative 1 improves existing Bruceville Road access to the north, while Alternatives 2 and 3 provide options for an additional access point to the facility. The alternatives are for preliminary cost-estimating purposes and would need to be further studied to determine the feasibility of implementation. At the preliminary level the roadway access alternatives do not consider the additional right-of-way acquisition, property access, utilities, drainage requirements, and other detailed design considerations that may be needed to meet construction requirements. The alternatives are shown in Figure 5 on the next page.

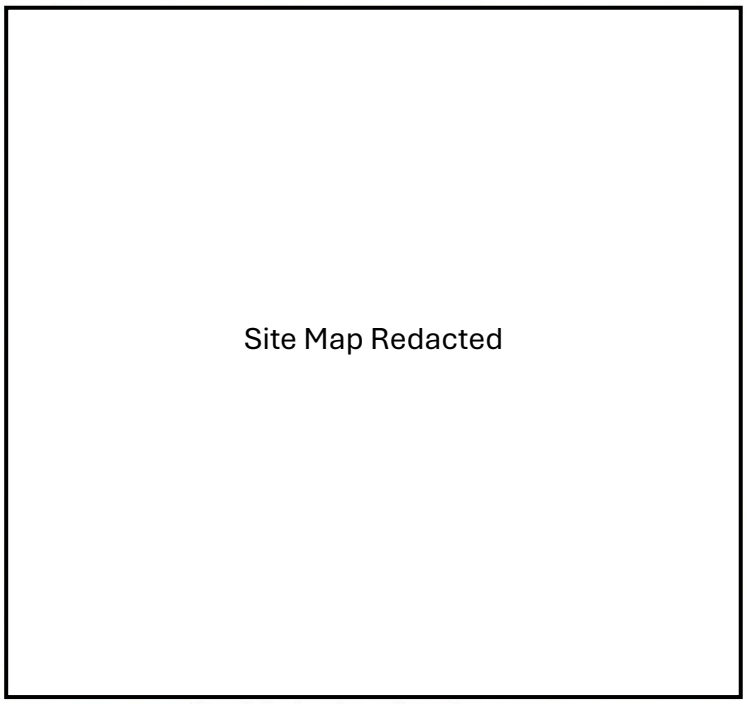


Figure 5- Roadway Access Alternatives

Alternative 1 – Bruceville Road Access Improvements (Preferred Alternative)
Alternative 1 consists of raising approximately 5,660 linear feet of Bruceville Road between the RCCC entrance and Lambert Road to the north. Assuming a roadway section width of approximately 35 feet, to match existing, the analysis estimates an average fill depth of approximately 2-4 feet to achieve the target roadway elevation of 22 feet NAVD88. The relatively shallow fill depth and shorter roadway length suggest this alternative would require the least amount of earthwork among the roadway access alternatives while providing improved access during flood events.

Alternative 2 – New Access Alignment from Lambert Road
Alternative 2 was studied to provide an additional access from Lambert Road. The roadway section would mimic the nearby roads at an approximate 35-foot width. The alternative consists of constructing or improving approximately 5,600 linear feet of roadway along a new alignment from Lambert Road. The analysis indicates an average fill depth of approximately 4 feet to achieve the target elevation of 22 feet NAVD88. Although the overall roadway length is similar to Alternative 1, lower existing ground elevations result in significantly greater fill requirements, which would likely

increase construction costs and floodplain permitting considerations. Additionally, property acquisition for this alternative may make the alternative more difficult to achieve.

Alternative 3 – Twin Cities Road / Southern Access Improvements
Alternative 3 studies improving the most direct route from Highway 5. It includes approximately 16,500 linear feet of roadway improvements from the southwest corner of the RCCC property extending south along Bruceville Road through the Twin Cities Road intersection and continuing west to I-5. The analysis estimates an average fill depth of approximately 6.5 feet to achieve the target elevation of 22 feet NAVD88. Due to both the substantially longer corridor length and greater fill requirements, this alternative would require the largest earthwork volume of the roadway options and would likely present the greatest construction, right-of-way, and floodplain permitting challenges. The resources required to achieve this alternative are very significant in comparison to Alternatives 1 and 2.

Based on field observations and staff interviews, the most practical and cost-effective means of maintaining access to the RCCC during flood conditions is from the north, Alternative 1. This route would utilize the Interstate 5 interchange at Hood Franklin Road, proceed south via Franklin Boulevard or Bilby Road, and continue to the Bruceville Road/Lambert Road intersection before accessing the site (See Access Alternative Plan). This route minimizes disturbance and exposure to the areas most susceptible to flood inundation from levee failures along the Cosumnes River and provides the most reliable means of ingress and egress during major flood events.

At a minimum, the profile of Bruceville Road would need to be elevated from the RCCC entrance to Lambert Road (approximately 1-mile). Based on the existing corridor, the following would likely be required to elevate the roadway to a passable level:

- Elevate approximately 1-mile of roadway by 2-4 feet.
- RCCC access drive modifications
- Firearms Training Range access drive modifications
- Private property access adjustments for approximately 5-6 properties.
- Electrical substation property access modifications north of Firearms Training Range
- Right-of-way acquisition for roadway embankment fill condition
- Drainage improvements along roadway corridor to achieve no adverse impacts and maintain existing patterns.

Advancement of any roadway access alternative will require additional engineering evaluation and design. As a first step, a preliminary roadway design should be developed to establish roadway profiles, embankment requirements, drainage modifications, right-of-way considerations, and compliance with applicable Sacramento County design standards. The proposed improvements would then need to be evaluated through detailed hydraulic analyses to determine whether the project can satisfy Sacramento County's “No Adverse Impact” criteria or if additional flood

conveyance features, such as culverts or bridge structures, are necessary to offset floodplain impacts. The results of these analyses would inform final design and permitting requirements and provide a basis for advancing the selected alternative toward construction.

Approximate earthwork quantities are summarized in the Estimated Fill Volume Table in Appendix A.

C. Floodproofing Strategies

Flood protection measures such as dry floodproofing, perimeter floodwalls, and deployable flood gates were evaluated as potential methods for reducing flood risk to existing RCCC facilities. Dry floodproofing is a technique that prevents floodwater from entering a structure by sealing exterior walls, protecting doors and openings, and designing the building to resist hydrostatic and hydrodynamic flood forces. Flood gates can be installed at building entrances, road crossings, or openings within a floodwall system and are deployed during flood events to create a temporary watertight barrier. When properly designed and maintained, these measures can reduce the risk of floodwater entering individual buildings without requiring the structure to be elevated above the surrounding grade.

Although these strategies may provide localized protection for individual facilities, they present several challenges at RCCC. Because the campus contains numerous buildings, utilities, access points, and support infrastructure, a comprehensive flood protection system would likely require multiple floodwalls, gates, and protected utility crossings to function effectively. In addition, correctional facilities are generally considered critical facilities and may be subject to more stringent flood protection requirements under the California Building Code and ASCE 24.

Depending on the interpretation of the applicable regulations, dry floodproofing alone may not satisfy current flood protection requirements for future building replacement or substantial improvement projects. Perimeter floodwalls and flood gate systems would also introduce fill and floodplain obstructions that would require hydraulic analyses and demonstration of compliance with Sacramento County's “No Adverse Impact” criteria and FEMA CLOMR/LOMR requirements. While these approaches may be feasible for protecting select structures, they are not likely to provide the same operational benefit as maintaining reliable site access during flood events, which was identified as the primary flood-related vulnerability at RCCC.

D. Alternatives Summary

Each mitigation alternative has the potential to impact the floodplain. Figure 6 compares the potential risk of each. An estimator is conducting a separate study to assign potential costs for the mitigation alternatives.

Mitigation Measure	Potential Floodplain Impact	Floodplain Permitting Required?	Hydraulic Analysis Required?	*No Adverse Impact Documentation	CLOMR/LOMR Required?
Dry-Floodproofing Existing Structures	Low	Yes	No	No	No
Dry-Floodproofing w/ Perimeter Floodwall	High	Yes	Yes	Yes	Potentially
Elevating Roadways for Emergency Access	High	Yes	Yes	Yes	Potentially
Elevating Site for New Construction	High	Yes	Yes	Yes	Potentially

Figure 6 Alternative Impacts Table

**Sacramento County defines "Adverse Impact" as causing an increase in flood stage, increased flood velocity, or increased flows in or near a special or local flood hazard area, including an increase in Base Flood Elevation (BFE) equal to or greater than 0.1 foot on upstream, downstream, or adjacent properties.*

VI. Summary

The available information indicates that RCCC faces both operational and regulatory challenges associated with its location within the FEMA-regulated floodplain. While the campus has remained operational through recent flood events, future building replacements, substantial improvements, and major infrastructure upgrades will be subject to current FEMA, California, and Sacramento County floodplain regulations, which may increase project complexity, permitting requirements, and construction costs.

The results indicate that RCCC's greatest flood-related vulnerability is not widespread inundation of the facility itself, but a loss of access during major flood events. When surrounding roadways become flooded, the ability of staff, emergency personnel, and support services to reach the site can be severely impacted. Ensuring reliable site access during flood conditions is therefore a critical operational consideration.

Any substantial renovation, expansion, or replacement project could require buildings to be elevated or floodproofed above the Base Flood Elevation and applicable design flood criteria, increasing project complexity and cost.

Key Takeaways

- Loss of access and facility flooding, are the primary flood-related risk to RCCC.
- Bruceville Road access from Lambert Road to the north appears to be the most reliable route during major flood events.
- Many existing facilities appear to be below current FEMA, California, and Sacramento County flood protection elevations.
- Future building replacements, substantial improvements, or major expansions will likely trigger compliance with current floodplain regulations.
- Site-wide grading and building elevation strategies are feasible, but would require substantial earthwork, hydraulic analyses, and floodplain permitting.
- Floodwalls, flood gates, and dry floodproofing may provide localized protection but may not fully satisfy current critical-facility flood protection requirements.
- All major floodplain modifications will need to demonstrate compliance with Sacramento County's "No Adverse Impact" standards.

REFERENCES

1) *Rio Cosumnes Correctional Center (RCCC) Final Infrastructure Study Report*, prepared by Kitchell and DLR Group for Sacramento County, dated March 1, 2010.

2) *Rio Cosumnes Correctional Center (RCCC) Master Plan*, prepared by Nacht & Lewis Architects for Sacramento County, dated July 6, 2011.

3) *Sacramento County Branch Jail (Rio Cosumnes Correctional Center) Original Construction As-Built Drawing Set*, prepared by Rickey & Brooks for Sacramento County, dated July 15, 1959.

4) *McCormack-Williamson Tract (MWT) Levee Modification and Habitat Development Project Hydraulic Impact Analysis*, prepared by CBEC Eco Engineering, Inc. for the California Department of Water Resources, dated March 29, 2024.

5) *Flood Insurance Rate Map (FIRM) Panel 06067C1450H*, prepared by the Federal Emergency Management Agency (FEMA) for Sacramento County, California, effective date current mapping, revised August 16, 2012.

6) *Flood Insurance Study (FIS) Number 06067CV001E for Sacramento County, California and Incorporated Areas*, prepared by the Federal Emergency Management Agency (FEMA), current effective edition revised February 22, 2024.

7) *Cosumnes River Multi-Benefit Floodplain Restoration Pilot RCCC Summary*, prepared by the California Department of Water Resources, dated June 2025.

