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Flood Risk Management in Los Angeles County

Presentation to Sierra Club
July 25, 2024

Patricia Wood, P.E

Who We Are

Los Angeles County Public Works oversees the County's flood risk management efforts.

- Administers the Los Angeles County Flood Control District
- Serves as the floodplain manager for the unincorporated areas

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Sierra Club's Questions

- ❑ How does Los Angeles County do flood control?
- ❑ What is in place to deal with the 100-year flood event?
  - Specifically, how does Los Angeles County respond to the 2023 UC Irvine Flood Study?
    - 100-year flood could impact up to 1 million people in and around Los Angeles
    - 30 times more than previously estimated.
    - Black communities especially affected
- ❑ How can we work together?

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Topics for Today's Presentation

- ❑ About Los Angeles County
- ❑ Stormwater management system in Los Angeles County
- ❑ Flood facility design standards
- ❑ Stormwater management limitations
- ❑ Understanding the UC Irvine Study hydrologic model
- ❑ Climate change
- ❑ Working together

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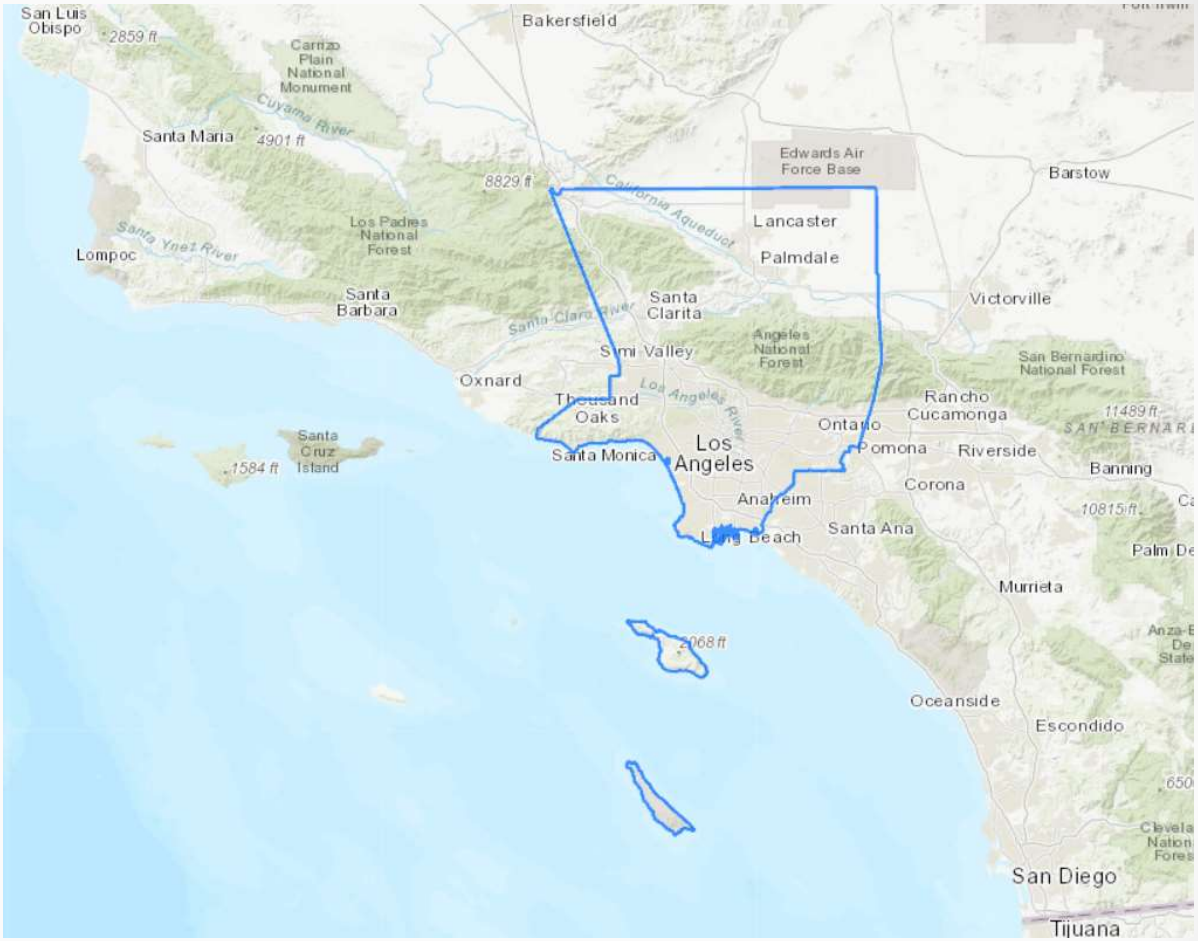
Los Angeles County Facts

