CR&R
INCORPORATED
environmental services
the face of a greener generation

CR&R Anaerobic Digestion Facility
Regional Organics Recycling - 335,000 TPY

An Organics Solution for Today's Environment

CR&R MATERIALS MANAGEMENT INFRASTRUCTURE

- 50 Municipal Contracts
- 14 Anaerobic Digestion Contracts
- 12 Processing Contracts
- 900 Trucks (400 are Natural Gas)
- Transitioning Fleet to Renewable Natural Gas
- 1,500 Employees
- 2.5 Million Customers Served
- 10 Solid Waste Service Centers
- 6 Transfer Stations / MRFs
- 2 Landfills
- 12 Haulaway Service Centers

ANAEROBIC DIGESTION TECHNOLOGY

EISENMANN

BIOGAS UPGRADING TECHNOLOGY

BIOGAS Greenlane

CONSTRUCTION MANAGEMENT

Lyles CONSTRUCTION GROUP

RENEWABLE NATURAL GAS DISTRIBUTION

Southern California Gas Company®

PROJECT ENGINEER

JRM &A ARCHITECTS ENGINEERS PLANNERS

EVOLUTION OF SOLID WASTE MANAGEMENT 2010's

Material Recovery Facility - MRF

Organics Receiving Facility - ORF

Anaerobic Digestion Facility - ADF

Recyclables

Organics

Trash

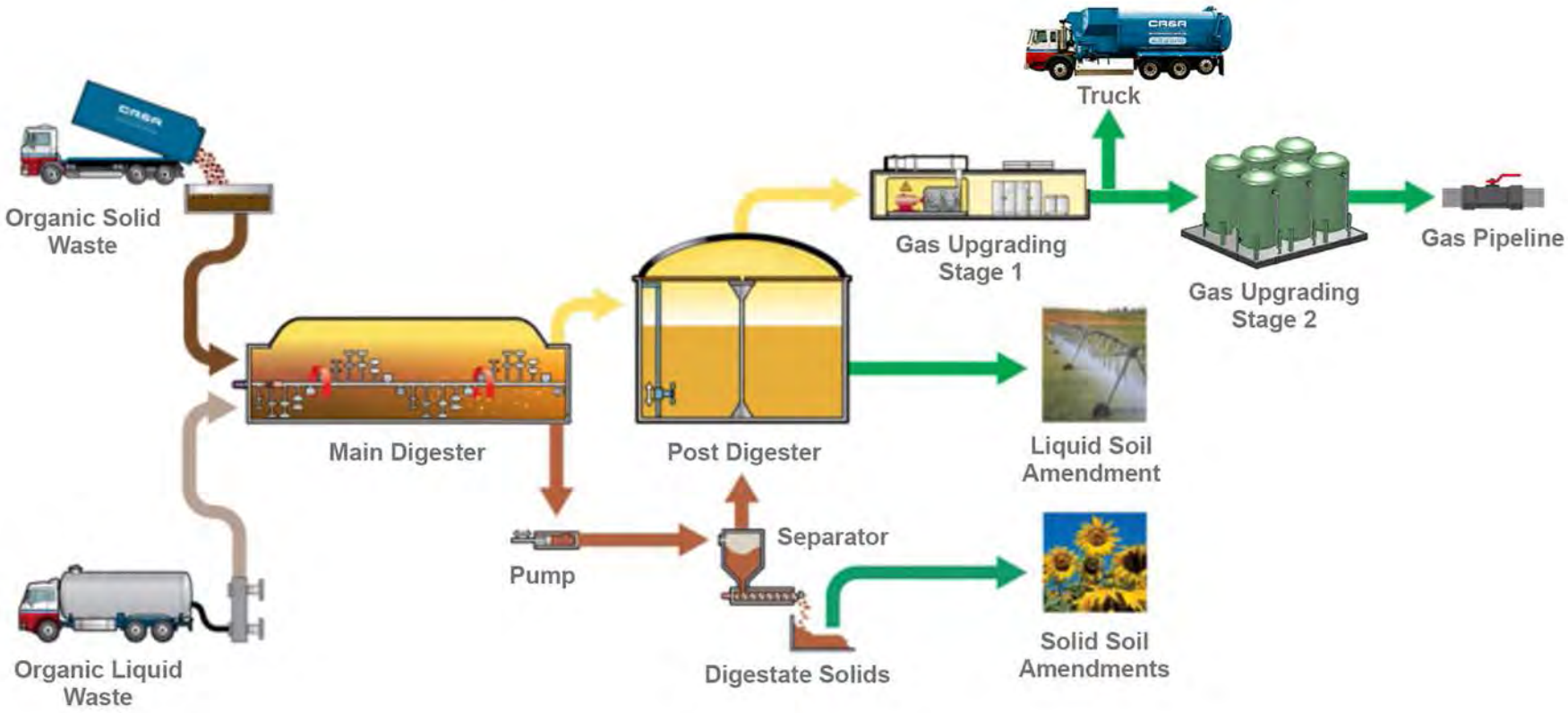
Residual

Recyclables

Renewable Natural Gas

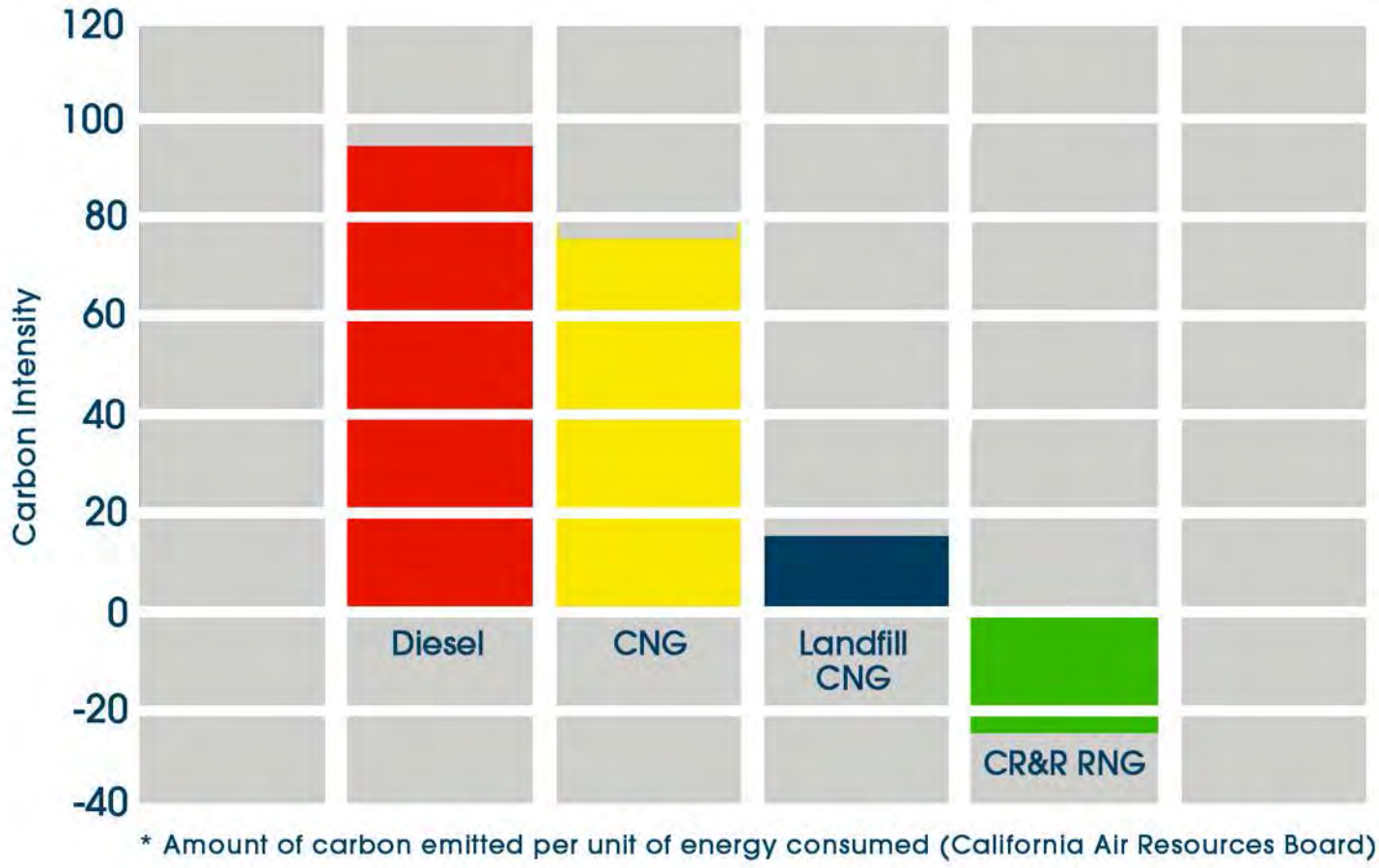
Fertilizer

ANAEROBIC DIGESTION - FLOW CHART



ANAEROBIC DIGESTION FACILITY

CARBON INTENSITY



* Amount of carbon emitted per unit of energy consumed (California Air Resources Board)

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The most cost effective, environmentally intelligent, and sustainable organics management program