8) *Franklin Field Airport Airspace Drawing: Conical Surface Plan and Profile Views,* prepared by Barnard Dunkelberg & Company, dated February 2010.

9) *Delta Primary Zone Study, Cosumnes/Mokelumne Floodplain Study Area, Map 1 of 1*, prepared by Douglas Environmental and Parus Consulting, Inc.

10) *Sacramento County Floodplain Management Ordinance*, adopted by Sacramento County and administered by the Sacramento County Department of Water Resources, effective June 19, 2025.

11) Appendix A - Exhibits

12) Appendix B - Site Data and Background Information

13) Appendix C – References and Studies

*Appendix A, B, & C may be available upon request, subject to county review and redaction.

APPENDIX A

Exhibits

1 - RCCC Flood Impact Questions and M/M Response
2 - RCCC 100-Year BFE Heat Map
3 - RCCC Access Alternative Plan
4 - Existing Grade Vs. Floodplain Compliant Elevation
5 - RCCC Site Plan
6 - RCCC Final Floodplain Study Presentation
7 - Estimated Fill Volume Table

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Martin/Martin Response
to Primary RCCC Flood Impact Questions

1. ***Flood Plain Impact on Existing Buildings. To what extent does the flood plain/FEMA & County Regulations impact existing buildings?***

   a. ***Note that the Kitchell Infrastructure Study dated March 1, 2010, p. 9, recommended constructing a 6'-0" tall floodwall or earthen berm around the perimeter of the site with a flood gate.***

   The effective FEMA floodplain mapping across the RCCC and Firearms Training Range is primarily driven by riverine flooding from the Cosumnes River. Historically, the river corridor has been heavily influenced by agricultural development and now functions as a constrained flood conveyance system affected by a combination of certified and non-certified levees. The Cosumnes River originates in the Sierra Nevada and is one of the last remaining unregulated rivers on the western slope of the range. Numerous non-engineered levees exist along the river that provide varying degrees of flood protection but are not recognized by FEMA as accredited flood control features. These levees are susceptible to overtopping and breaching during major flood events, as occurred during the 2017 and 2023 flood seasons.

   The RCCC and Firearms Training Range are located within FEMA Zone A and Zone AE flood hazard areas associated with the Cosumnes River. Zone A represents an approximate-study floodplain where Base Flood Elevations (BFEs) have not been established, while Zone AE represents a detailed-study floodplain with published BFEs. Based on the effective FEMA mapping, the regulatory BFE across the RCCC and Firearms Training Range is approximately **22.0 feet NAVD 88**. This elevation is derived from hydraulic analyses used to support the effective Flood Insurance Rate Map (FIRM) and does not account for flood protection provided by existing non-accredited levees.

   Based on the available topographic survey information and supplemental USGS elevation data, most, if not all, insurable structures within the RCCC property appear to have finished floor elevations below the effective FEMA regulatory BFE of 22.0 feet NAVD 88. Refer to the 100-Year Heatmap exhibit for a visual representation. The Existing grade vs. Floodplain Compliant elevation table presents the approximate finished floor elevations of the existing structures relative to the effective base flood elevation. Several structures appear to be elevated above surrounding grade and may have finished floor elevations that exceed the effective BFE; however, confirmation would require additional site-specific survey data and finished-floor elevation verification.

2. ***Flood Plain Impact on New Construction. To what extent does the flood plain/FEMA & County Regulations impact new construction, or the renovation of existing buildings, and if required what would be needed to mitigate concerns related to flooding? Provide a ROM for recommended mitigation measures assuming the entire 55-acre area within the existing perimeter and outside parking, and, as an option, the 14-acre firearm training range.***

   Per the Sacrament County Floodplain Management Ordinance, improvements to existing insurable structures that exceed 50% of market value (Substantial Improvements), are required to

10-26-26
Please note the Substantial improvements requirement is a FEMA requirement as well

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have the lowest finished floor elevation (including basements) elevated or floodproofed a minimum of 1.5 feet above the 100-year BFE. Construction of new commercial buildings also requires the lowest finished floor elevation to be elevated or dry floodproofed a minimum of 1.5 feet above the 100-year BFE (23.5ft minimum flood protection elevation).

Substantial damage repairs are also regulated to this requirement. Sacramento County defines Substantial Improvements, as follows:

> ***Sacrament County Zoning Code Title IX: Floodplain Management Ordinance Section 902-57 - Substantial Improvements*** *Any reconstruction, rehabilitation, addition, or alteration of a building, or any part thereof, the cumulative cost of which equals or exceeds 50 percent of the market value of the building prior to the start of construction, as determined by independent appraisal. Start of construction is the point at which a building permit for the improvements is issued. Cumulative cost is calculated for the preceding five (5) year period from the date of building permit application. "Substantial improvements" includes repair of "substantial damage", regardless of the actual repair work performed. The term does not include either:*
>
> *A. Any project for improvement of a building to correct existing violations or state or local, health, sanitary, or safety code specifications that have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions, or*
>
> *B. Any alteration of a "historic building" provided that the alteration would not preclude the building's continued designation as a "historic building".*

While the Sacramento County Floodplain Ordinance doesn't specifically define correctional facilities as non-residential structures, these buildings are typically treated as institutional or public facilities, not residential occupancy, even though occupants sleep there. From a building code and floodplain-management perspective, prisons are generally considered nonresidential structures. Therefore, the applicable floodplain standard would typically be *Title IX – Section 906-03* (Nonresidential Elevation and Flood-Proofing). Additionally, correctional facilities are considered high risk and are often classified as critical facilities, which requires a higher level of protection and may not allow dry floodproofing as a means of compliance.

- Elevation of the lowest floor to the applicable residential elevation standard (lowest finished floor elevation a minimum of 1.5ft above BFE), or
- Certified dry floodproofing to 1.5 feet above the Base Flood Elevation.

Dry floodproofing requirements are as follows:

- Watertight below 1.5 ft above the base flood elevation so that the building walls are substantially impermeable to the passage of water;
- Have structural components capable of resisting hydrostatic and hydrodynamic loads including the effects of buoyancy; and
- Be certified by a registered professional engineer or architect that the standards of this section are satisfied. Such certification shall be provided to the Floodplain Administrator.

A floodwall can be part of a dry-floodproofing system, but a floodwall alone is not automatically considered compliant dry floodproofing. The design would need to demonstrate that:

Martin/Martin Response
to Primary RCCC Flood Impact Questions

- The floodwall protects the building to the required elevation.
- Openings, doors, utilities, and penetrations are protected.
- The wall and foundation can resist flood loads without failure.
- The entire system is certified by a licensed design professional.

In FEMA practice, a perimeter floodwall is often referred to as a component of dry floodproofing, provided it forms a complete protection system around the structure and is professionally designed and certified. Sacramento County's ordinance would still require the engineering certification described in *Title IX – Section 906-03*.

Critical Facilities
Correctional facilities are considered high risk and may be considered critical facilities, requiring a higher level of protection compared to typical non-residential structures. The California Building Code (CBC) adopts flood-resistant design requirements through ASCE 24, which requires the higher of:

- Base Flood Elevation **(BFE) + 2 feet**, or
- The locally established Design Flood Elevation (DFE) [1.5ft for Sacramento County], or
- The 500-year flood elevation (not established for this reach of the Cosumnes River)

3. ***Flood Plain Impact on Existing Access Roads. As noted below, the primary recurring issue is the flooding of the main county access road which restricts all access to and from the site. (Consultant needs to research and/or estimate length of access road flooded and/or undermined during recent flood event identified below.) What would be required to raise the existing County Road above flood elevation to assure access to the site and any other roads that are needed to access the jail during extreme weather events? Provide a ROM for recommended mitigation measures.***

   Based on interviews with RCCC staff, significant flooding during the 2017 and 2023 storm events affected Bruceville Road between Twin Cities Road and Lambert Road. Staff observations indicate that floodwaters generally propagate from south to north as a result of levee breaches along the Cosumnes River. During these events, access through the Bruceville Road and Lambert Road intersection remained comparatively more passable, which is consistent with the local topography and the proximity of the flooding source areas.

   Based on these observations, the most practical and cost-effective means of maintaining access to the RCCC during flood conditions is from the north, Alternative 1. This route would utilize the Interstate 5 interchange at Hood Franklin Road, proceed south via Franklin Boulevard or Bilby Road, and continue to the Bruceville Road/Lambert Road intersection before accessing the site (See Access Alternative Plan). This route minimizes exposure to the areas most susceptible to flood inundation from levee failures along the Cosumnes River and provides the most reliable means of ingress and egress during major flood events.

Martin/Martin Response
to Primary RCCC Flood Impact Questions

At a minimum, the profile of Bruceville Road would need be elevated from the RCCC entrance to Labert Road (approximately 1-mile). Based on the existing corridor, the following would likely be required to elevate the roadway to a passable level:

- Elevate approximately 1-mile of roadway by 3-5 feet.
- RCCC access drive modifications
- Firearms Training Range access drive modifications
- Private property access adjustments for approximately 5-6 properties.
- Electrical substation property access modifications north of Firearms Training Range
- Right-of-way acquisition for roadway embankment fill condition
- Drainage improvements along roadway corridor to achieve no adverse impacts.

As part of the roadway access exercise, two additional route alternatives have been provided. Alternative 2 is a new roadway access from Lambert Road. The existing grade is generally lower than the Alternative 1, as grade general drops in the south and west directions. It is assumed additional fill will be needed compared to Alternative 1 to be above the 22' BFE elevation. Alternative 3 assumes roadway improvements from the Twin Cites Road and Highway 5 exit. The route avoids disturbing the Franklin Airfield site. The Alternative 3 route is the longest, at 3 miles, and likely most costly.

4. ***Mitigation Measures Impact on Flood Plain. To what extent would mitigation measures – e.g. installation of a flood wall, raising the site, and/or raising road elevations under 1, 2, & 3 – result in changes to the flood plain and result in increased flooding for surrounding property owners?***

Mitigation Measure	Potential Floodplain Impact	Floodplain Permitting Required?	Hydraulic Analysis Required?	*No Adverse Impact Documentation	CLOMR/LOMR Required?
Dry-Floodproofing Existing Structures	Low	Yes	No	No	No
Dry-Floodproofing w/ Perimeter Floodwall	High	Yes	Yes	Yes	Potentially
Elevating Roadways for Emergency Access	High	Yes	Yes	Yes	Potentially
Elevating Site for New Construction	High	Yes	Yes	Yes	Potentially

**Sacramento County defines "Adverse Impact" as causing an increase in flood stage, increased flood velocity, or increased flows in or near a special or local flood hazard area, including an increase in Base Flood Elevation (BFE) equal to or greater than 0.1 foot on upstream, downstream, or adjacent properties.*

5. ***Administration and ROM. Assuming that the County proceeds with expansion or major replacement construction on the site and roadway improvements to mitigate flooding, what steps will be required to be taken related to flood plain mapping, approvals etc.? Provide a ROM for time required and cost. Analysis should include the requirements of all authorities having jurisdiction (AHJ's).***

Martin/Martin Response
to Primary RCCC Flood Impact Questions

When is a permit required?
A Floodplain Management Permit is required before:

- New construction
- Substantial improvements or repairs (over 50% market value)
- Grading, filling, excavation
- Land alterations

within a Special Flood Hazard Area (SFHA) or Local Flood Hazard Area.

