



**US Army Corps
of Engineers**®
Los Angeles District



SANTA ANA RIVER 3 LEVEE SYSTEM

ORANGE COUNTY, CALIFORNIA
NLD SYSTEM ID # 3805010015

PERIODIC INSPECTION REPORT NO 1 **GENERALIZED EXECUTIVE SUMMARY**

FINAL SYSTEM RATING: MINIMALLY ACCEPTABLE
FINAL RATING DATE: 26 JAN 2015

PERIODIC INSPECTION REPORT PREPARED BY TETRA TECH
FOR THE U.S. ARMY CORPS OF ENGINEERS, LOS ANGELES DISTRICT

SUBMITTED: NOVEMBER 2014
INSPECTED: JUNE 19 AND DECEMBER 16-18, 2013

EXECUTIVE SUMMARY

This Executive Summary provides an introduction to the periodic inspection (PI), an overview of the Santa Ana River 3 (SAR3) Levee System, a summary of the major findings of the periodic inspection, and the overall rating for the system.

1.1 Scope and Purpose of Periodic Inspections

The purpose of the SAR3 Levee System periodic inspection is to identify deficiencies that pose hazards to human life or property. The inspection is intended to identify the issues in order to facilitate future studies and associated repairs, as appropriate.

This assessment of the general condition of the SAR3 Levee System is based on available data and visual inspections. Detailed investigation and analysis involving hydrologic design, topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of this SAR3 Levee System periodic inspection.

1.2 System Summary

The SAR3 Levee System is located on the left/east bank of the Santa Ana River and on the left/east and right/west banks of the Greenville-Banning Channel (GB Channel) in the state of California, in Orange County, in the cities of Santa Ana and Costa Mesa. The SAR3 Levee System was federally authorized and subsequently constructed by the U.S. Army Corps of Engineers, Los Angeles District (USACE LAD). Construction of the SAR3 Levee System was completed in September 1995 (USACE LAD 1996). The SAR3 Levee System is now entirely operated and maintained by the Orange County Flood Control District (OCFCD), which is administered by Orange County Public Works (OCPW) staff. OCPW staff was present at the periodic inspection. The National Levee Database Number (NLD No.) for the SAR3 Levee System is 3805010015. The SAR3 Levee System is composed of two levee segments: (1) the Santa Ana River 3 Levee Segment (i.e., the SAR3 Levee Segment), and (2) the Greenville-Banning Levee Segment (i.e., the GB Levee Segment). It should be noted that the SAR3 Levee System is currently listed in the NLD as one system/segment. It is recommended that the NLD be revised to include the two separate levee segments (i.e., SAR3 Levee Segment and GB Levee Segment). The SAR3 Levee System has an earthen embankment; a riverward slope armored with either grouted riprap, riprap, or reinforced concrete; an invert with either no lining, reinforced concrete lining, or derrick-stone lining; side-drainage structures; side-drain junction structures; utility crossings; bridge crossings; and access ramps.

The portion of the SAR3 Levee Segment along the Santa Ana River extends from the confluence of the Santa Ana River with Santiago Creek to Victoria Street, a distance of 48,098 feet (9.11 miles). The lower reach of the SAR3 Levee Segment consists of the left/east bank of the Santa Ana River and the right/west bank of the GB Channel. The portion of the SAR3 Levee Segment that coincides with the GB Channel extends from where the GB Channel begins to parallel the Santa Ana River to Victoria Street, a distance of 15,190 feet (2.88 miles).

The GB Levee Segment forms the left/east bank of the GB Channel, and extends from where the leveed condition begins along the left/east bank of the GB Channel to Victoria Street, a distance

of 13,990 feet (2.63 miles). Previous to the construction of the Santa Ana River Project, GB Channel also ran parallel to the Santa Ana River, but discharged directly into the Pacific Ocean (USACE LAD 1988b). As part of the Santa Ana River Project, the GB Channel was redesigned to discharge into the Santa Ana River just downstream from the Hamilton-Victoria Avenue. GB Channel runs parallel to the Santa Ana River instead of entering into the Santa Ana River further upstream to maintain the interior drainage along the GB Channel, which has a lower invert elevation compared to the Santa Ana River along most of the reach.

A location map of the levee system is shown on Figure 1.