Michael Silva, Project Director
MichaelS@CRRMail.com

CR&R Project Site
CUP 3741
Drainage Overview

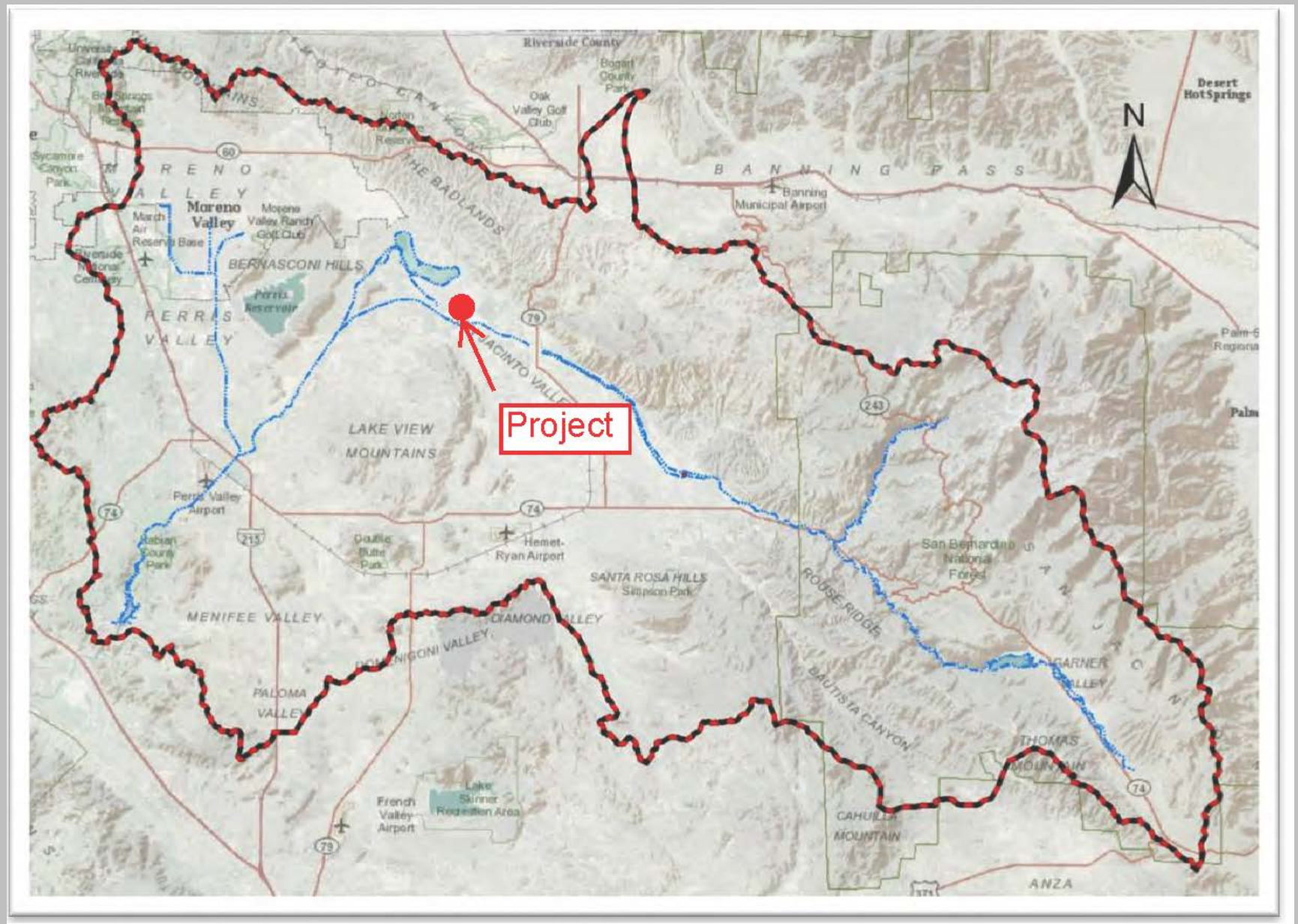


Figure 1-1 – San Jacinto River Watershed Tributary to Canyon Lake

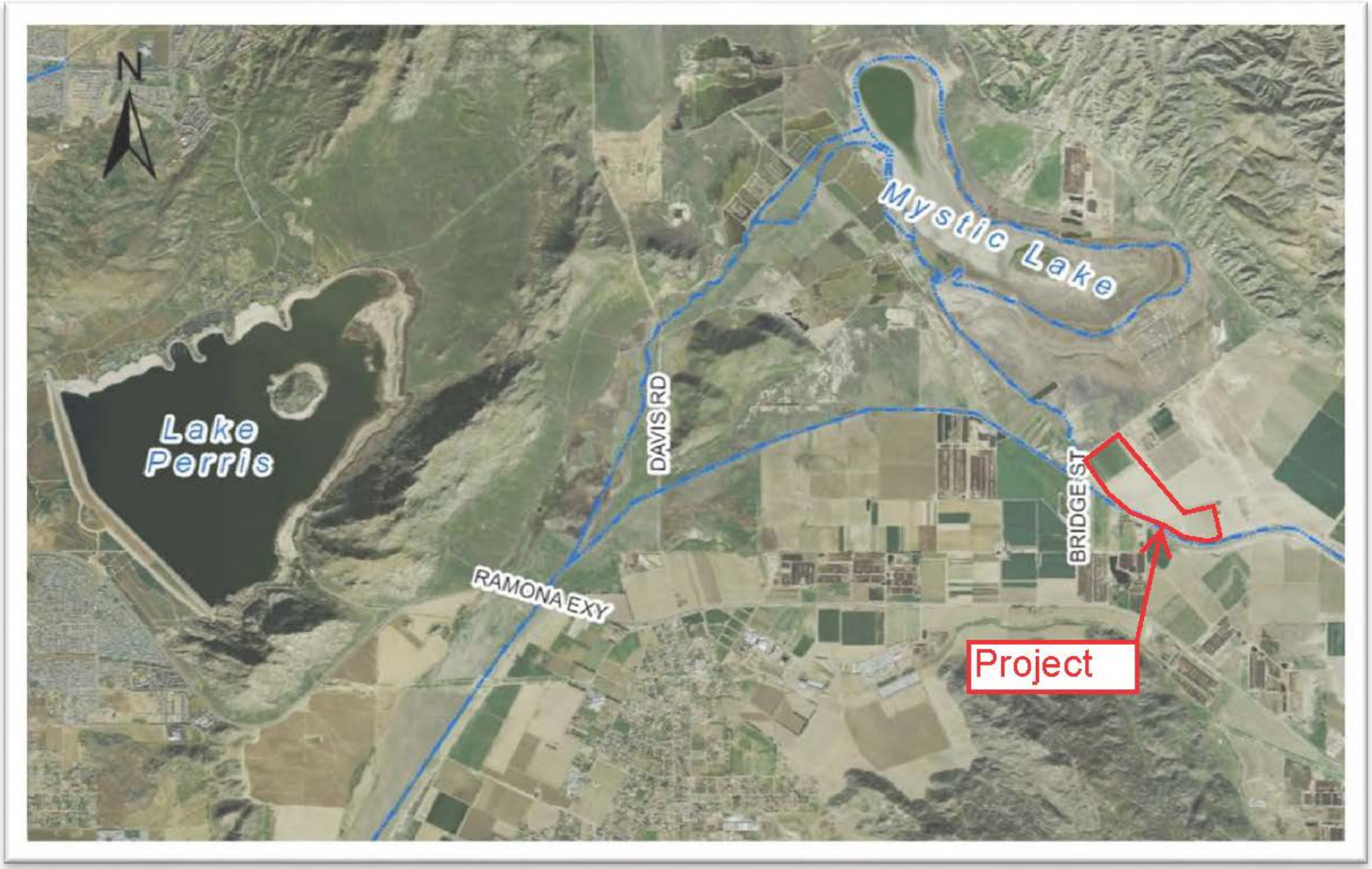
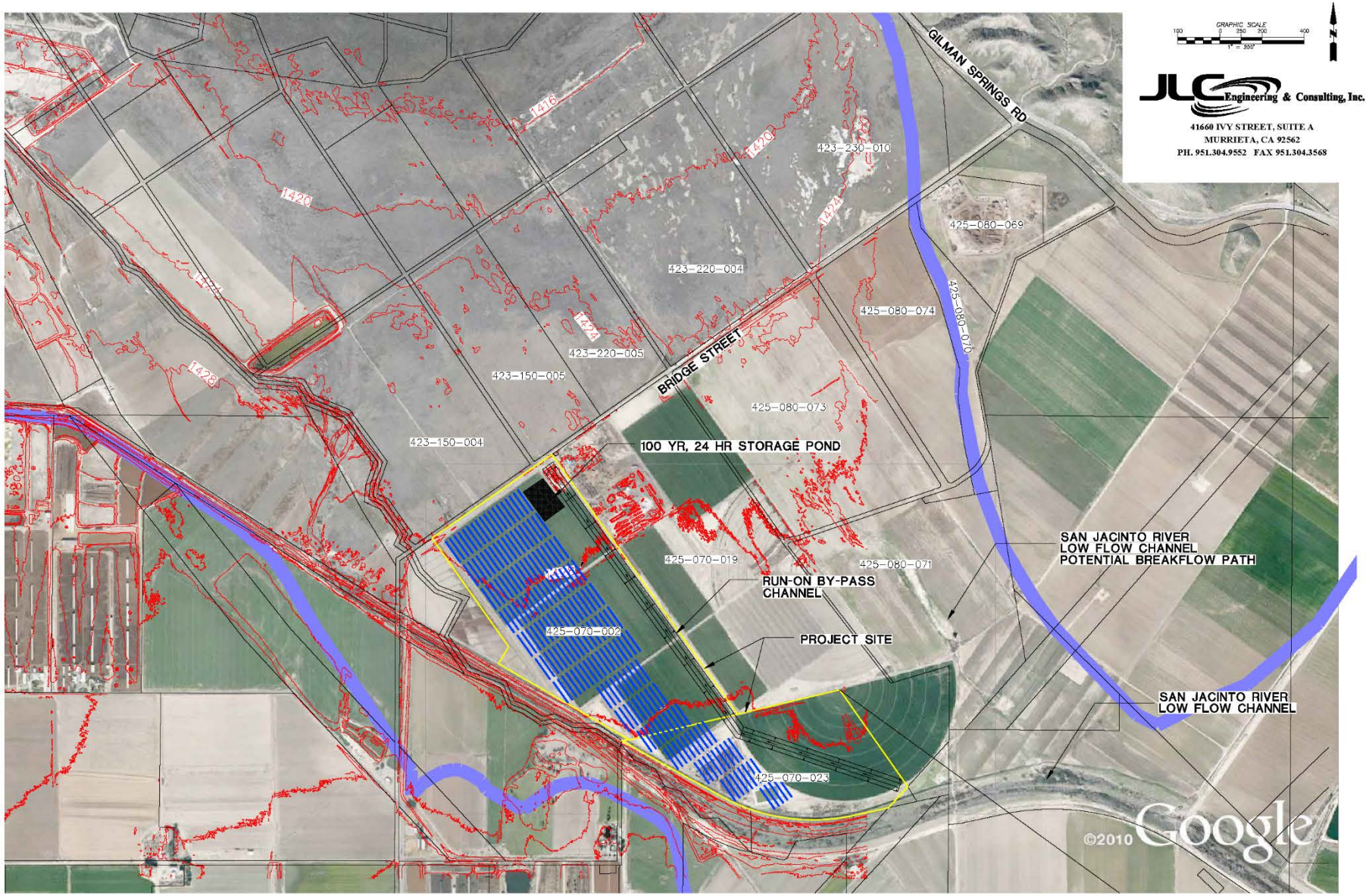
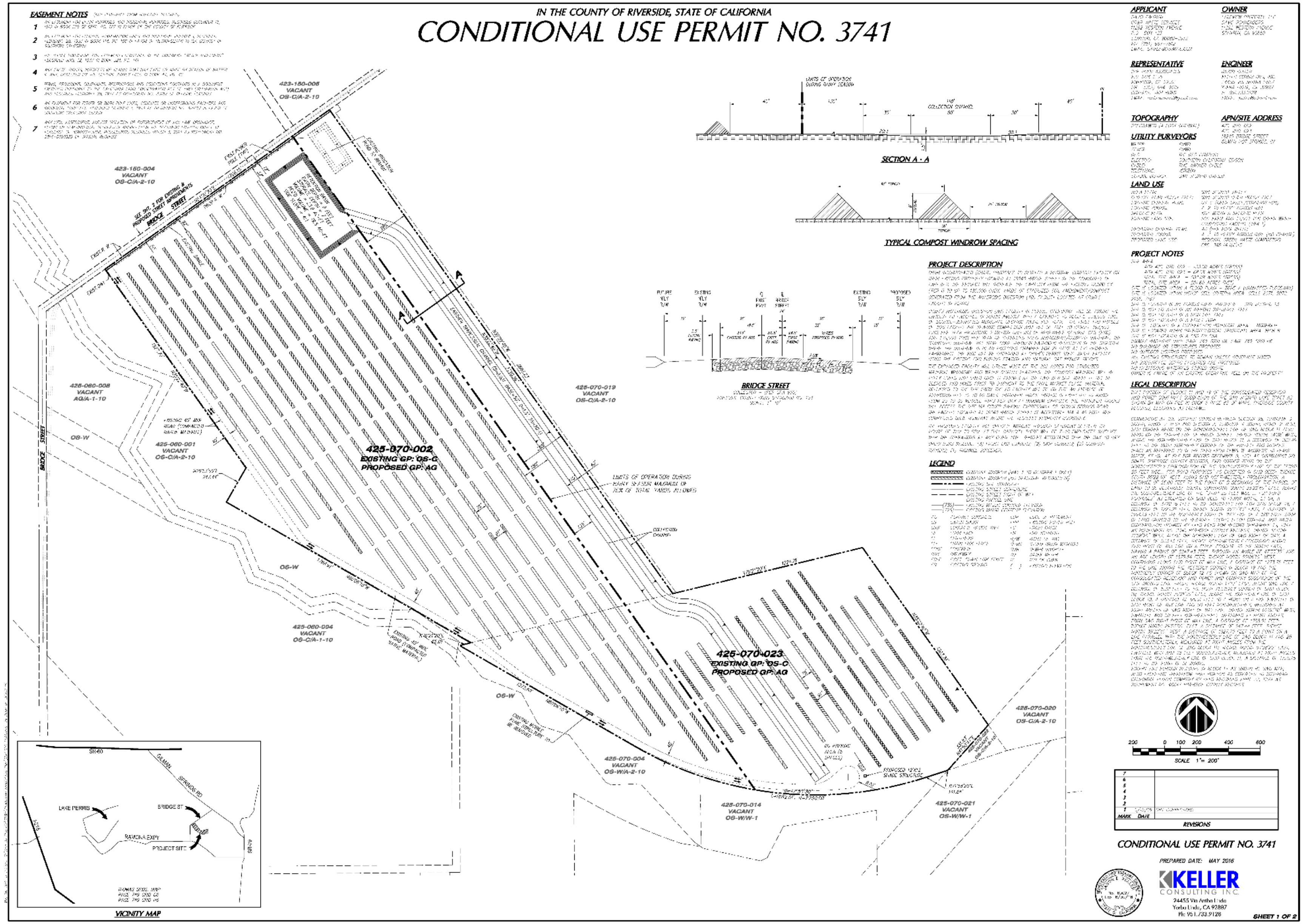