Permit application requirements:
Applicants must submit:

- Site plans showing property boundaries, structures, grading, drainage, and fill locations
- Existing and proposed elevations
- Lowest floor elevations for buildings
- Floodproofing elevations (if applicable)
- Base flood elevation (BFE) information
- Fill and excavation quantities
- Information on any watercourse alterations or relocations

Building elevation requirements:
For most new residential construction:

- Lowest finished floor must be at least 1.5 feet above the Base Flood Elevation (BFE) in Zones AE, AH, and local flood hazard areas.
- Building pads for slab-on-grade structures must be at least 1 foot above the BFE.

Fill and grading:
Projects must demonstrate that they:

- Do not adversely impact upstream, downstream, or neighboring properties.
- Maintain flood storage capacity.
- Meet FEMA and County hydraulic requirements.
- May require a FEMA Conditional Letter of Map Revision (CLOMR) if flood elevations are affected.
- Documentation of compliance with the Endangered Species Act (ESA) is required to initiate a CLOMR application.

Timeline:
ROM Schedule:

- Sacramento County Floodplain Permitting based on grading, fill, hydraulic analysis – **3-6 months (Permitting Fee - $50,000 - $60,000 excludes engineering design fees)**
- FEMA Conditional Letter of Map Revision (CLOMR) – **Approximately 1-year+ (Permitting Fee - $75,000 - $100,000 excludes engineering design fees)**

6. ***Mitigation Measure. Relative to each of the items above, should the County consider adopting a higher water elevation as the basis for planning given that recent events have exceeded the current 100-year benchmarks?***

Based on interviews with RCCC staff, the 2017 and 2023 storm events primarily affected roadway access to the site rather than causing widespread flooding within the RCCC property itself.

Martin/Martin Response
to Primary RCCC Flood Impact Questions

According to staff observations, flooding associated with levee failures along the Cosumnes River generally progressed from south to north across the area. The greatest impacts were observed near the Bruceville Road/Twin Cities Road intersection, while comparatively less flooding occurred near the Bruceville Road/Lambert Road intersection. Nevertheless, both intersections were reported to be largely impassable during peak flood conditions.

Based on these observations, the extent and severity of flooding experienced on the RCCC property during the 2017 and 2023 events do not appear to be consistent with the depth and extent of inundation associated with the effective FEMA 1.0-percent annual-chance (100-year) floodplain. While access to the site was significantly disrupted by flooding of surrounding roadways, available anecdotal evidence suggests that floodwaters within the RCCC property were less severe than those anticipated under the regulatory 100-year flood condition. Confirmation of this conclusion would require more detailed hydraulic analysis to compare current conditions with the effective FEMA BFE's.

The *McCormack-Williamson Tract (MWT) Levee Modification and Habitat Development Project – Hydraulic Impact Analyses*, prepared by CBEC Eco Engineering, dated March 29, 2024, provides insight on the 2017 and 2023 flood events, with the following key takeaways:

- Emergency levee repairs were completed following the 2017 and 2023 floods, which fortified the breaches from further erosion, rather than reclaiming the pre-failure elevations.
- The MWT project proposed degrading portions of the East, South (Mokelumne River) and Southwest levees.
- The existing repairs and degraded levees resulted in a revised baseline flood condition, referred to as the 2023 baseline condition, which includes the most accurate and detailed modeling conducted in this region to date, and should be used to re-evaluate required flood protection elevations for RCCC. Key data points that are in the vicinity of RCCC show a significant reduction in BFE's.

Table 1. 100-yr water surface elevations

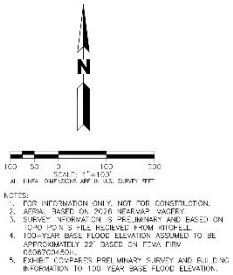
Location	FIRM Effective BFE	2023 Baseline WSE	2023 Minus FIRM Condition	Project Condition WSE	Project Minus 2023 Condition
Bensons Ferry	22.00	20.66	-1.34	19.54	-1.30
Beach Lake	18.00	16.47	-1.53	16.27	-0.25
Point Pleasant North	18.00	16.31	-1.69	16.09	-0.28
Point Pleasant South	18.00	16.28	-1.72	16.06	-0.28
Lambert Road Upstream (Stone Lake)	18.00	16.31	-1.69	16.09	-0.28
Snodgrass Slough at Lambert Road	18.00	16.34	-1.66	16.11	-0.28
Snodgrass Slough at Twin Cities Rd	18.00	17.57	-0.43	17.05	-0.59

Martin/Martin Response
to Primary RCCC Flood Impact Questions

Confirmation of the MWT levee degrading will need to be confirmed, but based in this data, it is recommended that regulatory flood protection elevations be re-evaluated for RCCC and the Firearms Training Range.

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Site Map Redacted



6-12-18 RULE

- 6” can knock an adult over
- 12” can float a vehicle
- 18” can wash a vehicle away

ID	Minimum Elevation	Maximum Elevation	Color Scheme
1	-11.90'	-6.00'	
2	-6.00'	-4.00'	
3	-4.00'	-3.00'	
4	-3.00'	-2.00'	
5	-2.00'	-1.00'	
6	-1.00'	-0.50'	
7	-0.50'	0.00'	

100-YEAR BASE FLOOD ELEVATION COMPARISON

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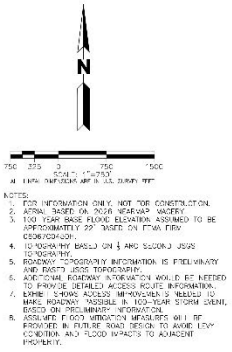
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MARTIN/MARTIN

RIO COSUMNES CORRECTIONAL CENTER
FLOODPLAIN/HYDROLOGY STUDY
100-YEAR BFE HEATMAP

Sheet Number
D1

Site Map Redacted



ACCESS ROUTES

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MARTIN/MARTIN

RIO COSUMNES
CORRECTIONAL CENTER
FLOODPLAIN/HYDROLOGY STUDY
ACCESS ALTERNATIVE PLAN

Sheet Number
D2

EXISTING GRADE VS. FLOODPLAIN COMPLIANT ELEVATION

ATTORNEY CLIENT PRIVILEGE- PREPARED AT THE DIRECTION OF GENERAL COUNSEL

KEY ID	FAC CODE	BUILDING NAME	APPROXIMATE FINISHED FLOOR ELEVATION (FT.)	FLOODPLAIN COMPLIANT FINISHED FLOOR (22' BFE+2') (FT.)	DELTA (FT.)	BUILDING FOOTPRINT (SQ. FT.)
2	533	RCCC - MAIN KITCHEN	19.97	24	4.03	11260
3	534	RCCC - LAUNDRY	19.34	24	4.66	6972
4	535	JOSEPH KIERVERNAGLE FACILITY (JKF) KEVIN BLOUNT FACILITY (KBF)	19.55	24	4.45	41364
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6	537	MHU - MEDICAL HOUSING UNIT	18.85	24	5.15	11269
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9	540	RCCC - BARRACKS G & H	19.71	24	4.29	10600
10	541	RCCC - BARRACKS J & K	20.00	24	4.00	11908
11	542	RCCC - FIRE PUMP	19.31	24	4.69	985
12	543	RCCC - MAIN TOWER	19.08	24	4.92	169
13	544	RCCC - T3 EDUCATION TRAILER	19.10	24	4.90	2358
14	545	RCCC - RE-ENTRY OFFICES	20.04	24	3.96	4402
15	546	RCCC - CHAPLIN & DGS OFFICES	19.40	24	4.60	882
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31	562	NORTH RCCC SE CARGO	18.60	24	5.40	312
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33	564	SOUTH RCCC SE CARGO	18.36	24	5.64	352
34	565	COMPOUND GUARD HOUSE (FISHBOWL)	19.33	24	4.67	400
38	569	GREENHOUSE	18.08	24	5.92	4825
39	570	STEWARD BAIRD FACILITY (SBF)	21.79	24	2.21	24980
40	200	SANDRA LARSON FACILITY (SLF)	21.37	24	2.63	27376
45	572	RCCC - ENGRAVING & OFFICES	20.49	24	3.51	7296
* BUILDINGS OUTSIDE THE SURVEY BOUNDARY OR RELOCATED ON AERIAL IMAGERY WERE NOT INCLUDED						

Site Plan Redacted

RCCC SITE PLAN

A-1

AREA ANALYSIS ONLY - PLAN SET NOT FOR CONSTRUCTION - FIELD VERIFY DIMENSIONS

REVISION DATE: DECEMBER 2, 2025

RCCC Floodplain Study

July 22nd, 2026

Site Map Redacted

Attorney Client Privileged Prepared At the Direction of Counsel

OUTLINE

1. OVERVIEW
   - A. HISTORIC FLOODING
   - B. PROJECT GOALS
   - C. FLOODPLAIN PERMITTING REGS
2. ON-SITE FACILITIES
   - A. CURRENT CONDITIONS
   - B. RECOMMENDATIONS
3. ROADWAY ACCESS
   - A. STAFF INTERVIEWS
   - B. ALTERNATIVES
   - C. NO ADVERSE IMPACT
4. OPPORTUNITIES
5. QUESTIONS

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Overview

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History of Flooding

Image Redacted

- Rio Cosumnes Watershed
- 1997 – Highest Flow on Record
  - Flood Stage @ Michigan Bar = 18.5ft
- 2017 – Roadway & Access
  - Flood Stage @ Michigan Bar = 15.1ft
- 22/23 – Roadway & Access
  - Flood Stage @ Michigan Bar = 16.5ft

10-26-26
Please note the Benson's Ferry Gage provides more accurate measurements for RCCC.

Key Regulations

- BASE FLOOD ELEVATION (BFE)
- SUBSTANTIAL IMPROVEMENTS (SZC TITLE IX: SECTION 902-57, 44.CFR.65.3)
- CRITICAL FACILITY 2' ABOVE BFE (ASCE 24)(CBC Title, 24 Part 2)
- FLOOD DESIGN CLASS 3 (ASCE 24)
- NO ADVERSE IMPACT

(SZC TITLE IX: SECTION 902-57)

- CONDITIONAL LETTER OF MAP REVISION & LETTER OF MAP REVISION
- CLOMR/LOMR

SACRAMENTO COUNTY

ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS

CALIFORNIA BUILDING STANDARDS COMMISSION CBSC

MARTIN/MARTIN CONSULTING ENGINEERS

Rio Cosumnes Correctional Center
July 22nd, 2026

FEMA FLOODPLAIN 100-YEAR BASE FLOOD ELEVATION

Site Map Redacted

ZONE AE FP

ZONE A FP

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6

USGS Topography vs. BFE

Topography Map Redacted

When is a Floodplain Permit required?

- New construction
- Substantial improvement
- Grading, filling, excavation
- Land alterations
- No adverse impact

within a Special Flood Hazard Area (SFHA) or Local Flood Hazard Area.