- Most populous county (about 10 million residents)
- 88 cities
- 86 communities in the National Flood Insurance Program



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Los Angeles County Hydrologic Picture

Varying geography

- Highly erosive mountains
- Valleys
- Coastal plains
- Desert valleys/plains
- Mountainous, rocky islands

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Los Angeles County Hydrologic Picture

Flood/drought cycles

- High intensity rainfall events
- Long drought periods
- Wildfires and debris flows

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Los Angeles County
Early Flooding History

Long documented history of flooding:

- 1770s
- 1815 and 1825
- 1862
- 1868
- 1880s
- 1910
- 1914

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Los Angeles County
Early Flooding History

1884 Flood

Los Angeles River south of First Street

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Los Angeles County
Early Flooding History

1914 Flood

Van Nuys

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Early Flooding History

1914 Flood

Glendale

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Early Flooding History

1914 Flood

City of Los Angeles, Arroyo Seco

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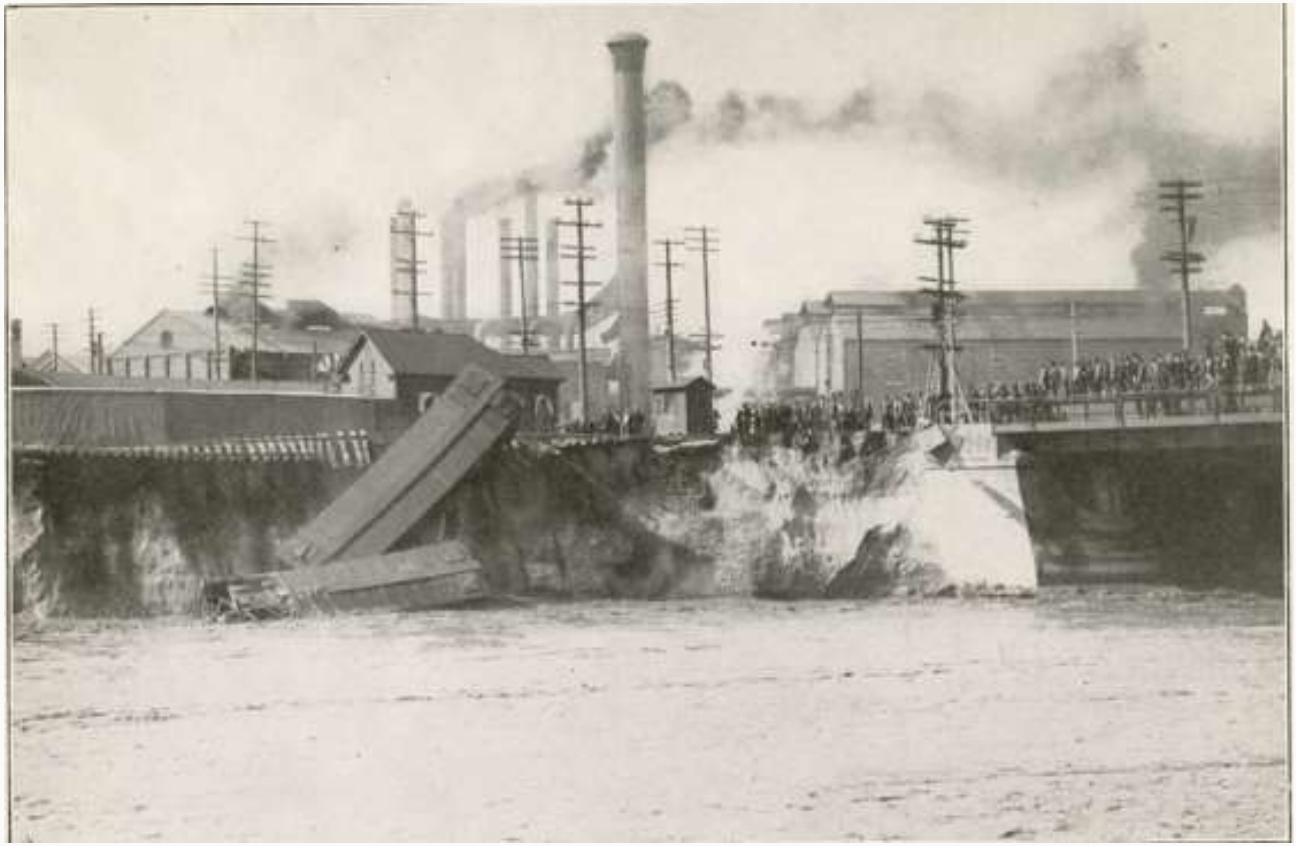
Los Angeles County
Early Flooding History