1.3 Summary of Major Deficiencies Found

The periodic inspection of the SAR3 Levee System was conducted on June 19, 2013 and December 16-18, 2013, and OCPW staff was present. During the periodic inspection of the levee system, deficiencies were noted for which remedial actions are required. The following main deficiencies of the project features were noted during the periodic inspection:

- SAR3 Levee Segment:
 - o Levee Embankment:
 - Non-Compliant Vegetation Growth: Significant vegetation growth including trees with trunks larger than 2-inches in diameter, shrubs, large rocks, and an irrigation system were present within the vegetation-free zone. The vegetation-free zone extends 15 feet outward from both the landward and riverward toes of the levee. Except for along Riverview Golf Course, the vegetation was planted as part of the landscape drawings (USACE LAD 1993b, 2002, and Unknown Date).
 - Depressions/Rutting: A depression measuring 7 inches in depth was observed in the asphalt pavement on the levee crown of the GB Channel behind the channel wall panel.
 - Underseepage Relief Wells/Toe Drainage Systems: Records provided by OCPW indicate the vaults associated with the subdrainage system at the toes of the concrete lined channels were cleaned once every 5 years. OCPW is in the process of cleaning the subdrain system, including the subdrain pipes and vaults (OCPW 2014).
 - Seepage: There was a significant amount of seepage coming into the channel through the joint of two adjacent side panels of the reinforced-concrete low-flow-channel at one location. Seepage through the joints could create voids behind the concrete panels damaging the integrity of those panels; however, none were detected during subsequent geotechnical investigations conducted on the behalf of OCPW (GMU 2014). The seepage may be a result of a cutoff wall at this location that was left in- place due to construction phasing.

- o Floodwalls:
 - Non-Compliant Vegetation Growth: Vines were observed growing on the reinforced-concrete retaining walls. The trunk diameters of some of the vines exceeded 2 inches. were present within the vegetation-free zone. The vines observed were consistent with what is shown on the landscape drawings (USACE LAD Unknown Date).
- o Interior Drainage System:
 - Vegetation and Obstructions: Vegetation, sediment, and/or debris were obstructing more than 10 percent of the inlet and/or outlet of three side-drainage structures.
 - Encroachments: There was a 6-inch-diameter steel water line located inside a 24-inch-diameter reinforced concrete pipe (RCP) side-drainage structure. The water line is not shown on the construction drawings and no permits were available from the USACE LAD.
 - Culverts/Discharge Pipes: A video inspection was not available for one of the side-drain junction structures.
 - Flap Gates: A flap gate shown on the construction drawings was missing from the outlet of a side-drainage structure.
- o Flood Damage Reduction Channel:
 - Foundation of Concrete Structures: The foundation soils were eroded beneath the top of the reinforced-concrete slope paving on the riverward slope. The void below the concrete slope paving extended approximately 2 feet in depth.
- GB Levee Segment:
 - o Levee Embankment:
 - Non-Compliant Vegetation Growth: Significant vegetation growth including trees with trunks larger than 2-inches in diameter, shrubs, large rocks, and an irrigation system were present within the vegetation-free zone. The vegetation-free zone extends 15 feet outward from both the landward and riverward toes of the levee.
 - Underseepage Relief Wells/Toe Drainage Systems: The subdrainage system was observed to be in good condition; however, no records were provided by OCPW indicating subdrains are cleaned a minimum of once every 3 years per OMRRR manual and 5 years per the check-list.
 - o Interior Drainage System:
 - Encroachments: One of the side-drain junction structures was abandoned and blocked with plywood 7 feet inside the pipe from the outlet per the video inspection. Another side-drain junction structure was filled with sediment near the outlet. The abandonment of the pipes is not shown on the construction drawings (USACE LAD 1991) and no permits are available from the USACE LAD. OCPW subsequently removed the flap gates from the outlet of the pipes and pressure grouted the inside of the pipes flush with the outlet surfaces.

- Culverts/DischargePipes: An 18-inch-diameter RCP side-drain junction structure was only partially video inspected; the video inspection was stopped 2 feet into the pipe because of an obstruction.

1.4 Overall Rating

The Levee Safety Out-Brief Meeting was held on April 2, 2014. An engineering determination has concluded that the observed deficiencies would not prevent the system from performing as intended during the next significant runoff event. Therefore, the Levee Safety Officer, Los Angeles District, has determined the overall system rating to be “Minimally Acceptable.”