Mitigation Measure	Potential Floodplain Impact	Floodplain Permitting Required?	Hydraulic Analysis Required?	*No Adverse Impact Documentation	CLOMR/LOMR Required?
Dry-Floodproofing Existing Structures	Low	Yes	No	No	No
Dry-Floodproofing w/ Perimeter Floodwall	High	Yes	Yes	Yes	Potentially
Elevating Roadways for Emergency Access	High	Yes	Yes	Yes	Potentially
Elevating Site for New Construction	High	Yes	Yes	Yes	Potentially

**Sacramento County defines "Adverse Impact" as causing an increase in flood stage, increased flood velocity, or increased flows in or near a special or local flood hazard area, including an increase in Base Flood Elevation (BFE) equal to or greater than 0.1 foot on upstream, downstream, or adjacent properties.*

On-site Facilities

July 22, 2026 Presentation

Site Map Redacted

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July 22, 2026 Presentation

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Rio Cosumnes Correctional Center
July 22nd, 2026

Site Map Redacted

Image Redacted

West Swale

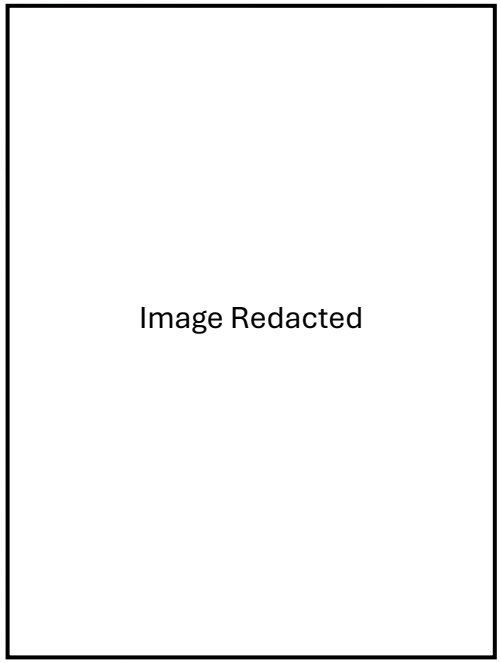
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Southwest Outfall

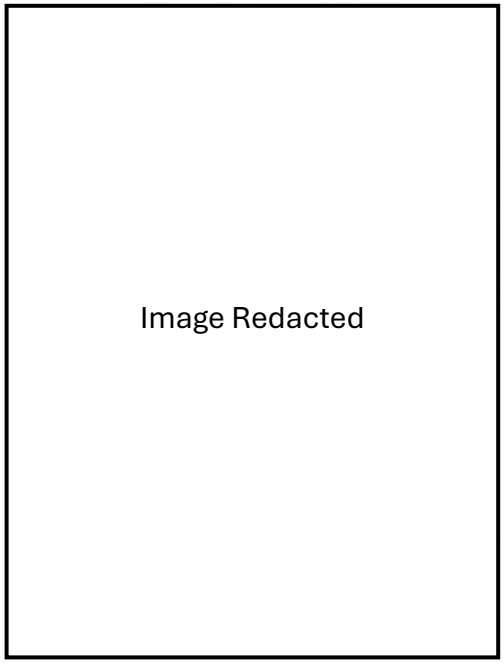
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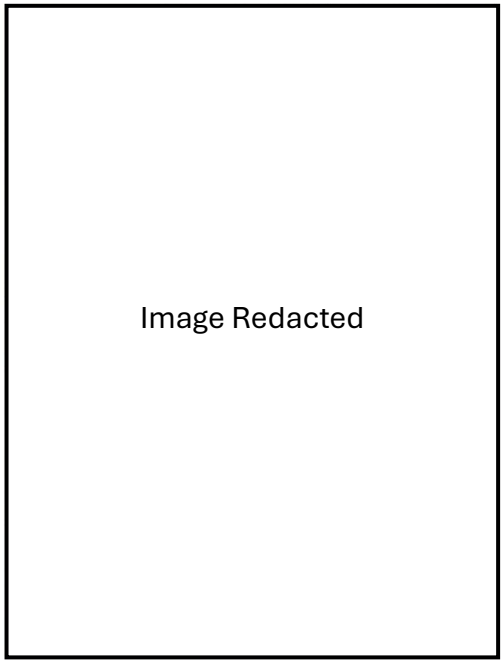
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Education Buildings



Kitchen



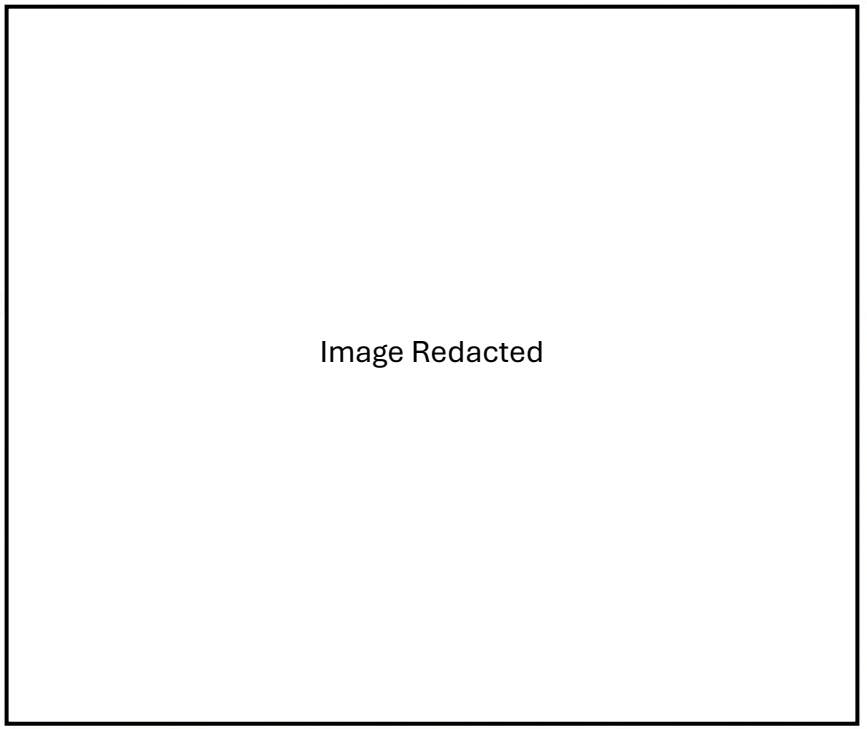
Kitchen Foundation

Roadway Access

Existing Access

On-Site Staff Interviews

- 2017 and 2023 floods propagated from south to north
- Bruceville/Lambert intersection has less impact
- Bruceville/Twin Cities intersection impassable



Aerial from North

Image Redacted

East Bruceville Road Entrance

Image Redacted

Bruceville Swale

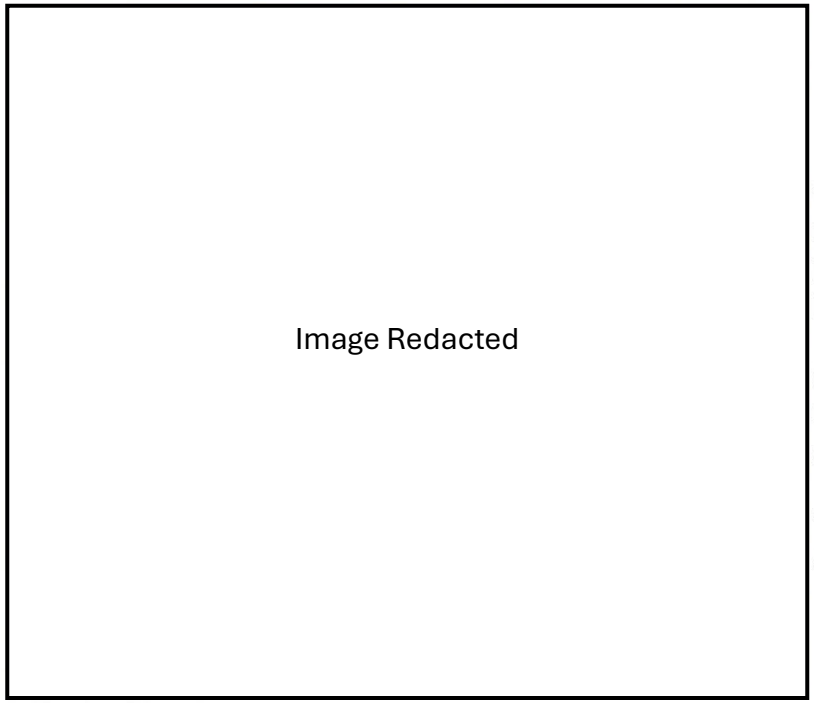
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Bruceville Road

MARTIN/MARTIN CONSULTING ENGINEERS

Rio Cosumnes Correctional Center
July 22nd, 2026

PROPOSED ACCESS ALTERNATIVES



*ASSUMED FLOOD MITIGATION MEASURES WILL BE PROVIDED WITH ROADWAY DESIGN TO DOCUMENT NO-RISE CONDITION

(CLOMR/LOMR REQUIRED IF NO-RISE CONDITION IS NOT ACHIEVABLE)

*ROW AND/OR EASEMENT ACQUISITION LIKELY REQUIRED

Roadway No-Rise Analysis and Evaluation

Image Redacted

- Detailed Survey
- Engineered Roadway Design
- Hydraulic modeling using best information available (pre- and post-project conditions)
- Mitigate potential floodplain impact with engineered solutions
- Sacramento County Floodplain Permit
- CLOMR/LOMR (1-Year Process)

Opportunities

Additional analysis (2024 MWT LEVEE MODIFICATION STUDY)

Site Map Redacted

Table 1. 100-yr water surface elevations

Location	FIRM Effective BFE	2023 Baseline WSE	2023 Minus FIRM Condition	Project Condition WSE	Project Minus 2023 Condition
Bensons Ferry	22.00	20.66	-1.34	19.54	-1.30
Beach Lake	18.00	16.47	-1.53	16.27	-0.25
Point Pleasant North	18.00	16.31	-1.69	16.09	-0.28
Point Pleasant South	18.00	16.28	-1.72	16.06	-0.28
Lambert Road Upstream (Stone Lake)	18.00	16.31	-1.69	16.09	-0.28
Snodgrass Slough at Lambert Road	18.00	16.34	-1.66	16.11	-0.28
Snodgrass Slough at Twin Cities Rd	18.00	17.57	-0.43	17.05	-0.59
Snodgrass Slough at DCC	17.00	17.52	0.52	16.99	-0.58
Dead Horse Island	17.00	15.38	-1.62	1.48	-13.99
South Fork Mokelumne at New Hope Bridge	17.00	17.08	0.08	16.67	-0.35
South Fork Mokelumne at Beaver Slough	12.00	12.60	0.60	12.34	-0.21
South Fork Mokelumne at Hog Slough	10.00	10.34	0.34	10.22	-0.10
North Fork Mokelumne at New Hope Road	14.00	16.23	2.23	15.86	-0.39
North Fork Mokelumne at latitude of Beaver Sl.	11.30	13.50	2.20	13.24	-0.29
North Fork Mokelumne at latitude of Hog Sl.	10.00	11.60	1.60	11.43	-0.18

All elevations reference NAVD88 feet.