Figure 3-1 - San Jacinto River Near Mystic Lake

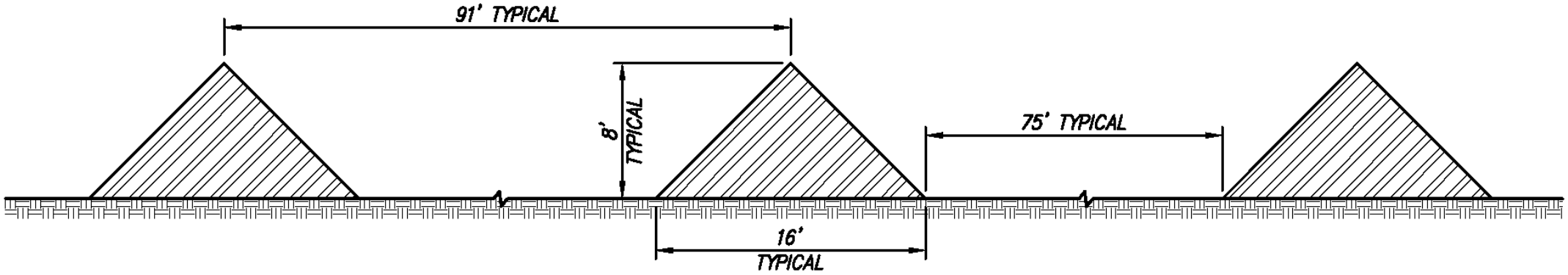


GRAPHIC SCALE
100 0 200 400
1" = 200'

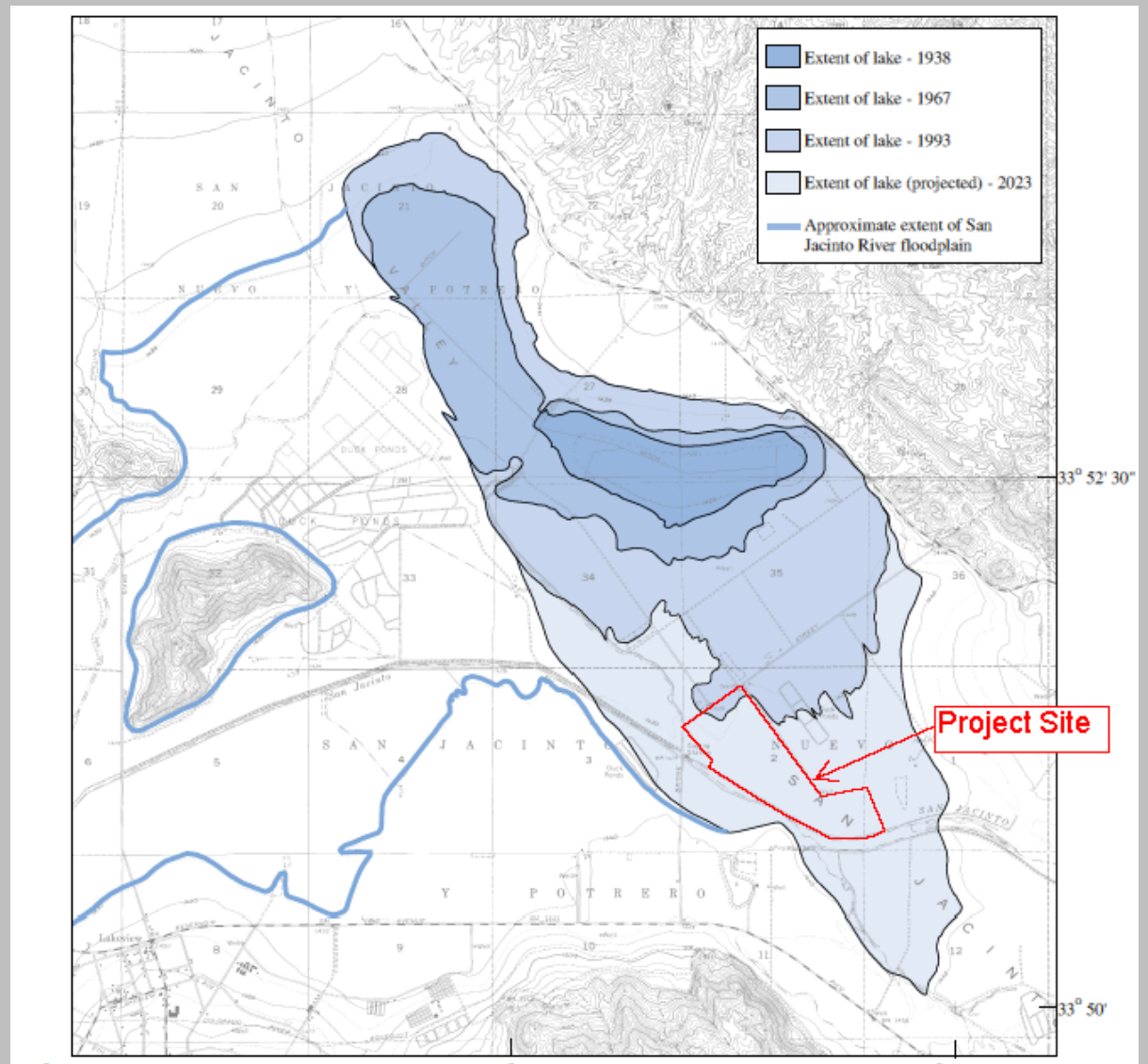
JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568



IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
CONDITIONAL USE PERMIT NO. 3741
EASEMENT NOTES
APPLICANT
OWNER
REPRESENTATIVE
ENGINEER
TOPOGRAPHY
APN/SITE ADDRESS
UTILITY PURVEYORS
LAND USE
PROJECT NOTES
LEGAL DESCRIPTION
PROJECT DESCRIPTION
LEGEND
SECTION A - A
TYPICAL COMPOST WINDROW SPACING
BRIDGE STREET
423-180-006
VACANT
OS-C/A-2-10
423-180-004
VACANT
OS-C/A-2-10
425-060-008
VACANT
AG/A-1-10
425-060-001
VACANT
OS-C/A-2-10
425-070-019
VACANT
OS-C/A-2-10
425-070-002
EXISTING GP: OS-C
PROPOSED GP: AG
425-060-004
VACANT
OS-C/A-1-10
425-070-023
EXISTING GP: OS-C
PROPOSED GP: AG
425-070-004
VACANT
OS-W/A-2-10
425-070-014
VACANT
OS-W/W-1
425-070-020
VACANT
OS-C/A-2-10
425-070-021
VACANT
OS-W/W-1
OS-W
LIMITS OF OPERATION DURING RAINY SEASON (MAXIMUM OF 75% OF TOTAL YARDS ALLOWED)
VICINITY MAP
LAKE PERRIS
BRIDGE ST
RAMONA EXPY
PROJECT SITE
GILMAN SPRINGS RD
200 0 100 200 400 600
SCALE 1"= 200'
7
6
5
4
3
2
1
MARK DATE
REVISIONS
CONDITIONAL USE PERMIT NO. 3741
PREPARED DATE: MAY 2016
KELLER
CONSULTING INC.
24455 Via Antha Linda
Yorba Linda, CA 92887
Ph: 951.733.9128
SHEET 1 OF 2