1914 Flood



City of Los Angeles

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Los Angeles County
Early Flooding History

1914 Flood

Clearwater (now City of Paramount)

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Los Angeles County
Early Flooding History

1914 Flood

Rio Hondo

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Los Angeles County
Early Flooding History

1914 Flood

San Gabriel River

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Los Angeles County Flood Control District (LACFCD)

- Established by 1915 Los Angeles County Flood Control Act
- 2,700+ sq mi, 2/3 of land in County
- Northern County, Catalina, and San Clemente Island outside LACFCD
- Dual mission:
  - Flood protection
  - Conservation of waters

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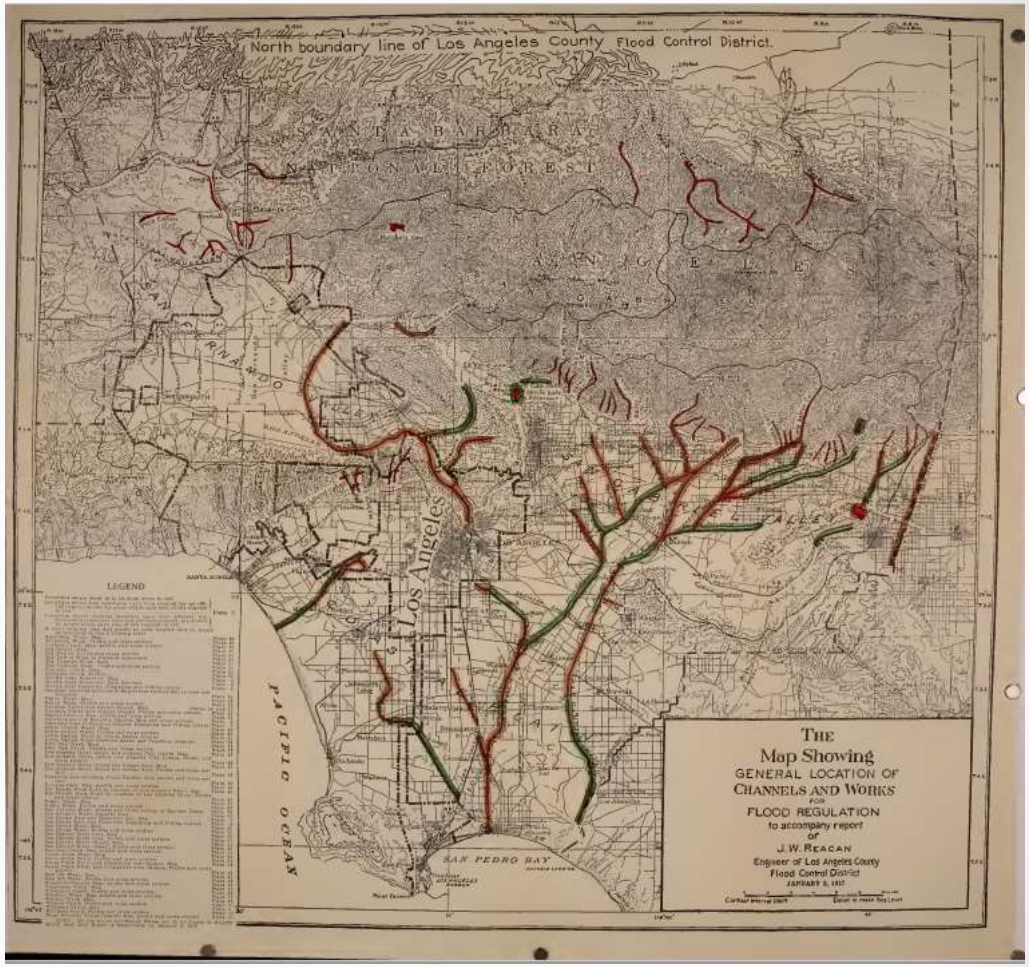
Los Angeles County Flood Control District
Initial Efforts

1917 Plan

- Major dams
- Check dams in mountains
- Channelization in major waterways
- Protecting Ports of Los Angeles and Long Beach



COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT

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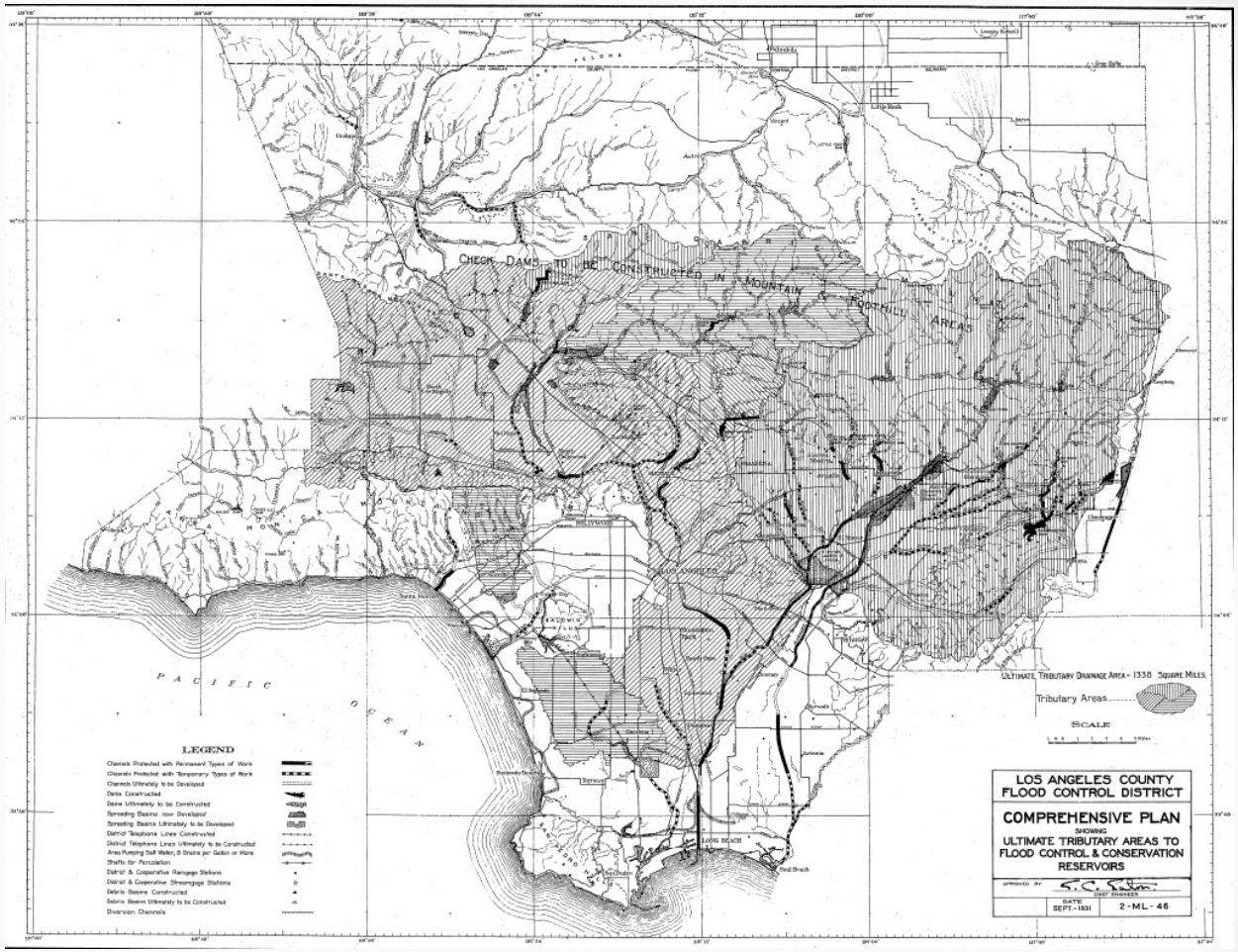
Comprehensive Plan for Flood Control and Water Conservation (1930s)