July 22, 2026 Presentation

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Rio Cosumnes Correctional Center
July 22nd, 2026

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Summary

1. OVERVIEW
2. ON-SITE FACILITIES
3. ROADWAY ACCESS
4. OPPORTUNITIES

Questions

ESTIMATED FILL VOLUME FOR EACH ALTERNATIVE					
AREA ID	PROPOSED ELEVATION	LINEAR FEET	AREA (SF)	VOLUME DIFFERENCE (CY)	AVERAGE DEPTH (FT)
ROADWAY ALT 1 (50' W)	22'	5660	283,000	25,156	2.4
ROADWAY ALT 2 (50' W)	22'	5600	280,000	41,481	4.0
ROADWAY ALT 3 (50' W)	22'	16500	825,000	200,000	6.5
PG BUILDINGS	24'	N/A	1,006,000	170,000	4.6
PG AIRPORT	24'	N/A	22,600,000	7,600,000	9.1

APPENDIX B

Site Data and Background Information

1 - RCCC Infrastructure Study Content Summary
2 - Master Plan Report for RCCC Executive Summary
3 - RCCC As-Builts Cover Page & Site Plan
4 - Franklin Field Airport Airspace Drawing
5 - Floodplain Definition Correspondence
6 - Cosumnes/Mokelumne Floodplain Study Area
7 - Aerial Images of Site Layouts
8 - RCCC Utility Site Plan

Attorney Client Privileged Prepared at the Direction of Counsel

Infrastructure Study

Rio Consumnes Correctional Center





Prepared by Kitchell
For

County of Sacramento
Sacramento, CA

March 1, 2010
Job No. 3520A3
FINAL REPORT

KITCHELL

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7. **Electrical** 8
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APPENDICES

- **Cost Estimate**

- **Exhibits:**

Exhibit C-1	**Sanitary Sewer Consumption**
Exhibit C-1a	**Sanitary Sewer Analysis**
Exhibit C-2	**General Site Drainage**
Exhibit C-2a	**Storm Drain System Analysis**
Exhibit C-3	**Parking Space Requirements**
Exhibit C-4a	**Ex Domestic Peak Flow Demand (System C=120)-Junctions**
Exhibit C-4b	**Ex Domestic Peak Flow Demand (System C=120)-Pipes**
Exhibit C-5	**Ex Condition –Original Fire Flow Summary Analysis- One Pump at 2000-gpm, 105-psi-C=120**
Exhibit C-6	**Ex Condition Upgrade- Two Pumps- Fire Flow Summary Analysis- Pump at 2000-gpm, 105-psi-C=120**
Exhibit C-7a	**Fire at Christopher Boone Facility = 3750-gpm – Two Pumps ON with Imp-Junctions**
Exhibit C-7b	**Fire at Christopher Boone Facility = 3750-gpm – Two pumps ON with Imp-Pipes**
Exhibit C-8a	**Fire at Barracks "K"=1750-gpm-Two Pumps ON with Imp-Junctions**
Exhibit C-8b	**Fire at Barracks "K"=1750-gpm-Two Pumps ON with Imp-Pipes**
Exhibit C-9	**Two Main Pumps ON-Fire @ Christopher Boone Facility=3750-gpm**
Exhibit E-1	**Existing Electrical Service Distribution Infrastructure Data**
Exhibit E-2	**Existing Telecommunications Distribution Infrastructure Data**

- **Reference List**

- **Assumption Summary Sheet**

Drawings:

C1.0 Existing Site Plan and Building Key
C2.0 Future Site Plan and Building Key
C3.0 Existing and Future Storm Drain System Plan
C4.0 Existing and Future Sanitary Sewer System Plan
C5.0 Existing and Future Domestic Water System Plan
C6.0 Existing and Future Fire Protection Water System Plan
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E3.1 Existing CCTV Fiber Network Single Line Diagram
E3.2 Existing CCTV Twisted Pair Single Line Diagrams
E3.3 Future Electrical Site Plan
E3.4 Future CCTV Fiber Network Single Line Diagram
G1.0 Existing and Future Natural Gas/Diesel System Plan

EXECUTIVE SUMMARY

1. Introduction

In January 2008, the County of Sacramento commissioned Kitchell to prepare a site infrastructure study for the Rio Cosumnes Correctional Center (RCCC) and Kenneth Royal Firearms Training Facility (KRFTF). This study focusses on the existing and future (2015) utility infrastructure capacities. The infrastructure addressed in this study are domestic water, fire protection, sanitary sewer, storm drain, electrical, telecommunication, natural gas, diesel, propane, security fencing and security patrol roads.

In 1947 the Federal Government deeded 140 acres to the County of Sacramento. The Sheriff's Department converted military barracks into a county jail/farm correctional center known as the Branch Jail. Since that time the correctional center has expanded to a rated operating capacity of about 1,562 inmates. The existing average daily population for 2008 was 2,181 and the future 2015 population is estimated to increase to about 3,348 inmates.

2. Site

A. Recommendations:

1) Construct a new 24-foot wide security patrol road along the existing perimeter fencing.
2) Move staff and visitor parking outside the fenced area.
3) Construct an off-site 5,000-sq-ft delivery storage building and paved delivery area.
4) Provide additional 200 parking spaces for future expansion.
5) Construct 5 building pads for new building sites.

3. Domestic Water / Domestic Storage Tank

A. Recommendations:

1) Repair the existing well site and conduct a pump performance test on all three well sites to determine current capacity.
2) Construct a new well site to provide a backup for the existing system.
3) The main water treatment facility requires an upgrade from 445-gpm to a 940-gpm facility with alternate backup system.

4) Add an additional 239-gpm (minimum) water tank booster pump to meet future peak hour demand conditions
5) Add an additional 239,846-gallon storage tank volume to current system.
6) Add an additional 262,450-gallon storage tank volume in future.
7) The calculations were based on information provided by the County. The County needs to verify and confirm all potable and non-potable lines.
8) Based upon the poor water quality and continuous maintenance of the on-site water system it is recommended that RCCC should connect into a local water purveyor water system. Further evaluation should be performed when more information is known about the extension from an existing domestic water system to RCCC.

4. Fire Protection Water System

A. Recommendations:

1) Perform a pump performance test at the existing fire pump unit and expand the building to include a full backup system.
2) Drill a new well, construct a new building, and install a new 2000-gpm 125-hp fire pump unit.
3) Upgrade the existing system, field verify and install 4 cross-connections between the existing 10"-inch and 6-inch non-potable water systems**.**
4) The calculations were based on information provided by the County. The County needs to verify and confirm all potable and non-potable lines.

5. Sanitary Sewer Systems

A. Recommendations:

1) Replace approximately 50 manhole covers with watertight covers.
2) Provide a sanitary sewer connection to the existing sanitary sewer manhole.
3) Provide a new sanitary sewer manhole for the new sanitary sewer building lateral.
4) The calculations were based on information provided by the County. The County needs to verify and confirm all sanitary sewer lines.

6. Storm Drains and FEMA Floodplain

A. Recommendations:

1) Construct a storm drain pump station at RCCC with twin 150-HP pumps and a full backup system.
2) Replace the storm drain pump station at KRFTF with twin 6-HP pumps and a full backup system.
3) Construct 5,800-ft of perimeter concrete floodwall, with an average height of 6-ft, around the entire RCCC complex and include a floodgate at the entrance.
4) Re-construct a perimeter earth berm (16,500-cy), with an average height of 6-ft, around the entire KRFTF complex and include a floodgate at the entrance.

7. Electrical

A. Recommendations:

1) ESA-2: Trench 250 feet, from new housing unit to existing main switchboard MSB-SLF, and install appropriate conduit and conductors for both normal and emergency power.
2) ESA-4: Install a new 480-208/120 V, 3-phase, 225 KVA step-down transformer at the site of the new housing units.
3) ESA-4: Trench 450 feet, from the new step-down transformer to the existing main switchboard MSB-GE, and install appropriate conduit and conductors for both normal and emergency power. Remove the existing SMUD service transformer and associated primary and secondary feeders and replace with a larger SMUD service transformer and associated primary and secondary feeders.
4) ESA-4: Install a new 250 KW diesel-fueled generator set with associated automatic transfer switch and day tank for emergency power back-up for ESA-4.
5) ESA-4: Install new 400 A, 480/277 V, 3-phase emergency switchboard.
6) ESA-5: Install a new 480-208/120 V, 3-phase, 225 KVA step-down transformer at the site of the new housing unit.
7) ESA-5: Trench 100 ft from the new step-down transformer to existing main switchboard MSB-A/B and install appropriate conduit and conductors for both normal and emergency power.

8) ESA-5: Trench 200 ft from the new Fire Pump Station to existing main switchboard MSB-A/B and install appropriate conduit and conductors for both normal and emergency power.

9) G-14/G-21 Well Site: Replace the existing three pole-mounted transformers feeding the well area with a new 12 KV-480/277 V, 500 KVA, 3-phase ground-mounted SMUD service transformer. Remove the existing power pedestal and install new switchgear.

10) G-14/G-21 Well Site: Trench 25 ft to install appropriate conduit and conductors to connect the new SMUD service transformer to the new switchgear.

11) G-14/G-21 Well Site: Install a new 500 KVA diesel-fueled generator set with associated automatic transfer switch and day tank for emergency power back-up to the well/lift station site.

8. Telecommunications

A. Recommendations:

1) Proposed 200 Bed Women's Housing Unit W1: Trench 550 ft to the Administration Building and install a 25 twisted-pair copper cable in 4" conduit for the future telephone system and (2) sets of (6 strands of multi-mode fiber in 4" conduit) for the future CCTV system.

2) Proposed 200 Bed Men's Housing Unit M1: Trench 450 ft to the Administration Building and install a 25 twisted-pair copper cable in 4" conduit for the future telephone system and (2) sets of (6 strands of multi-mode fiber in 4" conduit) for the future CCTV system.

3) Three proposed 200 Bed Men's Housing Units M2-M4: Trench 800 ft to the Administration Building and install (3) sets of (25 twisted-pair copper cable in 4" conduit) for the future telephone system and (6) sets of (6 strands of multi-mode fiber in 4" conduit) for the future CCTV system.

9. Natural Gas/Propane Gas/Diesel Fuel Facilities

A. Recommendations:

1) Provide a separate gas meter with piping infrastructure for future site M1, M2, M3, and M4.

2) Provide a separate gas meter and gas piping infrastructure for future sites Provide a separate gas meter and gas piping infrastructure for future site W1.
3) Due to the age of the existing gas line system it is recommended additional testing be conducted and replace as needed.

10. Cost Overview

Sacramento County Rio Cosumnes Correctional Center
Sacramento, CA
Current Infrastructure Deficiencies and Future Expansion Cost Overview
May 1, 2009

Item	Work Description	Quantity	Units	Unit Cost	Priority[1] (A,B,C)	Total Cost Priority A	Total Cost Priority B	Total Cost Priority C	Comments
	PROJECT SUMMARY WITH MARKUPS								
	SITE					$3,251,768	$4,769,470		
	WATER					$2,245,109	$3,951,235		
	FIRE PROTECTION					$1,322,229	$0		
	WASTE WATER					$0	$526,774		
	STORM DRAIN SYSTEMS AND FEMA FLOODPLAIN PROTECTION					$7,091,104	$0		
	ELECTRICAL					$0	$1,599,912		
	TELECOMMUNICATIONS					$0	$1,423,872		
	NATURAL GAS/DIESEL					$0	$539,238		
	PROJECT TOTAL WITH MARKUPS					$13,910,210	$12,810,500		

Notes:
1.0 Priorities are classified as:
A = Current Needs
B = Future Needs
C = Not Used

See Appendix for complete cost estimate.