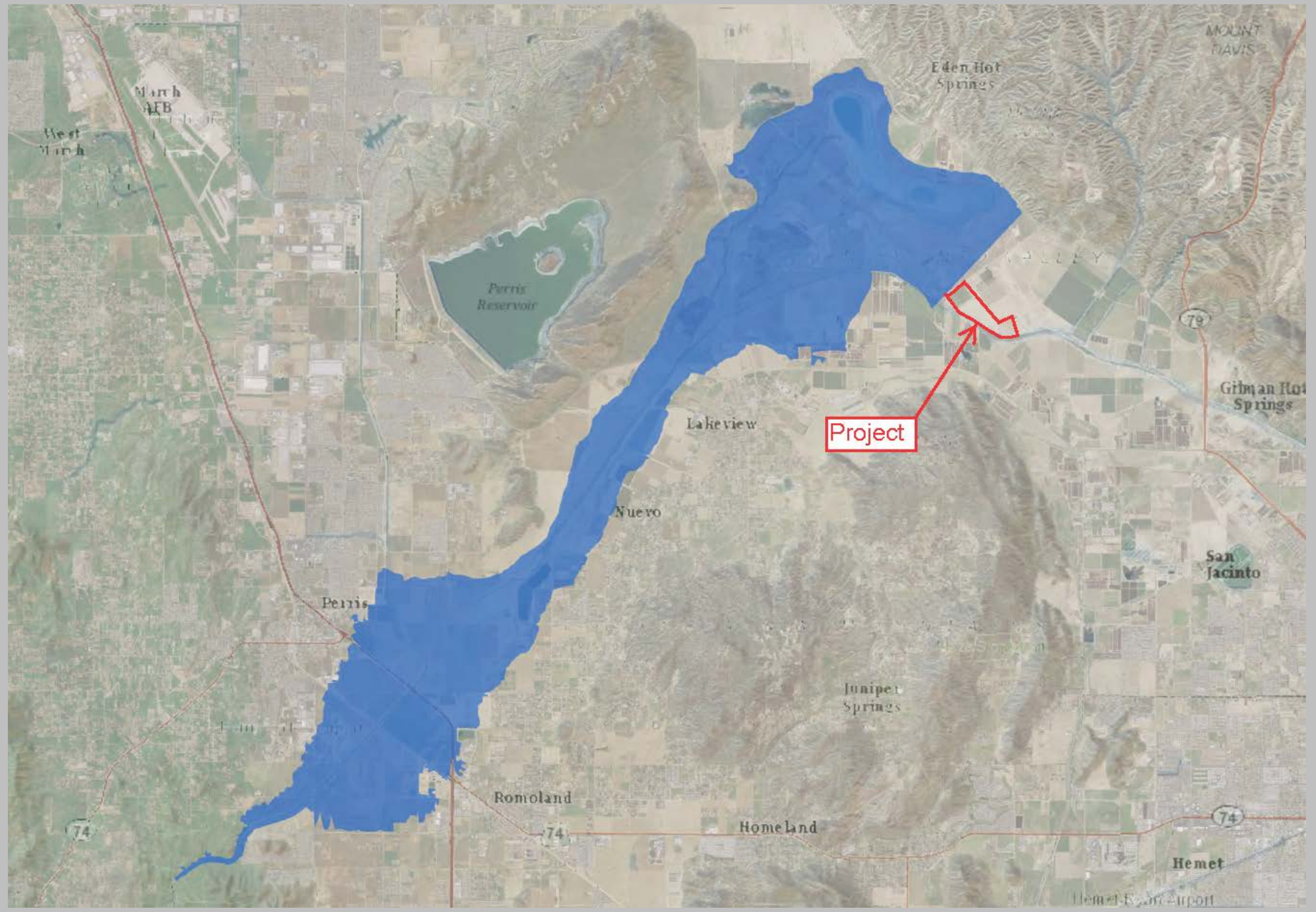


TYPICAL COMPOST WINDROW SPACING



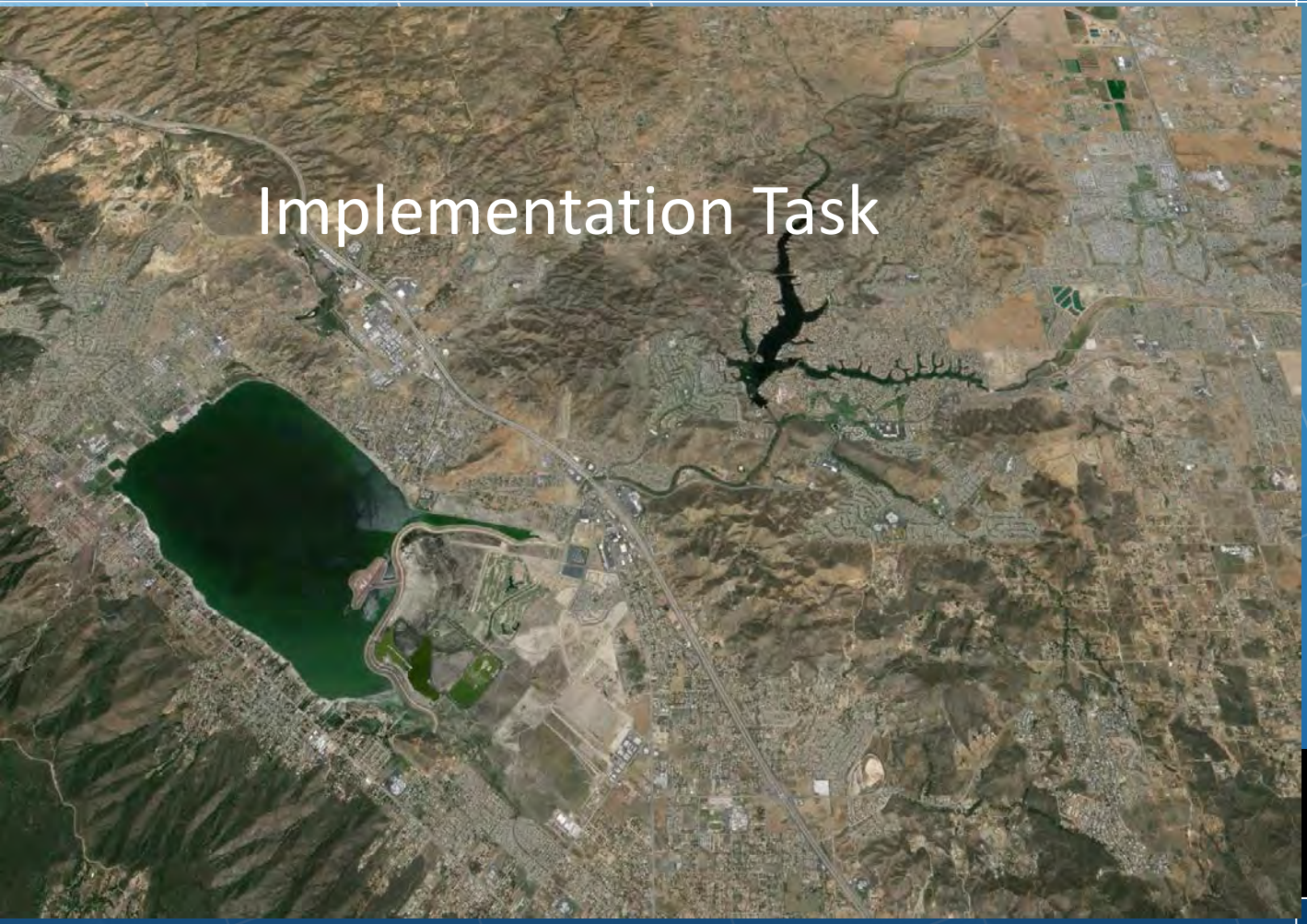
Base from U.S. Geological Survey
7.5' Lakeview and El Casco quadrangles
UTM projection, Zone 11

Historic Lake Levels of Mystic Lake, Riverside County, California


March AFB
West March
Eden Hot Springs
Mount Davis
Perris Reservoir
Project
Lakeview
Nuevo
Perris
Juniper Springs
Romoland
Homeland
Hemet
San Jacinto
Gilman Hot Springs
74
79

Revision of the Lake Elsinore & Canyon Lake Nutrient TMDL

CDM Smith
Team & Risk Sciences



Implementation Task

September 13, 2017

Lake Elsinore/Canyon Lake Task Force Meeting

RISK SCIENCES

CDM Smith

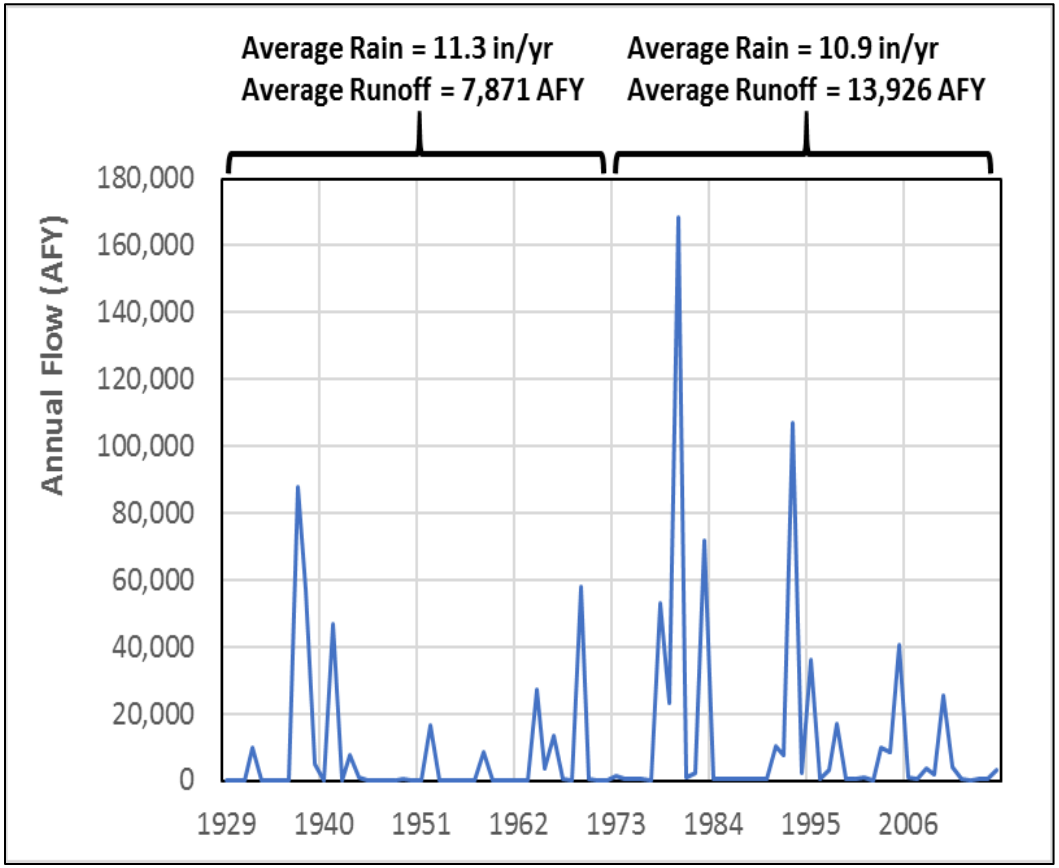
Presentation Outline

- Lake Elsinore Reference Hydrology Update
- Implementation Framework
- Reasonable Assurance Analysis
- Supplemental project characterization
- Lake Elsinore Internal Loads

Lake Elsinore Reference Hydrology

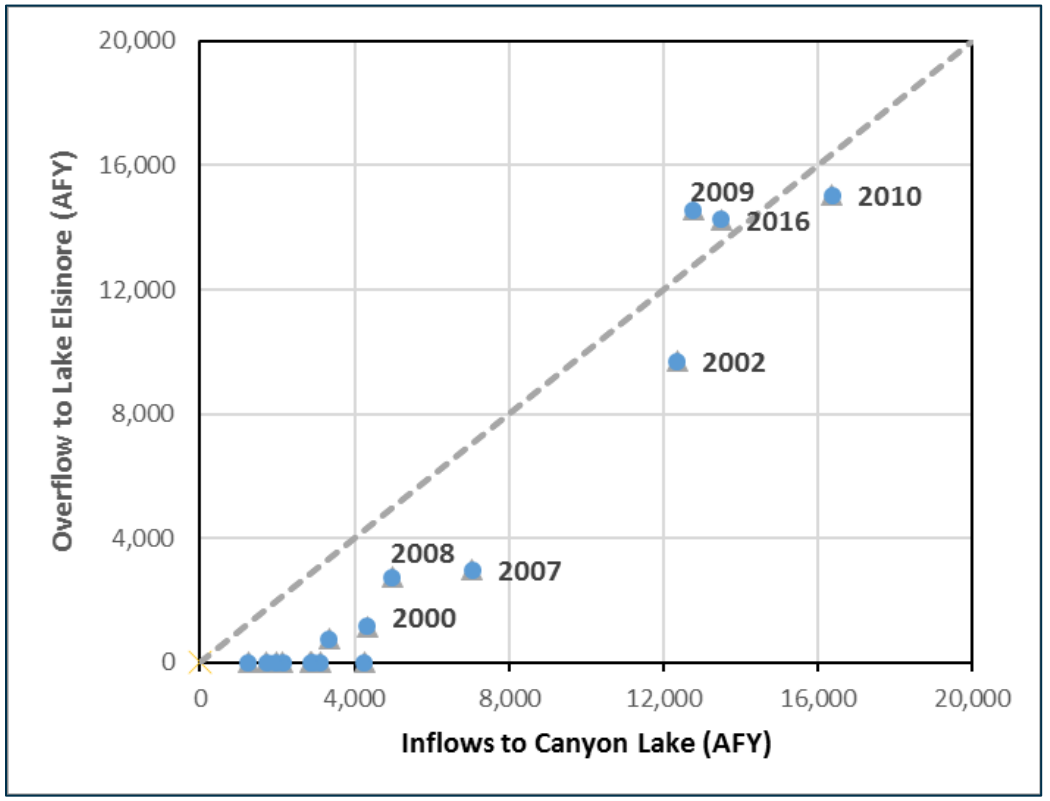
Reference Hydrology – Draft TMDL Revision

- Assumes existence of Railroad Canyon Dam
- Canyon Lake overflows
  - Reference condition represented by 1929-1972 flows
  - Current conditions represented by 1973-2016 flows
- Watershed model for local watershed