- Additional dams
- Additional check dams
- Additional channelization
- Debris basins
- Spreading Grounds



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Los Angeles County's Partnering with U.S. Army Corps of Engineers

- Based on LACFCD's *Comprehensive Plan for Flood Control and Water Conservation* (1931, amended 1935)
- Initial Emergency Appropriations Relief Act of 1935
- Federal Flood Control Act of 1936
  - Comprehensive Plan garnered 25% of the total 1936 national funding
- Continued with subsequent Flood Control Acts through 1960s

Los Angeles County's Partnering with U.S. Army Corps of Engineers

- Array of facilities built by the Corps
  - Dams
  - Debris basins
  - Channels
- Shared responsibilities
  - Corps designed and constructed
  - LACFCD provided land, paid for crossing adjustments, took over maintenance
  - Exceptions due to 1938 Act

    Corps still owns 5 dams, 40+ miles of channels

US Army Corps of Engineers
Los Angeles District

COUNTY OF LOS ANGELES FLOOD CONTROL DISTRICT

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Los Angeles County Storm Drain Systems

- Originally built by cities or small drainage improvement districts
- LACFCD storm drain program ramped up after 1952 Flood

Non-LACFCD Construction 1923

Non-LACFCD Construction 1924-25

1952 Flood - Downey

LACFCD Construction 1954

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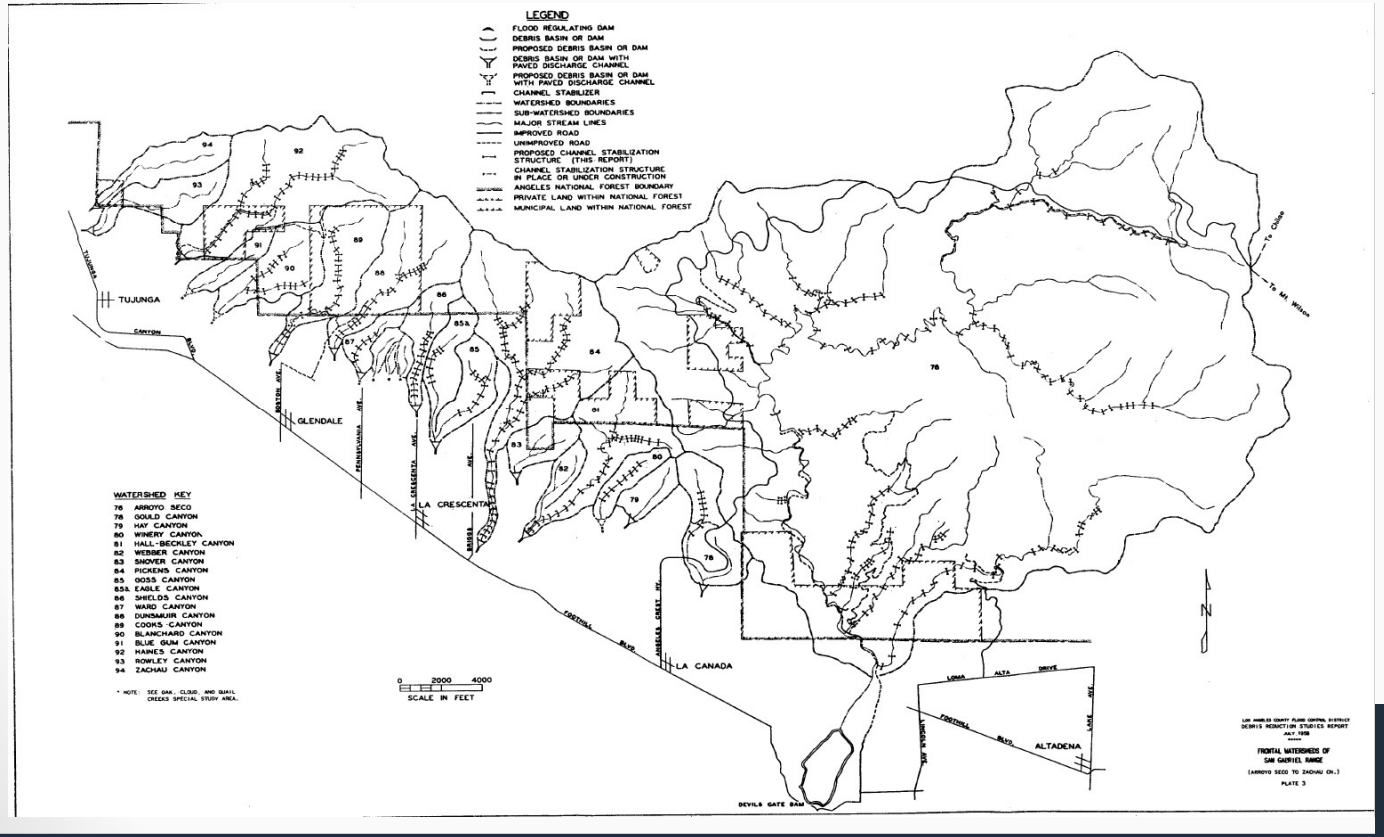
Los Angeles County
Debris Mitigation Systems

- 1917 LACFCD Plan – check dams
- 1931-1935 LACFCD Comprehensive Plan – check dams and debris basins
- 1959 *Report on Debris Reduction Studies for Mountain Watersheds of Los Angeles County* – crib dams and debris basins



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Los Angeles County
Debris Basins/Debris Inlets