A “Minimally Acceptable” system rating is where one or more items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable items would not prevent the segment / system from performing as intended during the next significant runoff event.

The local sponsor will be notified of the overall rating of the levee system by letter with instructions to correct the Unacceptable rated items immediately, and to correct the Minimally Acceptable rated items within two years so that they do not deteriorate further and become Unacceptable.

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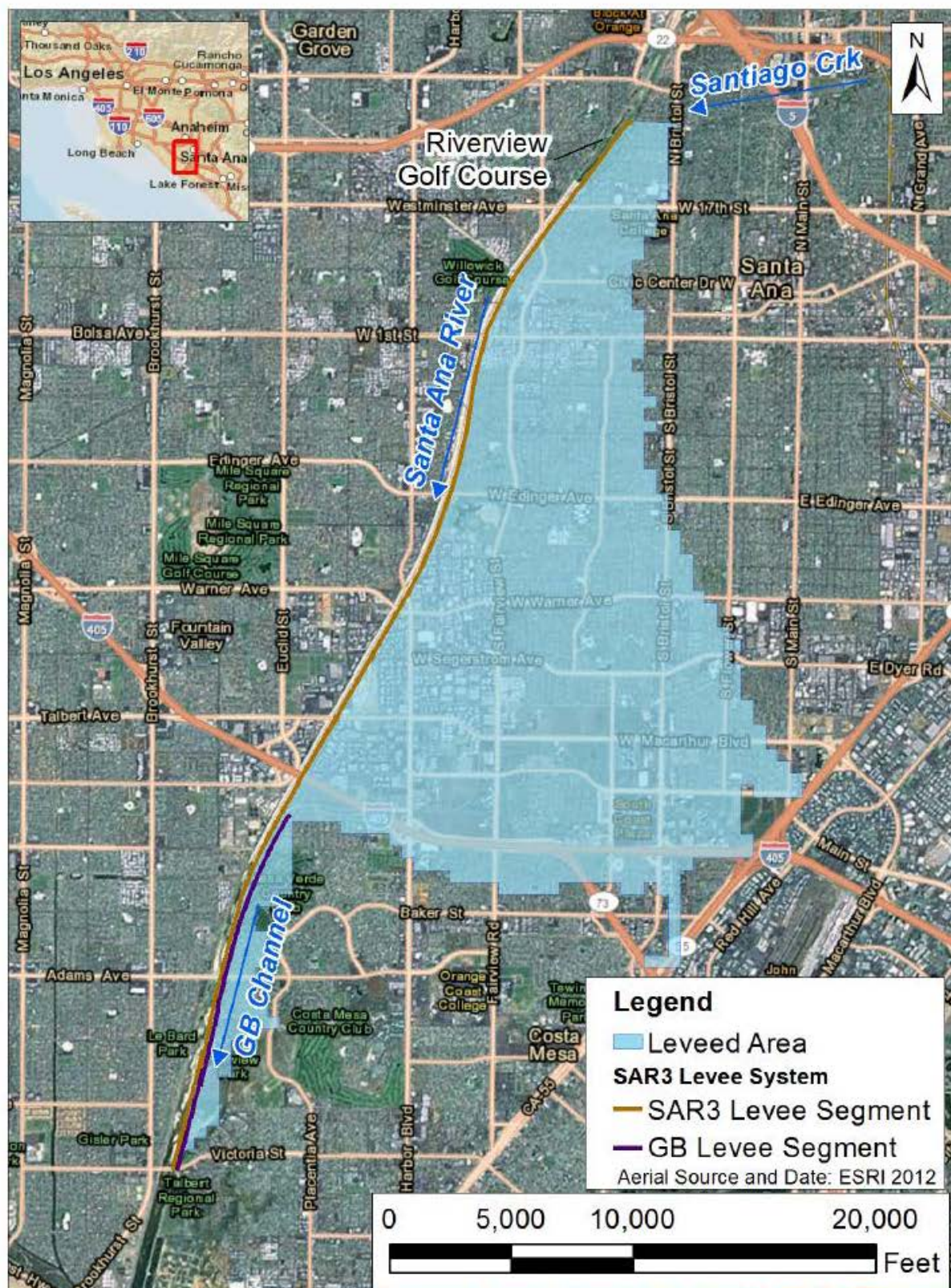


Figure 1: Santa Ana River 3 Levee System