Reference Hydrology – Draft TMDL Revision

- Retention within Canyon Lake not a significant loss of inflow volume to Lake Elsinore in a single year
- Cumulative impact of reduced volume may be important



Notes:
1) 2004-2005 point outside of range plotted, no measurable retention in Canyon Lake was recorded in 2004-2005
2) Inflow gauges do not account for small drainages around Canyon Lake
3) outflow gauge includes some drainage area downstream of Canyon Lake

Railroad Canyon Dam

- RR Dam construction in 1929
- Followed by recent legal agreements requiring the maintenance of Lake Elsinore water level at 1240’
- Reference condition for Lake Elsinore should not presume the existence of RR Canyon Dam

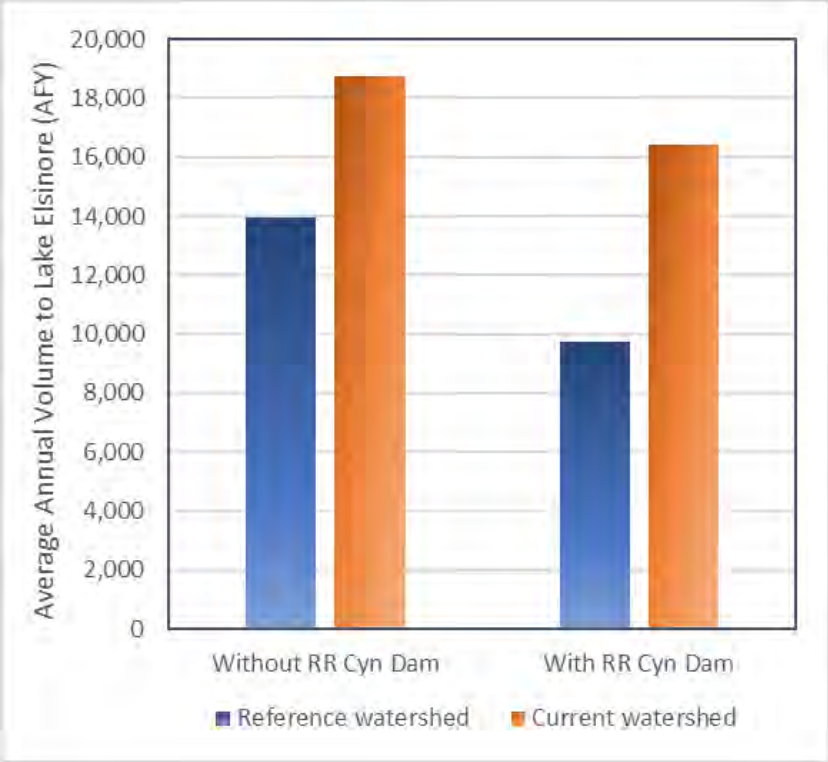
Photo source: Brown and Caldwell, 2010-11 TMDL Monitoring Report

Reference Hydrology

- Many sources can provide supplemental water for lake level stabilization
- Reclaimed water
- Imported water
- Increased watershed runoff

Reference Hydrology

- Watershed model used to hindcast annual average runoff volume without RR Canyon Dam
  - Current development based on impervious area map
  - Reference condition removes imperviousness from model
  - Includes approximated Mystic Lake overflows
- Compare with USGS gauge data of RR Canyon overflow



Reference Hydrology

- Current average annual runoff reaching Lake Elsinore is slightly greater than reference condition without RR Canyon Dam
- Increased watershed runoff from impervious areas washes off more nutrients than are assumed for reference watershed
  - Land use based EMCs

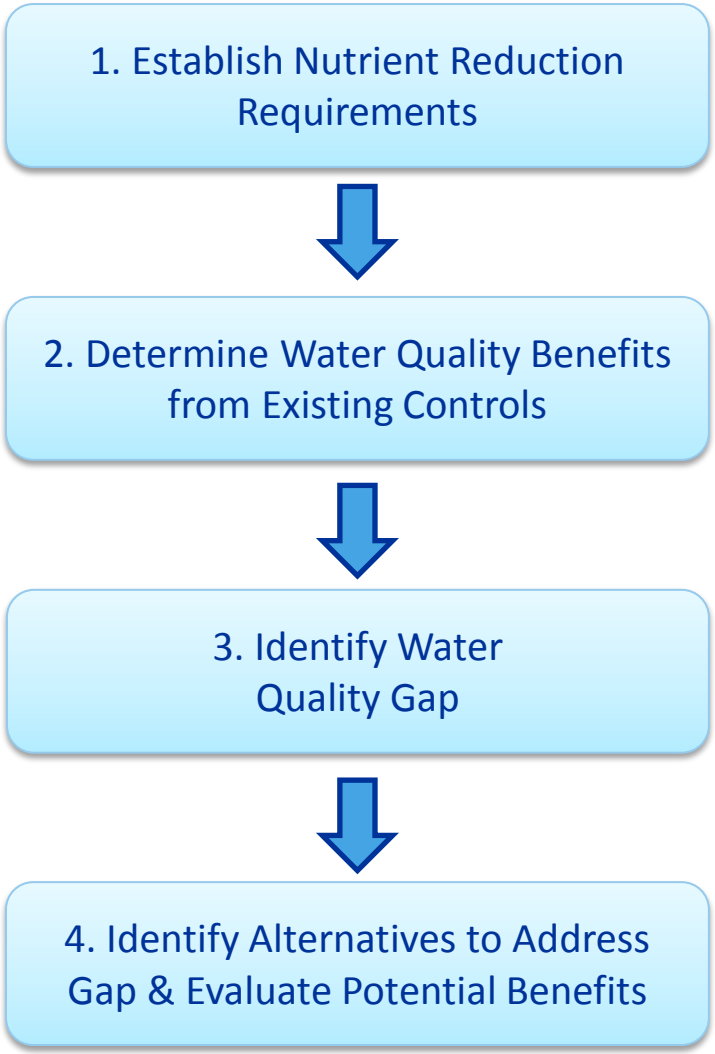
Reference Hydrology

- Watershed model runoff coefficient (RC) as power function of imperviousness
- Reference condition with no imperviousness, RC = 0.065
  - Validation of reference condition RC from runoff ratio for San Jacinto River at State Street

Implementation Framework

Implementation Framework

- Load reduction required = current minus allowable
- Reasonable assurance analysis
  - Quantify reduction credits from ongoing implementation of existing controls
  - Supplemental projects needed if existing controls do not provide required load reduction

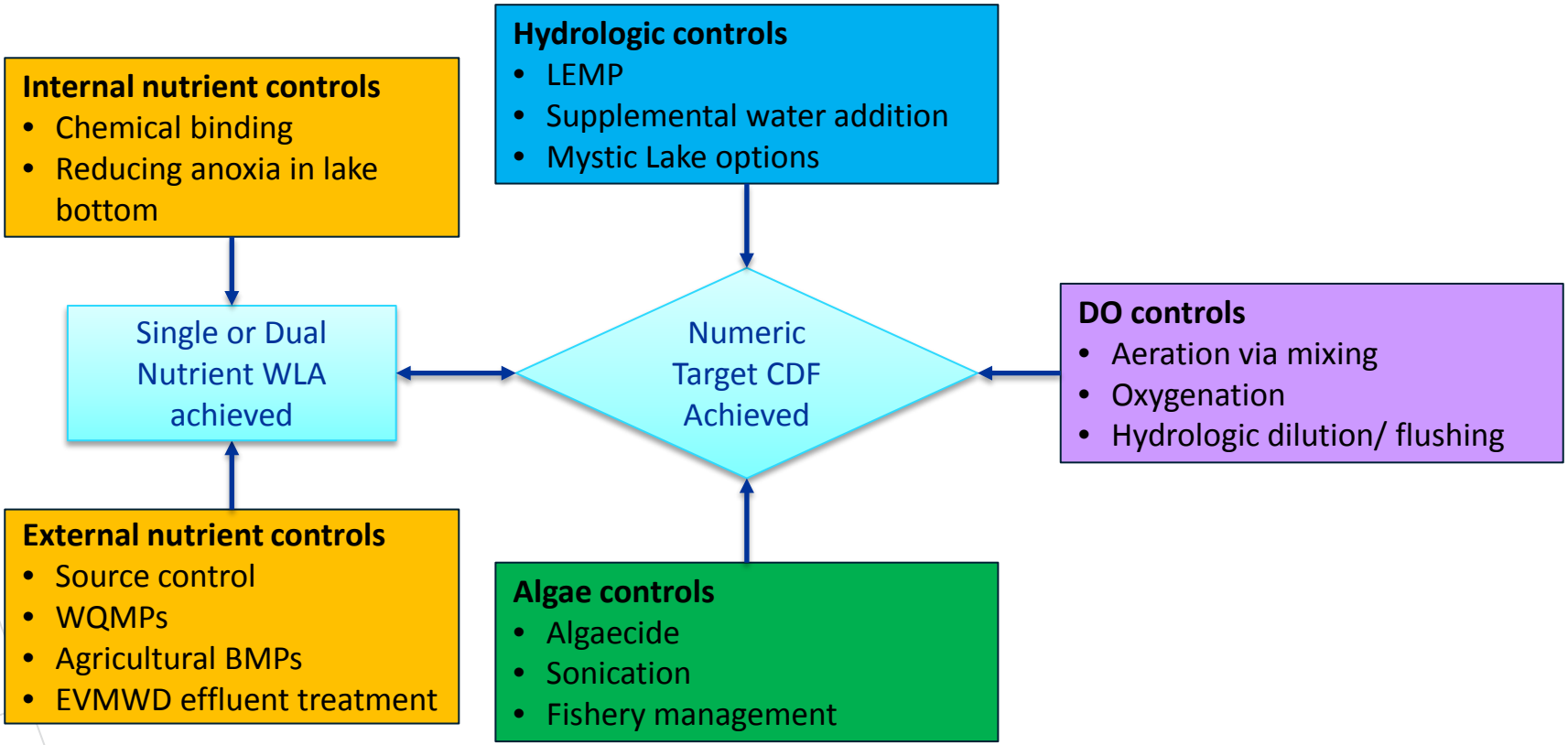


Implementation Framework

- Chapter organization
  - *Review of Historical Plans and Projects*:
  - *Evaluation of Water Quality Benefit from Ongoing Implementation of Existing Controls*
  - *Reasonable Assurance Analysis*
  - *Supplemental Project Concepts*
  - *Required Actions*