Built by LACFCD and Developers

Debris Basin

Debris Retaining Inlet

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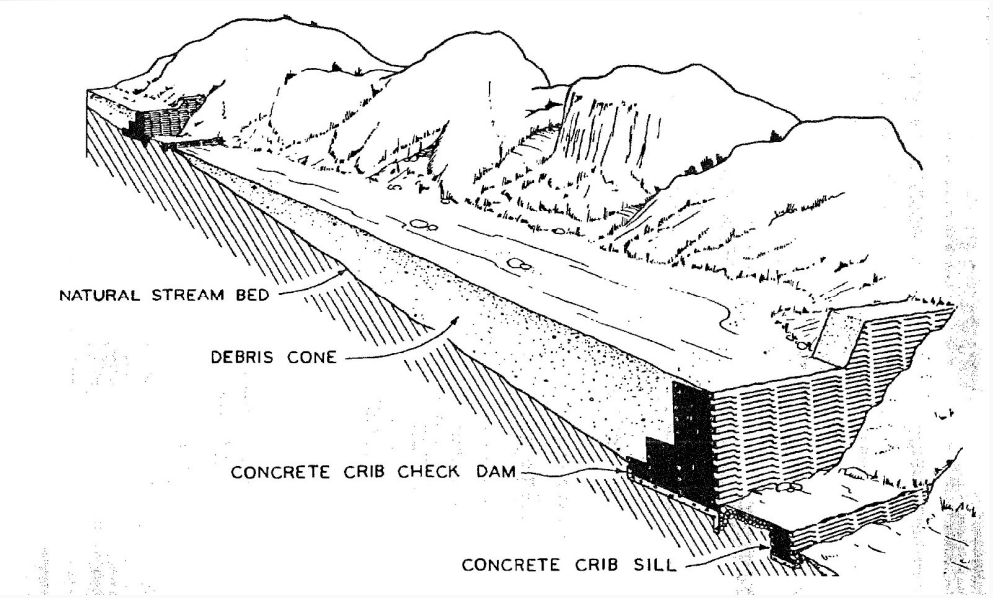
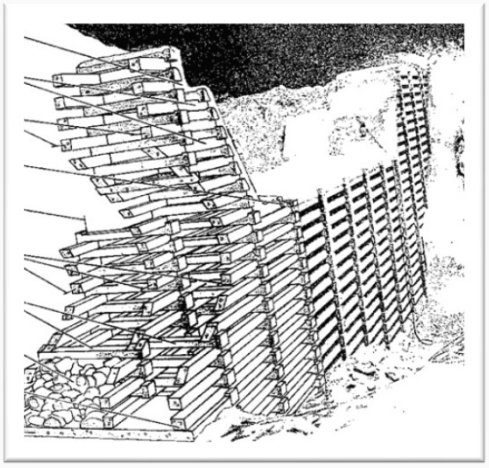
Los Angeles County
Crib Dams