County of Sacramento

Master Plan Report
for the
Rio Cosumnes Correctional Center

July 6th, 2011

Prepared by:

nacht & lewis ARCHITECTS

600 Q Street, Suite 100
Sacramento, CA 95811
www.nlarch.com

Executive Summary:

The Rio Cosumnes Correctional Center (RCCC) Master Plan Study was commissioned by the County of Sacramento to assess the following with respect to the RCCC Campus:

1. Survey the condition of the existing campus, buildings, and infrastructure and review as-built documentation for key buildings.
2. Review findings of Kitchell report titled "Infrastructure Study-Sacramento County Rio Cosumnes Correctional Center" dated May 15, 2009 as well as the Sacramento County Facilities Master Plan-Adult Correctional Facilities 2002. Analyze inmate population projections.
3. Perform a basic code analysis for each housing unit to determine CSA's board rated capacity relative to when the buildings were constructed. Determine which buildings currently meet disabled accessibility requirements.
4. Update existing site plan.
5. Develop two (2) master plan options, showing the addition of housing units constructed by phase to accommodate inmate population projections.
6. Meet with County and Sheriff representatives to discuss merits of options, discuss pros and cons of each option, select the best option, and address any concerns.
7. Complete final master plan, incorporating recommended changes from County and Sheriff representatives, in a phased approach, documenting the increased rated population at each phase and charting it against inmate population projections.
8. Provide a cost estimate for each phase of the master plan.

It is important to note that this master plan focused primarily on housing and utility infrastructure. Calculating the number of parking stalls and building area for administration, medical, intake, kitchen, laundry, and warehouse storage were not closely examined as part of this report. While the master plan drawings show these, they reflect only estimated quantities and/or areas.

This report is organized in sections corresponding to tasks 1-8 above. However, a summary of findings is listed in the conclusion below.

Conclusion:

It is difficult to project inmate populations due to the changing political and economic landscape. Since the Kitchell report was completed, population growth in Sacramento County has stalled, and therefore projections by Kitchell (which were based heavily on the growth of the County) are no longer accurate. A new Sacramento Criminal Courthouse which should be completed in 2016 will provide more criminal courtrooms which may reduce the average length of stay for inmates in the County. Both of these factors should decrease Kitchell's inmate population projections. However, on April 4th, 2011, Governor Brown signed Assembly Bill 109, which reassigns the responsibility of housing of lower level offenders, adult parolees and juvenile offenders from the State to individual Counties. Over time, AB 109 has the potential to increase inmate populations at RCCC. Therefore, in this report we have provided best and worst case scenarios for inmate population projections. What is unclear, however, is at what rate the population will increase. In either scenario, however, the County must begin to improve the RCCC facility as soon as possible.

Site Plan Redacted

Site Plan Redacted

Site Plan Redacted

Floodplain Definition Correspondence

FW: Rio Cosumnes Correctional Center - 12600 Bruceville Road
Cornelius. Janet<corneliusj@SacCounty.NET>
Bryson. Christopher

Janet Cornelius

916.876.6308

From: Johnson. Michael (MSA)
Sent: Friday, November 04, 2011 10:18 AM
To: Cornelius. Janet
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Minimum finished floors in the green may need to be slightly higher than 21.5 ' (NGVD) because the floodplain becomes higher as it moves east of the blue area. We would need a building location so we can interpolate a floodplain and determine the required minimum finished floor elevation.

From: Cornelius. Janet
Sent: Friday, November 04, 2011 9:23 AM
To: Johnson. Michael (MSA)
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

So, anything built within the green area needs to be at 21.5 ' and the blue at the same? I 've attached the map.

Janet Cornelius

916.876.6308

Floodplain Definition Correspondence

From: Johnson. Michael (MSA)
Sent: Friday, November 04, 2011 9:13 AM
To: Cornelius. Janet
Cc: Stephen Lai
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Hi,

Any FEMA flood zone that starts with an "A " means the area is in a special flood hazard also known as the 100-year floodplain. An "AE " Zone means a 100-year flood elevation has been determined for that flood zone, an "A " Zone means that FEMA has not determined the floodplain elevation. These are the two flood zones at this site. Although FEMA does not specified the A Zone flood elevation the County has determined the floodplain elevation in this area, and uses that information for setting floors. Finished floor need to be at least 1.5 above the 100-year floodplain elevation.

Mike

Michael Johnson

Sacramento County Department of Water Resources

Drainage Development Review/ Hydrology

(916) 874-8646

From: Cornelius. Janet
Sent: Friday, November 04, 2011 8:54 AM
To: Johnson. Michael (MSA)
Subject: FW: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Floodplain Definition Correspondence

What are the flood zone types as designated by A, A99, AE, etc.? Thanks.

Janet Cornelius

Chief, Facility Planning and Management

Department of General Services

County of Sacramento

916.876.6308

From: Lai. Stephen (MSA)
Sent: Friday, November 04, 2011 8:43 AM
To: Cornelius. Janet
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

They are just floodzone designations, I am not quiet sure on the whole history or background of them all, if you would like a detailed explanation I would suggest contacting Michael Johnson at johnsonm@saccounty.net he's the engineer in charge of your area.

From: Cornelius. Janet
Sent: Friday, November 04, 2011 8:41 AM
To: Lai. Stephen (MSA)
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

So, what are the types?

Janet Cornelius

916.876.6308

Floodplain Definition Correspondence

From: Lai. Stephen (MSA)
Sent: Friday, November 04, 2011 8:28 AM
To: Cornelius. Janet
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

oh those are just the floodzone types

From: Cornelius. Janet
Sent: Friday, November 04, 2011 8:28 AM
To: Lai. Stephen (MSA)
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Okay, thanks. What do the codes mean? A, A99, AE, etc.

Janet Cornelius

916.876.6308

From: Lai. Stephen (MSA)
Sent: Friday, November 04, 2011 8:16 AM
To: Cornelius. Janet
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Yes, I sent off a map a few days ago but I assume you never got it? It's attached again, the floodplain elevation for that area is a BFE of 20 feet.

From: Cornelius. Janet
Sent: Friday, November 04, 2011 8:13 AM
To: Lai. Stephen (MSA)
Subject: RE: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Floodplain Definition Correspondence

Any luck finding the elevations?

Janet Cornelius

916.876.6308

From: Booth. George (MSA)
Sent: Wednesday, November 02, 2011 7:57 AM
To: Lai. Stephen (MSA)
Cc: Cornelius. Janet; Johnson. Michael (MSA)
Subject: FW: Rio Cosumnes Correctional Center - 12600 Bruceville Road

Stephen,

Would you please help Janet? Thanks.

G eorge H. B ooth , PE, CFM

Drainage Development, Hydrology, and Floodplain Management

Sacramento County Department of Water Resources

(916) 874-6484

From: Cornelius. Janet
Sent: Tuesday, November 01, 2011 3:55 PM
To: Booth. George (MSA)
Subject: Rio Cosumnes Correctional Center - 12600 Bruceville Road

We are looking for the elevations at RCCC. We know that portions are in the 100 yr flood plain, but need to know actual elevations and what areas are in the flood plain. Do you have a map of this site? Thanks.

Janet Cornelius

Floodplain Definition Correspondence

Chief, Facility Planning and Management

Department of General Services

County of Sacramento

916.876.6308

Site Map Redacted

Image Redacted

Image Redacted

Site Plan Redacted

APPENDIX C

References and Studies

1-MWT Study
2-Flood Photos
3-FIRM 06067C0450H
4-Sacramento County FIS Report

Attorney Client Privileged Prepared at the Direction of Counsel

MCCORMACK-WILLIAMSON TRACT LEVEE MODIFICATION AND HABITAT DEVELOPMENT PROJECT

HYDRAULIC IMPACT ANALYSES

Prepared for
Reclamation District 2110
and
California Department of Water Resources

Prepared by



cbec Project #: 15-1020

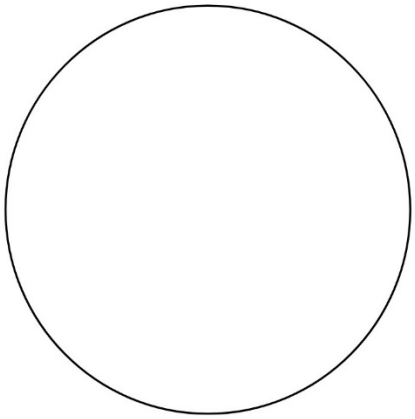
3/29/2024

P.E. CERTIFICATION

This report has been prepared by or under the supervision of the following Registered Engineers. The Registered Civil Engineers attest to the technical information, contained herein, and have judged the qualifications of any technical specialists providing engineering data upon which recommendations, conclusions, and decisions are based.

_____

Sam Diaz, P.E., *cbec eco-engineering*



QC REVIEW

Project	MWT Levee Modification and Habitat Development Project
Project No.	cbec project 15-1020
Subject	Hydraulic Impact Analysis
Review Date	March 2024
Submission Date	3/29/2024

This document and supporting analysis have been reviewed for accuracy and completeness.

_____

Chris Campbell, Director/Ecohydrologist, cbec eco-engineering

1 INTRODUCTION

The McCormack-Williamson Tract (MWT) is located in the northern Delta just downstream of the confluence of the Cosumnes River and the Mokelumne River (**Figure 1**). The approximately 1,500-acre tract has supported agricultural activities since the early 1900's when levees were first established around the tract. Since that time, the tract has had levee failures and has flooded approximately seven times since 1998 (TNC, 2013) and most recently in 2017 and 2023. Emergency levee repairs were completed in summers 2017 and 2023 following the 2017 and 2023 floods; however, the 2023 repairs fortified the breaches from further erosion and did not reclaim the tract via dewatering. To mitigate the flood risk associated with levee failure and to enhance tidal marsh habitat in the Delta, the MWT Levee Modification and Habitat Development Project (Project) was proposed. The Project consists of two phases, with Phase A being completed in 2018, and Phase B to follow. The objectives for Phase A were to construct a ring levee around the radio tower infrastructure located in the northwest corner of the tract to protect said infrastructure and re-slope several interior sections of the MWT levees to provide wind wave protection to the levees and enhance/create associated riparian habitat. The Phase B portion of the Project intended to degrade portions of the East, South (Mokelumne River) and Southwest levees of MWT and perform interior grading to enhance tidal and riparian habitats. However, after the tract was flooded again in the winter of 2023, RD 2110 in coordination with DWR decided to not reclaim the tract. With the tract full of water, the Phase B Project design was revised and limited to the levee degrades.

Following the emergency levee repairs of 2023 and the decision to not reclaim the tract, this represents a new existing condition for subsequent flood and onsite hydrologic assessments. This is referred to as the 2023 baseline condition in this memorandum. As a result of the emergency repairs, MWT remains flooded and is subject to muted tidal action through a breach on the MWT Southwest levee. Since MWT remains inundated, land cover and vegetation conditions have changed to an extent, and the conditions under which the Phase B Project would be implemented have changed, because now water cannot be completely removed from the tract. However, substantial amounts of habitat restoration could still be achieved by modifying the Phase B Project while leaving the tract inundated. The original Phase B Project proposed interior grading of MWT to create tidal channels and tidal marsh, enhance riparian habitat, and complete the remaining levee re-slopes. However, due to the tract being inundated and the difficulty of in-water dredging, the Phase B Project will no longer include interior grading except for limited reuse of levee degrade material to enhance riparian habitat. The current Phase B Project intends to degrade a 900 linear foot section of the East levee to allow flood waters to enter the tract and reduce the backwater effect experienced in Franklin Pond (the area just upstream of I-5 and MWT, **Figure 1**). The Mokelumne River levee will also be degraded approximately 300 linear feet at the current breach site (at the location of the 2017 and 2023 levee failures); this degrade will activate under flood flows but remain disconnected under typical tidal conditions. The final degrade will lower 1,000 linear feet of the MWT Southwest levee (adjacent to Dead Horse Cut) and allow flood water to exit the tract while accommodating tidal fluctuations. More information about the project design is available in Appendix A.