Reasonable Assurance Analysis

Reasonable Assurance Analysis

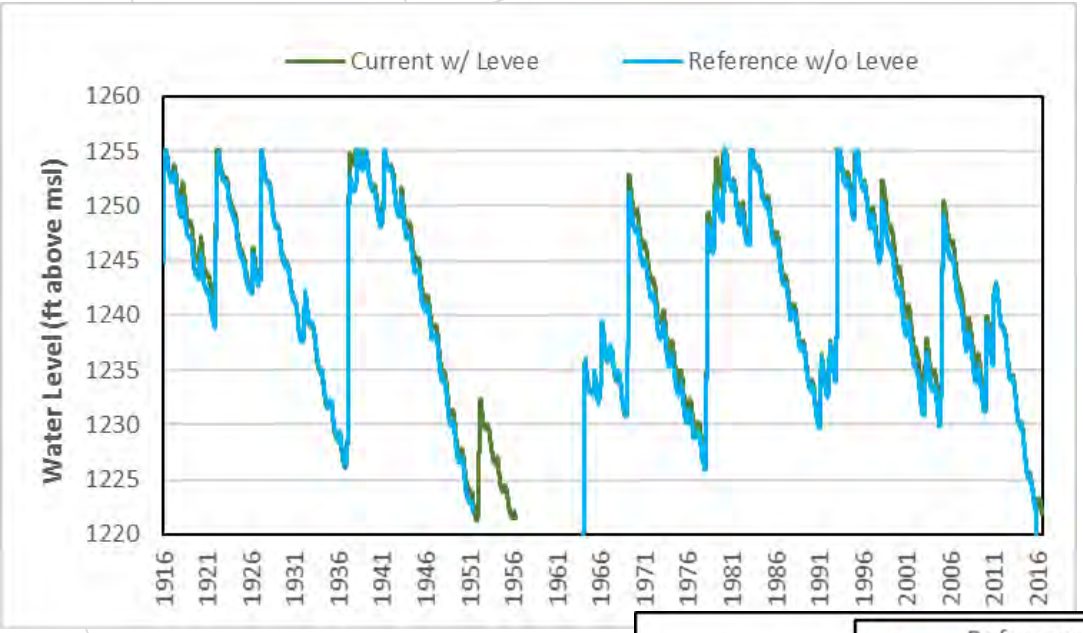


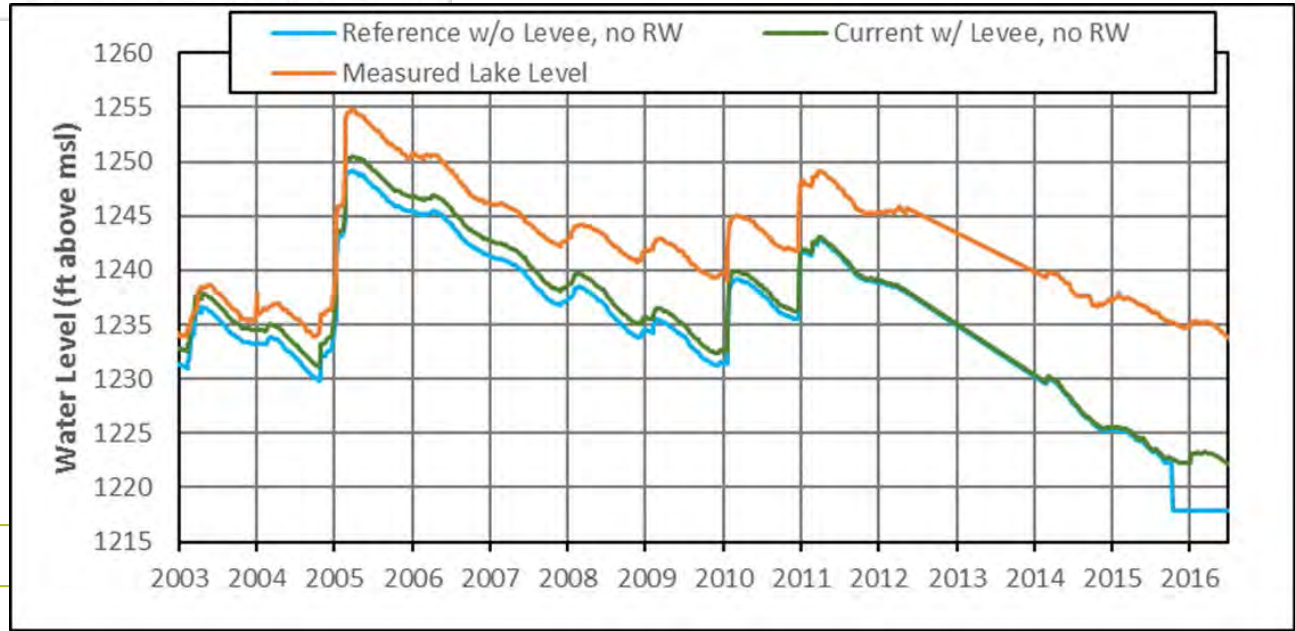
Water Quality Impacts from Levee Project

- Recent lake model simulation to test the influence of levee construction on Lake Elsinore
- Comparison of two different hydrologic periods representing reference watershed and current watershed with RR Canyon Dam
- All results are preliminary and subject to change – do not cite

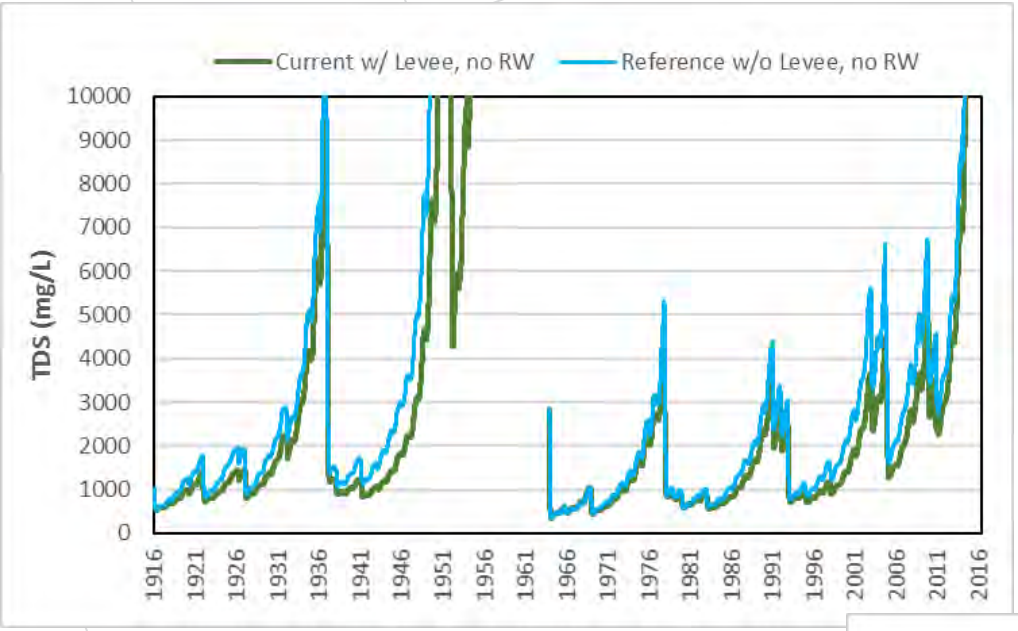
Water Quality Impacts from Levee Project

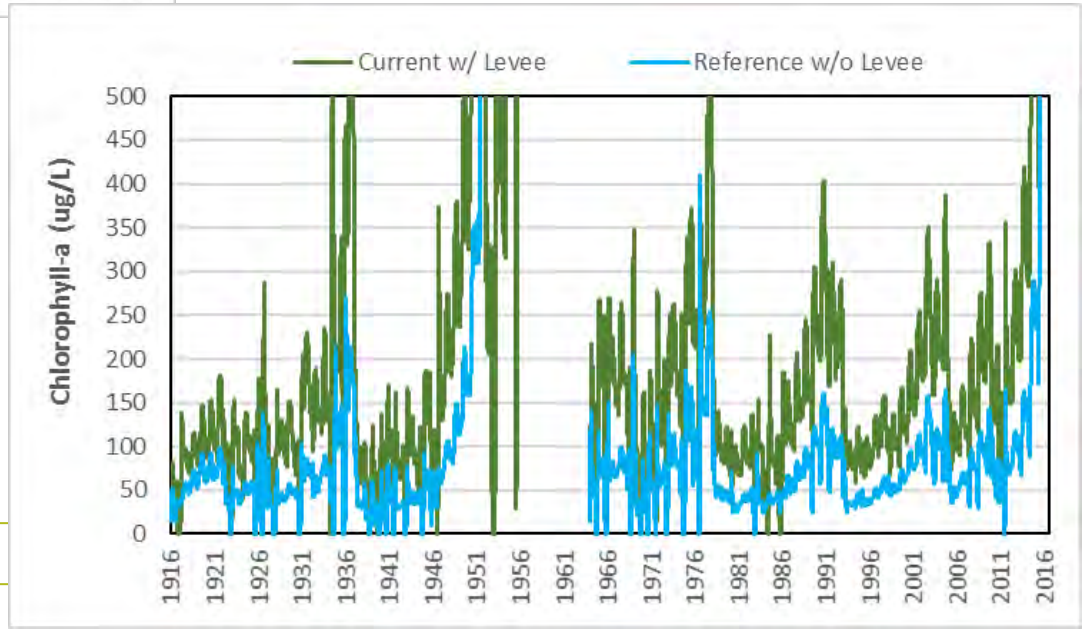
Water Quality Impacts from Levee Project



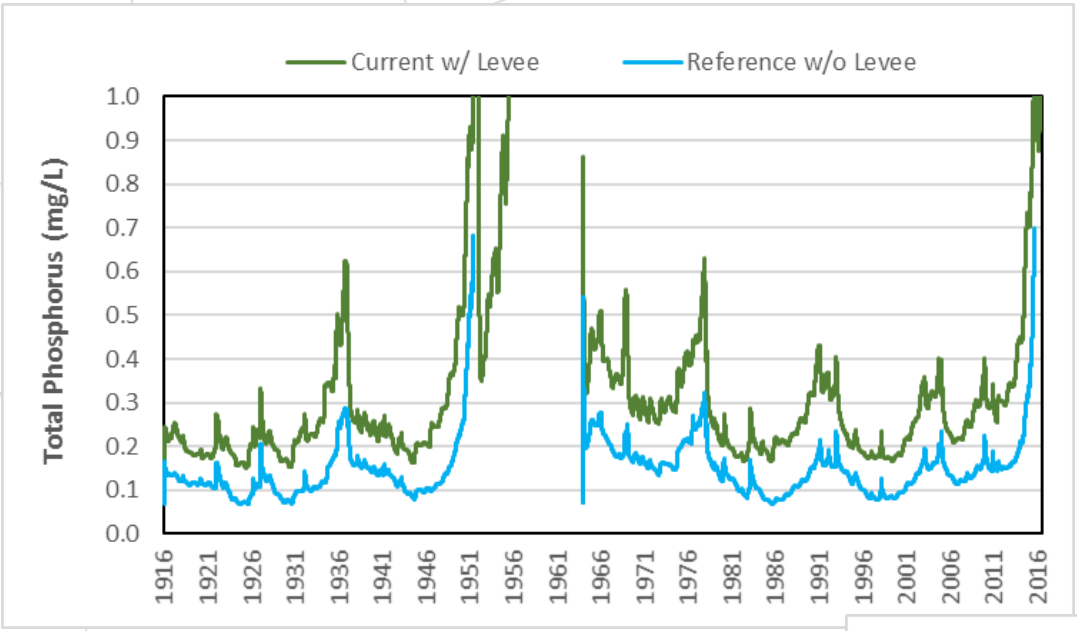


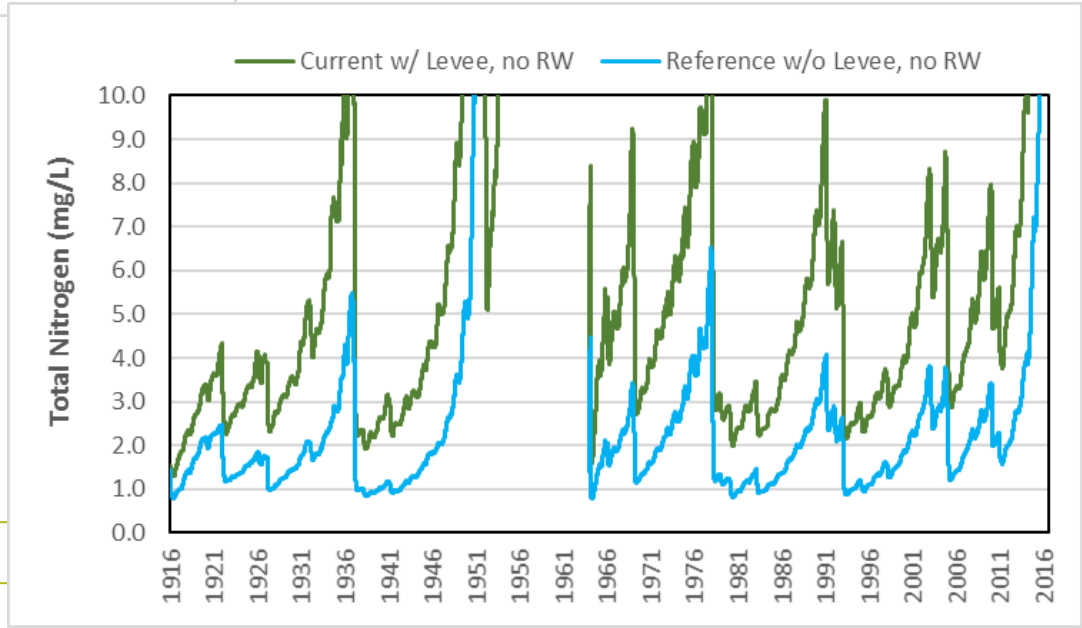
Water Quality Impacts from Levee Project