This memorandum serves to explore the changes in flood water surface elevations in and around MWT due to the proposed levee modification and habitat project. The purpose of this report is to demonstrate that the project will have a no-rise impact on the project footprint and its surrounding areas and is

provided in lieu of a Federal Emergency Management Agency (FEMA) Conditional Letter of Map Revision (CLOMR). As part of the Project, a highly detailed coupled one dimensional and two dimensional (1D/2D) HEC-RAS model was developed, using the latest topographic and bathymetric data, and land cover data. This model has been developed over numerous years and has been thoroughly reviewed by third parties including MBK, KSN and Sacramento County, to verify it performs at a high level of accuracy. The model was calibrated to the 2017 flood events and validated with the 1997 flood (cbec, 2020). Model calibration for 2017 resulted in an average RMSE for twelve calibration points of 0.35 ft. The 1997 validation run introduces a slightly higher amount of error with an average RMSE for seven validation points of 0.40 ft (cbec, 2020). This model serves as the most accurate and highly detailed model created for this region to date.

2 FLOOD IMPACT ANALSYSIS

The flood impacts were assessed for the revised Phase B Project relative to the 2023 baseline for the 100-yr design storm based on hydrology developed by David Ford Consulting Engineers using design storm data within the HEC-1 watershed runoff model (David Ford, 2004). The 100-yr design storm has a peak inflow along the Cosumnes River at Michigan bar of about 73,000 cfs, which is only about 5,000 cfs greater than the flood event experienced over the winter of 2023. More details about the model boundary conditions can be found in the *Flood Model Design Options Screening Report* revised by cbec on 1/5/2022 (cbec, 2022; Appendix B).

The revised Phase B Project was screened against the updated 2023 baseline condition to better understand how the inundation pattern of the study area may be altered due to the Project. A series of index points were developed to query the model results at important locations within the study area. **Figure 1** denotes the model index point locations. The index points were used to sample and compare water surface elevation (WSE) results for 2023 baseline and the Project as well as Federal Emergency Management Agency (FEMA) effective base flood elevation (BFE) values for reference. **Table 1** depicts the tabular results of the 100-year flood water surface elevations.

Simulated WSEs under the Project are lower than the 2023 baseline conditions and provide flood mitigation throughout the study area (**Table 1**). The WSEs are predicted to be over 1 foot lower upstream of I-5/ Franklin Pond. The majority of the study area is expected to experience a 100-yr WSE decrease between 0.1 and 0.6 feet. These typical WSE reductions are accompanied by reduced flooding of Dead Horse Island as well as reductions greater than 1 foot upstream of Interstate 5 and Franklin Pond (per the Benson Ferry index point). With the Project showing lower WSEs at all index points, hydraulic modeling demonstrates that the Project causes no rise in WSE and provides a substantial flood benefit to the areas upstream and downstream of the Project.

Baseline conditions were also compared to the effective FEMA BFE values for the counties of Sacramento and San Joaquin (FEMA, 2016; FEMA, 2024). The current updated model is calculating 100-yr WSEs that are higher than the current effective BFE values in the downstream extent of the model (**Table 1**). In Section 3, for reference only, we will outline potential reasons for this discrepancy.

Table 1. 100-yr water surface elevations

Location	FIRM Effective BFE	2023 Baseline WSE	2023 Minus FIRM Condition	Project Condition WSE	Project Minus 2023 Condition
Bensons Ferry	22.00	20.66	-1.34	19.54	-1.30
Beach Lake	18.00	16.47	-1.53	16.27	-0.25
Point Pleasant North	18.00	16.31	-1.69	16.09	-0.28
Point Pleasant South	18.00	16.28	-1.72	16.06	-0.28
Lambert Road Upstream (Stone Lake)	18.00	16.31	-1.69	16.09	-0.28
Snodgrass Slough at Lambert Road	18.00	16.34	-1.66	16.11	-0.28
Snodgrass Slough at Twin Cities Rd	18.00	17.57	-0.43	17.05	-0.59
Snodgrass Slough at DCC	17.00	17.52	0.52	16.99	-0.58
Dead Horse Island	17.00	15.38	-1.62	1.48	-13.99
South Fork Mokelumne at New Hope Bridge	17.00	17.08	0.08	16.67	-0.35
South Fork Mokelumne at Beaver Slough	12.00	12.60	0.60	12.34	-0.21
South Fork Mokelumne at Hog Slough	10.00	10.34	0.34	10.22	-0.10
North Fork Mokelumne at New Hope Road	14.00	16.23	2.23	15.86	-0.39
North Fork Mokelumne at latitude of Beaver Sl.	11.30	13.50	2.20	13.24	-0.29
North Fork Mokelumne at latitude of Hog Sl.	10.00	11.60	1.60	11.43	-0.18

All elevations reference NAVD88 feet.

3 100-YR FEMA BFE DIFFERENCE RESULTS

The calibrated MWT flood model estimates WSEs close to 2 feet higher than the effective BFE values in the North Fork of the Mokelumne River and less than a foot higher in the South Fork of the Mokelumne and Snodgrass Slough (**Table 1**). The discussion below describes how model assumptions, topographic differences, and hydrology may contribute to these differences.

3.1 MODEL ASSUMPTIONS

Hydraulic models can be sensitive to model parameterization and two different model platforms may lead to different results for relatively similar model configurations. Limited information is available to detail the model assumptions applied in the calculation of the 100-yr BFEs. Additionally, the FEMA FIS occasionally lacks information critical to the modeling, such as bathymetric information for the North Fork of the Mokelumne River (FEMA, 2016, p71). Furthermore, little information is given about the modeling platforms used for this analysis. The FEMA FIS shows missing or unknown data sources for the Hydraulic Modeling and Methods used (FEMA, 2016 Table 13; FEMA, 2024, Table 12).

Levee breaches are common in the North Delta under large flood events, and it is anticipated that levees would fail in and around the proposed project area based on historical lines of evidence. Catastrophic levee failures were observed surrounding MWT during the 1997 flood event (MBK, 2003). The rapid filling of MWT from breaching of the east levee, and subsequent breaching of the lower end of the tract sent a surge of water downstream. Aerial photographs were collected on January 3rd and 4th, during and just after peak stages, and serve as the best source for breach location information. In the calibrated MWT flood model, three levee breach assumptions are utilized and are based on the locations of the breaches identified from previous flood events. Both the East and Southwest levees are set to fail in the calibrated MWT flood model as well as the Dead Horse Island Levee. These levees have been known to historically breach and were similar to breaches observed in 1986 and 1997.

However, this analysis does not include the assumption that all non-federally accredited levees would fail. For example, the Delta Island levees downstream of MWT (i.e., Staten and Tyler) were likely assumed to have failed in the effective 100-yr BFEs, but in this analysis are assumed to be intact due to a lack of a levee overtopping failure mechanism. Further, the effective 100-yr BFEs assume the Sacramento River levee was in a non-failure mode because it was accredited at the time of the effective BFEs, but in present day, it is not accredited and therefore would be assumed to fail under a traditional CLOMR analysis. As such, the preparation of a CLOMR would go beyond simulating the effects of just the Project and would include other system-wide deficiencies beyond the purview of the Project. Hence the simplicity of the no-rise analysis comparing the Project to the 2023 baseline.

3.2 TOPOGRAPHY

The calibrated MWT flood model, developed to support the Project, has been updated to include the most recent topographic and bathymetric data sources. Multibeam sonar data was collected around MWT and the adjacent areas around 2016 and was incorporated into the model with LiDAR data from 2017 and 2008 (cbec, 2020). The inclusion of recent, detailed topographic data for all channels included in the current baseline model domain allows for accurate WSE calculations. It is unknown what data sources were incorporated into the 100-yr BFE model runs. The flood profiles shown in the FEMA FIS include limited detail in many reaches, and in some cases large river segments use only one elevation, suggesting that FEMA BFE model relies on estimated or incomplete bathymetry (FEMA, 2024, p143). Deposition and scour within the channels of the project area can lead to significant differences in water surface elevations.

3.3 HYDROLOGY

The last variable which may explain the differences between the effective BFE values and the calibrated MWT flood model, is hydrology. Limited information is presented in the FEMA FIS to understand how the discharge and stage values used in the model were calculated or selected. The flood analysis undertaken for the MWT project relied on hydrology calculated by David Ford Consulting Engineers using design storm data within the HEC-1 watershed runoff model (David Ford, 2004). The David Ford simulations developed an unsteady, time varying hydrograph, which included many smaller and gradually larger storm peaks, leading to the peak flow of the 100-yr storm. It is assumed that the FEMA BFE values were calculated using a steady state flow model. Significant differences can be experienced when comparing these two

methods, as the steady state solutions do not consider in-channel and floodplain attenuation and may not accurately represent very complex flood characteristics.

We intended to characterize the peak flows used between the two models, however model inflow locations, flow routing, and the methods for flow accounting vary between the models and an effort to create a direct comparison proved infeasible. A general comparison of model inflow at the main upstream tributaries (Cosumnes River, Dry Creek, Mokelumne River and Morrison Creek) appears to be relatively consistent, however, obtaining the FEMA BFE model would be required for more detailed review and comparison, as many tributaries enter the system and complicate a direct model comparison.

4 CONCLUSIONS

The calibrated MWT flood model is the most accurate and detailed modeling conducted in this region to date and should be used to evaluate whether the MWT Phase B Project would have any adverse flood impacts. Under the 100-yr flood, the Project will provide flood risk reduction to the system as a whole with typical WSE reductions up to 0.6 ft accompanied by more significant reductions greater than 1 foot within Franklin Pond. However, when compared to the FEMA effective BFE's, the 2023 baseline estimates higher WSEs in the North and South Forks of the Mokelumne River. It is proposed that these differences are explained due to the differences in the model parameterizations (e.g. levee breach assumptions), topographic differences, and hydrology, which under a conventional approach would be addressed during a CLOMR process. However, a CLOMR is not being prepared, and this approach is justified because this study indicated that the hydraulic effects of the Project relative to 2023 baseline conditions result in no-rise in WSEs. As such, we recommend that the no-rise analysis utilize the results of the 2023 baseline model, which is the most recent and most appropriate calibrated model.

5 REFERENCES

cbec. 2020. McCormack-Williamson Tract Levee Modification and Habitat Development Project - Flood Model Calibration and Validation Report. October 2020.