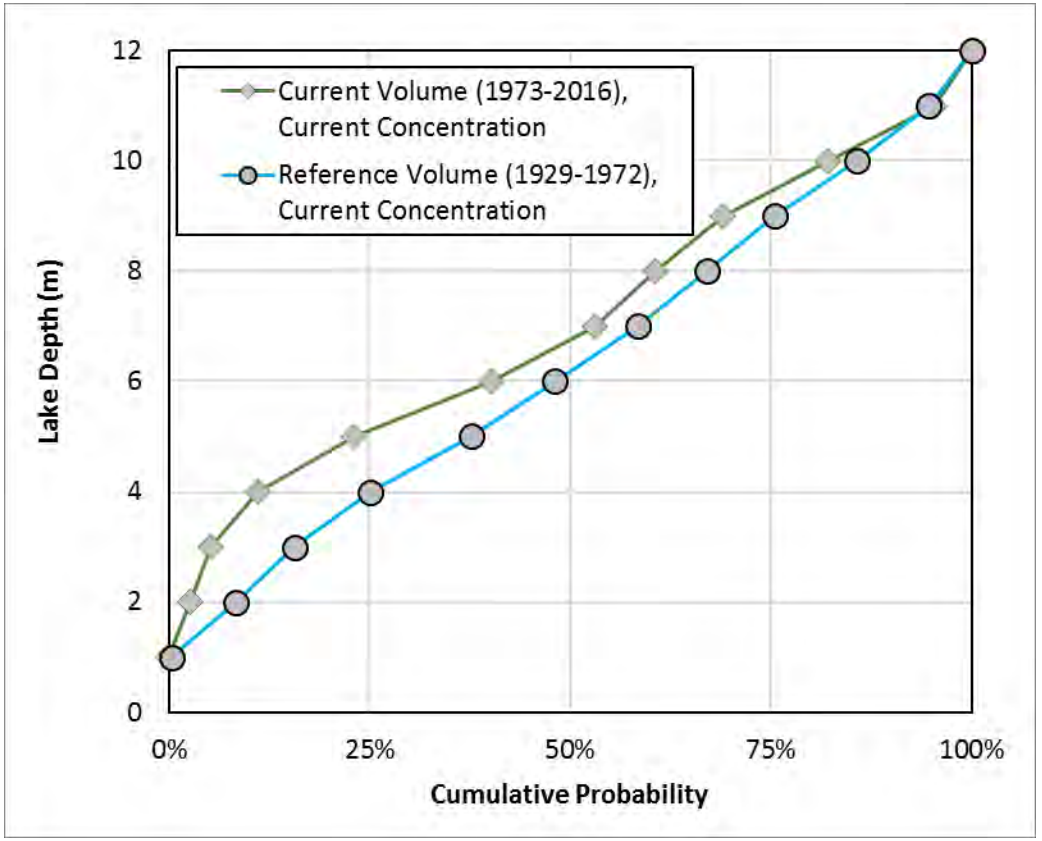
Water Quality Impacts from Levee Project





Water Quality Impacts from Increased Runoff

- Roughly twice the total nutrient load with current volume
- Different climatic patterns despite equivalent long-term rainfall total
- Reference volume scenario CDFs exclude period of desiccation



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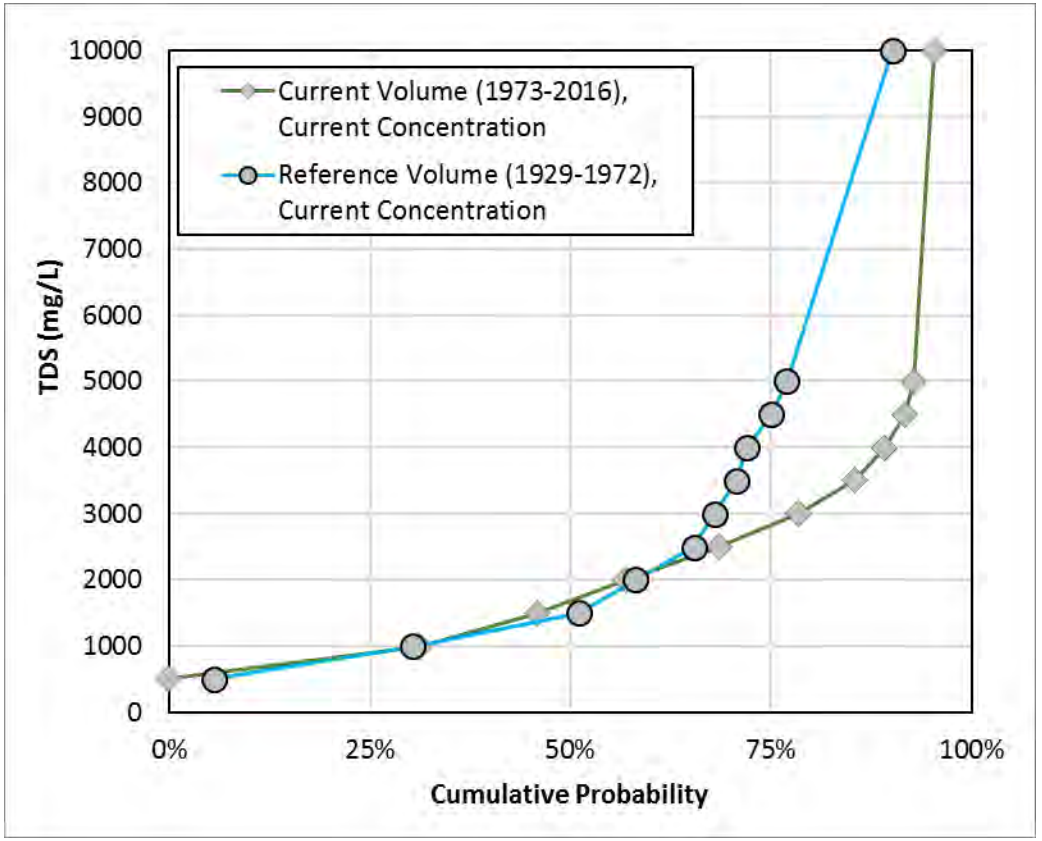

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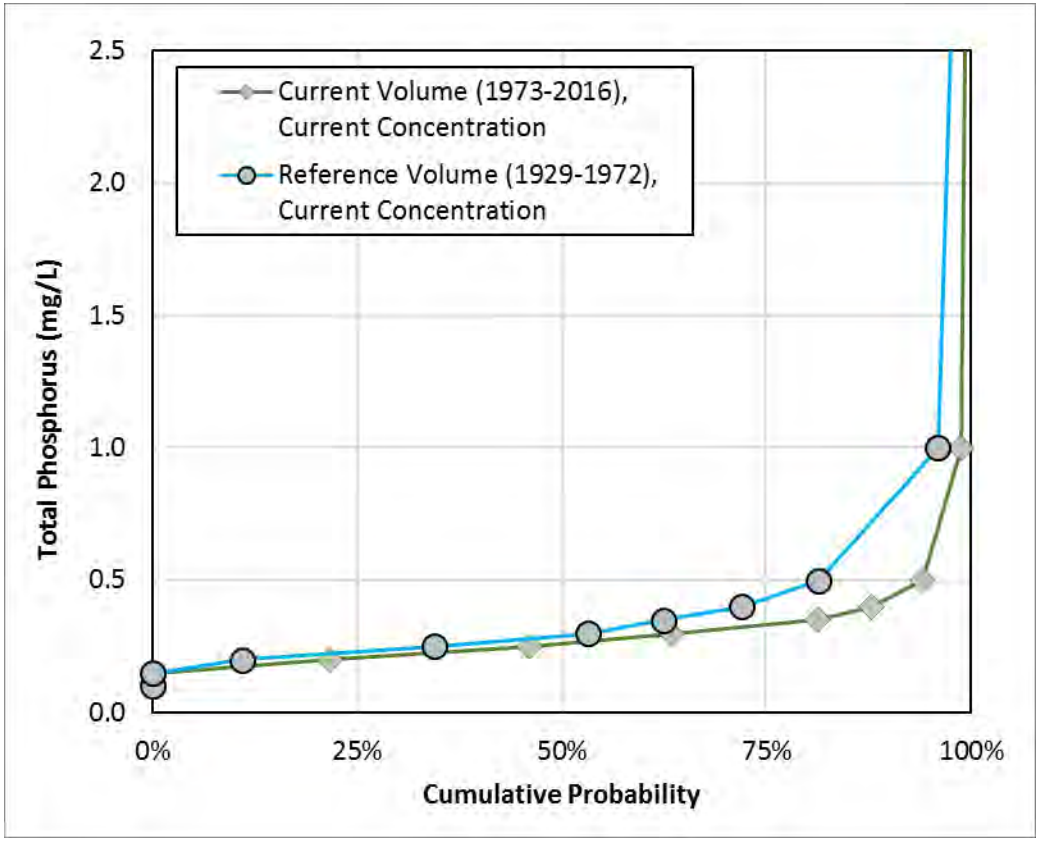

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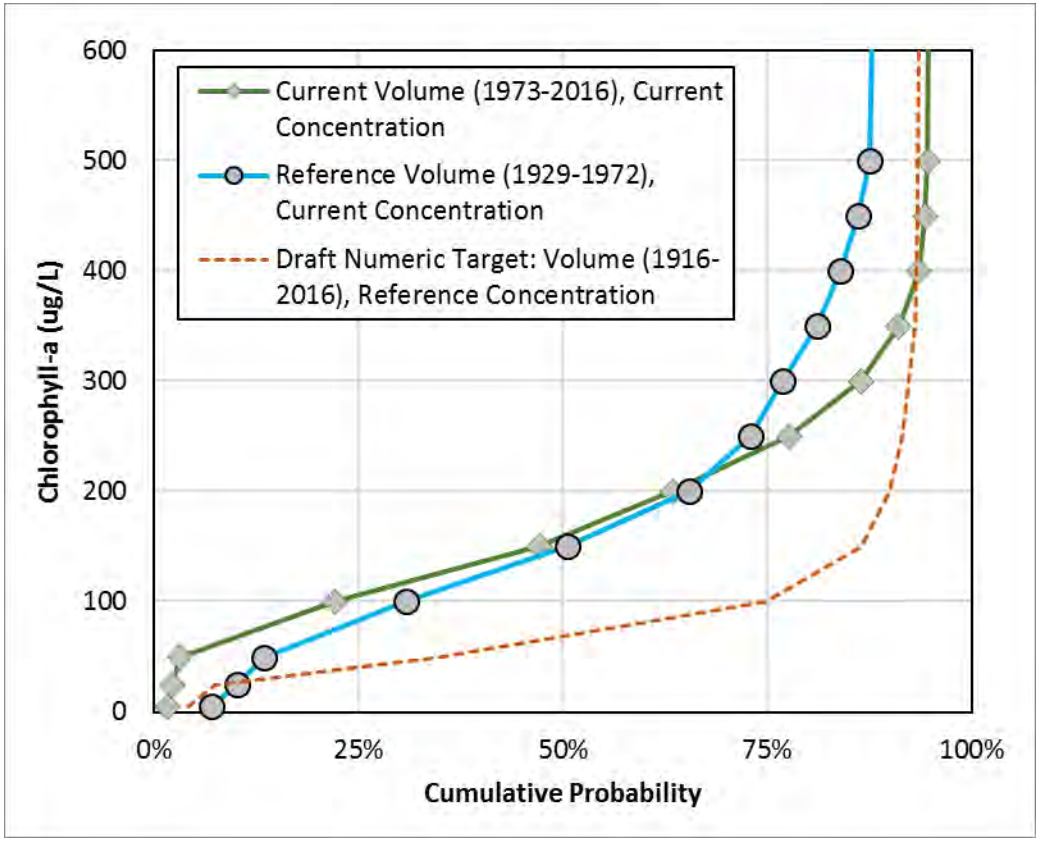


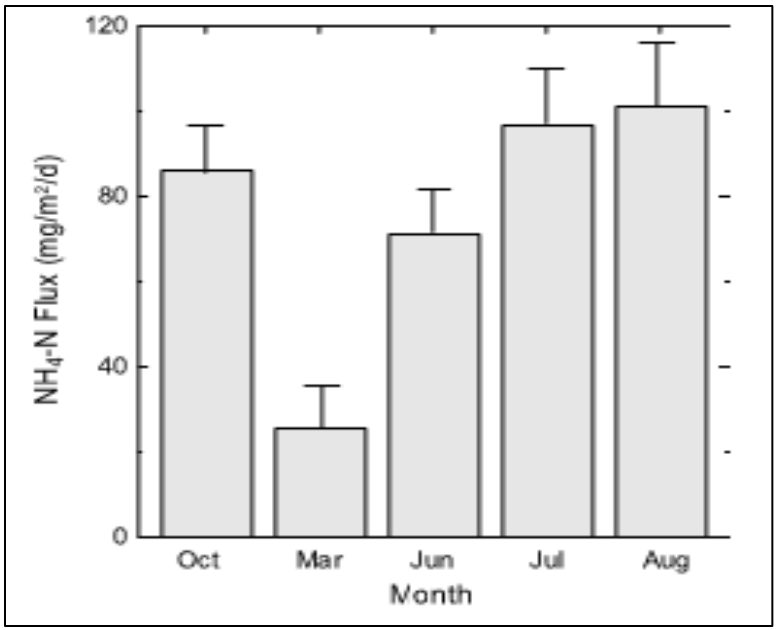
Lake Elsinore Internal Load

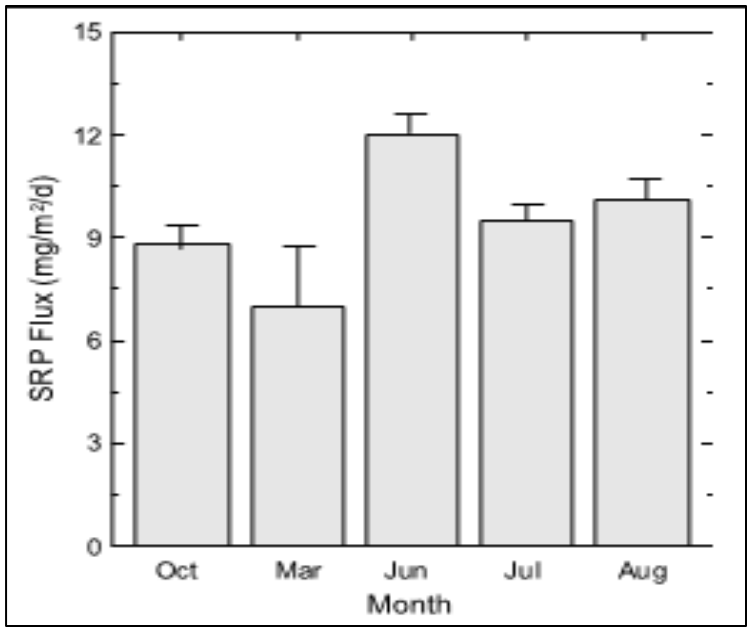
Reasonable Assurance Analysis

- Key component of many existing and potential controls involves internal loads from lake bottom sediments
- Draft TMDL revision source assessment for sediment nutrient flux is still under development

Lake Elsinore Internal Load

- Estimates of annual mass must account for seasonality
- Flux dependent on DO, temperature, and pH at lake bottom





Plots from Anderson, 2001. Internal Loading and Nutrient Cycling in Lake Elsinore

Lake Elsinore Internal Load

- 2004 TMDL applied winter (March) flux rate over 6 months and summer (July) flux rates over 6 months

Variable	Summer	Winter	Annual
Average SRP Flux Rate (mg/m^2/day)	8.4	6.6	7.5
SRP Flux (kg/yr)	18,588	14,560	33,147
Average NH4-N Flux Rate (mg/m^2/day)	71.0	17.9	44.5
NH4-N Flux (kg/yr)	157,337	39,726	197,063

Lake Elsinore Internal Load

- Diffusive flux from lake bottom sediments to water column accounts for majority of nutrients in Lake Elsinore
- Small % reductions in internal load needed to offset all external load
- Different offset estimation approach needed

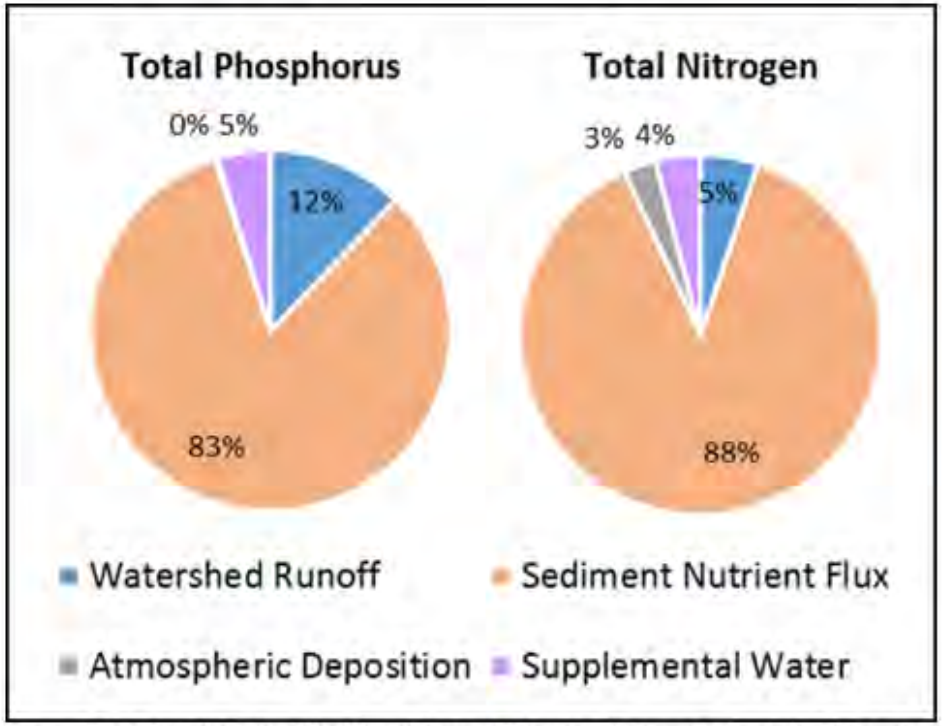
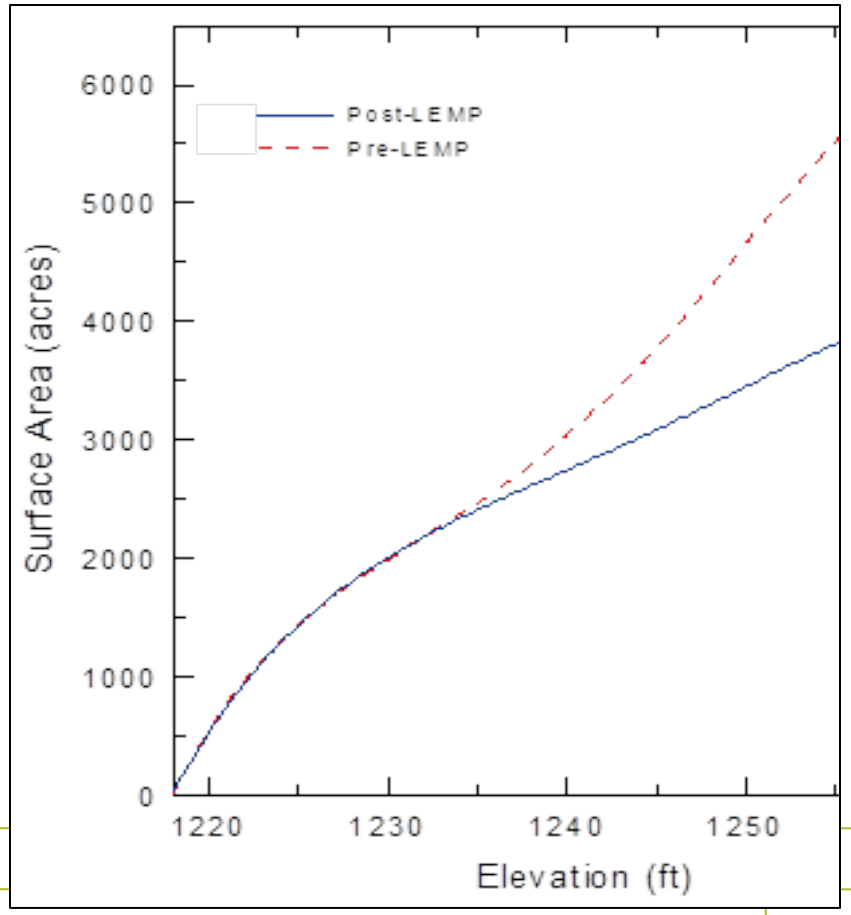


Figure 4-24. Relative Contribution of General Source Categories for Lake Elsinore Long-term Average Annual Nutrient Budget

TMDL Revision - Lake Elsinore Internal Load

- More refined daily CAEDYM model results to estimate annual flux
  - Accounting for temporal changes in DO, temperature, and pH
  - Accounting for different extent of lake bottom area for flux to occur year to year



TMDL Revision - Lake Elsinore Internal Load

- Linkage analysis with DYRESM-CAEDYM completed
  - Calibration
  - Numeric target CDF development
- Software issues for extracting the compartment showing daily flux from sediments
  - Needed to update source assessment and serve as basis for assessing nutrient mass based offsets from existing and potential controls

Lake Elsinore Internal Load – Historic versus Current Flux Rates

- Estimate internal load for a hypothetical reference watershed
  - Numeric target CDF was developed using a scaling factor approximated from paleolimnology study
- Return to historic flux may take decades - empirical analysis of nutrient kinetics by Anderson (2012)
- Implementation schedule will consider timeframe to reduce flux rates from lake bottom sediment by continuting to reduce or offset external loads
  - Dynamic sediment diagenesis analysis