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Site Map Redacted

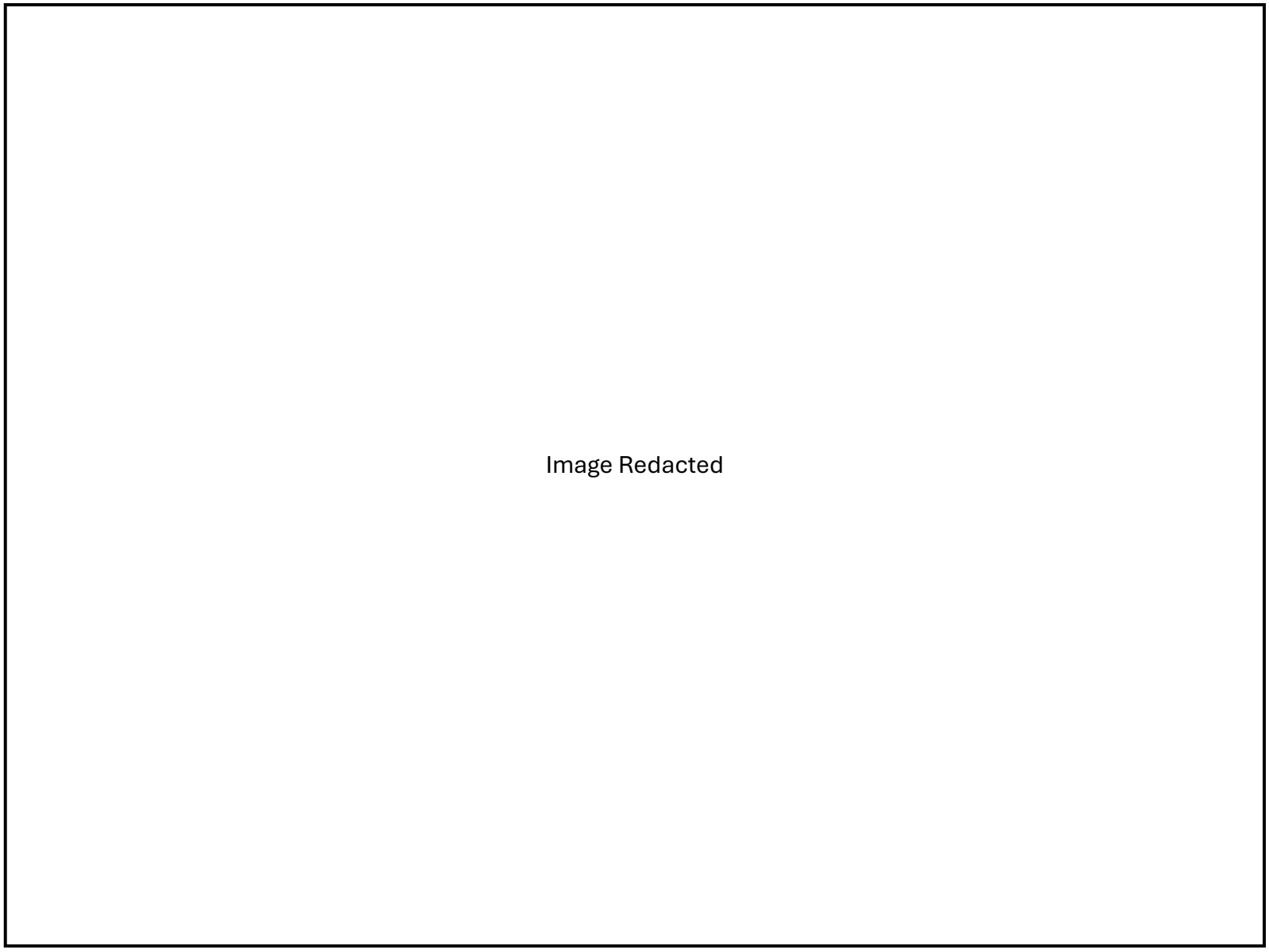
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FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 4



SACRAMENTO COUNTY, CALIFORNIA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CITRUS HEIGHTS, CITY OF	060765
ELK GROVE, CITY OF	060767
FOLSOM, CITY OF	060263
GALT, CITY OF	060264
ISLETON, CITY OF	060265
RANCHO CORDOVA, CITY OF	060772
SACRAMENTO, CITY OF	060266
SACRAMENTO COUNTY UNINCORPORATED AREAS	060262

FEMA

REVISED:

FEBRUARY 22, 2024

FLOOD INSURANCE STUDY NUMBER
06067CV001E

Version Number 2.6.5.6

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Carmichael Creek	032-033	P
Chicken Ranch Slough	034-037	P
Cosumnes River	038	P
Cosumnes River Above Dillard Road	039-046	P
Cosumnes River Above State Highway 99	047-053	P
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Published Separately

Flood Insurance Rate Map (FIRM)

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Chicken Ranch Slough	City of Sacramento, Sacramento County	American River Pumping Plant	Walnut Ave	18020111	7.9	*	Y	AE	*
Cosumnes River	SacramentoCounty	Confluence with North Fork Mokelumne River	State Highway 99	18040012, 18040013	1.8	*	N	A	*
Cosumnes River Above Dillard Road	Sacramento County	Approximately 400 feet upstream of Dillard Road	Just upstream of the eastern Sacramento County border	18040013	9.8	*	Y	AE	2010
Cosumnes River Above State Highway 99	Sacramento County	State Highway 99	0.13 miles upstream of Dillard Road	18040013	15.5	*	N	A, AE	*
Cosumnes River Overflow North of Lambert Road	Sacramento County	Union Pacific Railroad	Lambert Road	18040012	3.2	*	N	AE	*
Coyle Creek	City of Citrus Heights, Sacramento County	Confluence with Brooktree Creek	Madison Avenue	18020111	1.8	*	Y	AE	*
Cripple Creek	Citrus Heights, City of	Confluence with Arcade Creek	Approximately 1300 feet upstream of Antelope Road	18020111	3.4	*	Y	AE	2021
Cripple Creek	City of Citrus Heights, Sacramento County	Approximately 1300 feet upstream of Antelope Road	Hickory Avenue	18020111	7.4	*	Y	AE	*

*Data Not Available

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharges (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
American River	At mouth	*	*	*	*	157,000	*
	Just Upstream of confluence with the Natomas Main Drainage East Channel	*	*	*	*	145,000	*
	At Greenback Lane	2,100	115,000	*	115,000	115,000	425,000
	At Nimbus Dam	1,890	*	*	*	180,000	*
Arcade Creek	*	40.0	2,900	*	4,280	5,000	6,750
		33.0	2,800	*	4,100	4,700	6,250
	At Interstate 80 Business Loop	31.7	3,050	*	3,870	4,130	4,860
	Downstream of Greenback Lane	18.3	2,440	*	3,210	3,470	4,260
	Upstream of the confluence of Cripple Creek	8.6	1,260	*	1,700	1,840	2,230
Arcade Creek South Branch	*	26.0	350	*	740	950	1,440
	At Hoffman Lane West	1.3	320	*	640	840	1,120
Brooktree Creek	*	3.5	540	*	1,200	1,540	2,320
Carmichael Creek	*	32.0	362	*	837	1,045	1,650
Chicken Ranch Slough	*	41.3	550	*	860	1,030	1,380
Cosumnes River	At Twin Cities Road (Route 104)	820	*	*	*	70,600	*

*Data Not Available

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharges (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Linda Creek South Branch (continued)	Just upstream of Linda Creek confluence	*	756	*	1,085	1,221	1,584
Lower MagpieCreek	*	4.5	460	*	950	1,150	1,860
Magpie Creek	At Southern Pacific Railroad	2.5	614	*	663	687	739
	At Bailey Loop	2.7	705	*	804	847	906
	Approximately 950 feet downstream of Patrol Road	3.7	716	*	823	867	969
Magpie Creek Diversion	*	9.0	750	*	1,500	1,880	2,400
Mariposa Creek	*	2.2	260	*	510	650	1,030
Mokelumne River	Downstream of Dry Creek	1,000	*	*	*	28,200	*
Morrison Creek	At Interstate Highway 5	131.9	*	*	*	7,890	*
	At Sacramento River	110.7	4,280	*	6,635	7,410	11,025[1]
	At Western Pacific Railroad	67.5	3,450	*	4,845	5,315	6,415[1]
	Downstream of State Highway 99	43.4	2,340	*	3,155	3,395	4,235[1]
	At Southern Pacific Railroad	30.9	1,375	*	1,510	1,555	1,960[1]

[1]Basin 0.2-percent annual chance flow does not include American River 0.2-percent annual change overflow
*Data Not Available

Table 9: Summary of Discharges (continued)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharges (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Natomas North Drainage Canal	*	2.5	720	*	1,500	1,900	2,960
Natomas West Drainage Canal	*	27.5	125	*	225	270	370
North Fork Laguna Creek	At Laguna Creek	1.5	155	*	180	195	235
	At Bruceville Road	0.3	61	*	92	106	137
Robla Creek	*	17.0[3]	720[3]	*	2,700[3]	2,900[3]	7,000[3]
Sacramento River	At I Street	23,500	*	*	*	120,000	*
San Juan Creek	*	2.3	330	*	650	920	*
Sierra Creek	*	3.0	190	*	340	430	730
Strawberry Creek	At Unionhouse Creek	4.37	430	*	590	655	955
Strong Ranch Slough	*	9.0	1,190	*	1,970	2,390	3,425
Unionhouse Creek	Morrison Creek	11.47	975	*	1,420	1,560	2,410
	Strawberry Creek	8.43	830	*	1,125	1,255	2,020
	State Highway 99	4.06	420	*	600	675	1,265
	Southern Pacific Railroad	2.67	325	*	535	615	1,105

[3]Excluding overflow
*Data Not Available

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Arcade Creek	Approximately 50 feet upstream of Sunrise Boulevard	Greenback Lane	*	*	*	AE w/ Floodway	
Arcade Creek South Branch	Confluence with Arcade Creek	Approximately 190 feet downstream of Manana Way	*	*	*	AE w/ Floodway	
Arcade Creek South Branch	Approximately 190 feet downstream of Manana Way	Approximately 120 feet downstream of Ritz Way	HEC-1	HEC-RAS	12/28/2020	AE w/ Floodway	
Arcade Creek South Branch	Approximately 120 feet downstream of Ritz Way	Illinois Avenue	*	*	*	AE w/ Floodway	
Brooktree Creek	Confluence with Arcade Creek	San Juan Avenue	*	*	*	AE w/ Floodway	
Carmichael Creek	Confluence with American River	Fair Oaks Boulevard	*	*	*	AE w/ Floodway	
Chicken Ranch Slough	American River Pumping Plant	Walnut Avenue	*	*	*	AE w/ Floodway	Floodways determined by volumetric method. Because the discharge is pumped, volume is kept constant to ensure that there is not more than a 1.0 rise in BFEs within the floodway.
Cosumnes River	Confluence with North Fork Mokelumne River	State Highway 99	HEC-1	HEC-2, NETWORK	February 1995	A	
Cosumnes River Above Dillard Road	Approximately 400 feet upstream of Dillard Road	Just upstream of the eastern Sacramento County border	*	HEC-RAS	March 2010	AE w/ Floodway	
Cosumnes River Above State Highway 99	State Highway99	0.13 miles above DillardRoad	*	*	*	A, AE	

*Data Not Available

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Mather Field Main Drain Tributary	Confluence with Mather Field Main Drain	0.3 miles upstream of Mather Boulevard	*	*	*	AE w/ Floodway	
Mather Field West Drain	Confluence with Mather Field Main Drain	0.08 miles upstream of Macready Avenue	*	*	*	AE w/ Floodway	
Mather Lake Tributary	Confluence with Morrison Creek	Eagles NestRoad	*	*	*	AE w/ Floodway	
Mokelumne River	County Boundary	New Hope Road	HEC Regional Frequency program	HEC-2, NETWORK	*	AE	
Morrison Creek	Confluence with Sacramento River	1.6 miles upstream of Eagles NestRoad	HEC-1	HEC-2, NETWORK	February 1995	A, AE w/ Floodway	
Morrison Creek Right Overbank	Confluence with Morrison Creek	*	HEC-1	*	February 1995	A	

*Data Not Available