Built in partnership with U.S. Forest Service





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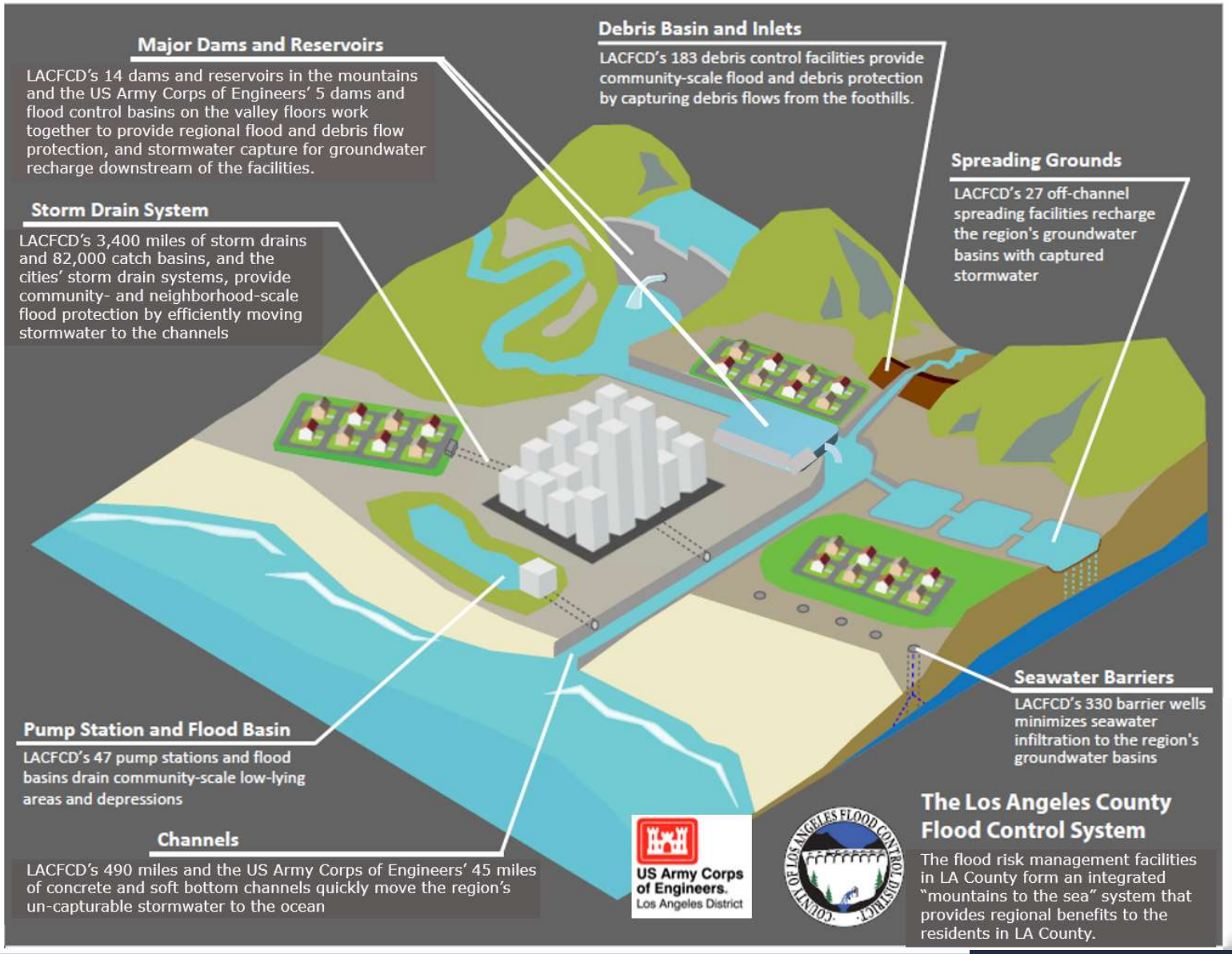
Stormwater Management System in Los Angeles County



Corps of Engineers Flood Standard

- Design flood based on reasonable protection of existing assets
- Federal “100-year” flood established in 1970s
- Based on historical peak flow rates at stream gage stations and flood frequency analysis
- Future development not accounted for
- Corps 100-year flood slightly different from FEMA 100-year
  - Due to selection of parameters, calibration and verification

Los Angeles River

- Upper LA River
  - Completed in 1940s by Corps
  - Alignment from County's 1930s Comprehensive Plan
  - Used 1943 Flood for design
  - Capacity upgrades determined not cost-effective in late 1980s
- Lower LA River – Originally completed in 1960s, upgraded in 2000
  - Originally constructed in 1950s-1960s by Corps
  - Capacity upgrade below Rio Hondo in 2000 by Corps (LACDA Project)
    - 133-year flood

LACDA Project
Scope and Costs

Scope of Work

- 21 miles of levee improved
- 24 railroad, traffic, utility, and pedestrian bridge crossings modified
- Bike trails, equestrian trails, and landscaping improved
  - Connection between trail and 8 area parks

Duration and Cost

- Original (1992 Estimate):
  - 10 Years
  - $364 million
- Actual (2001 Completion):
  - 5 years
  - $220 million

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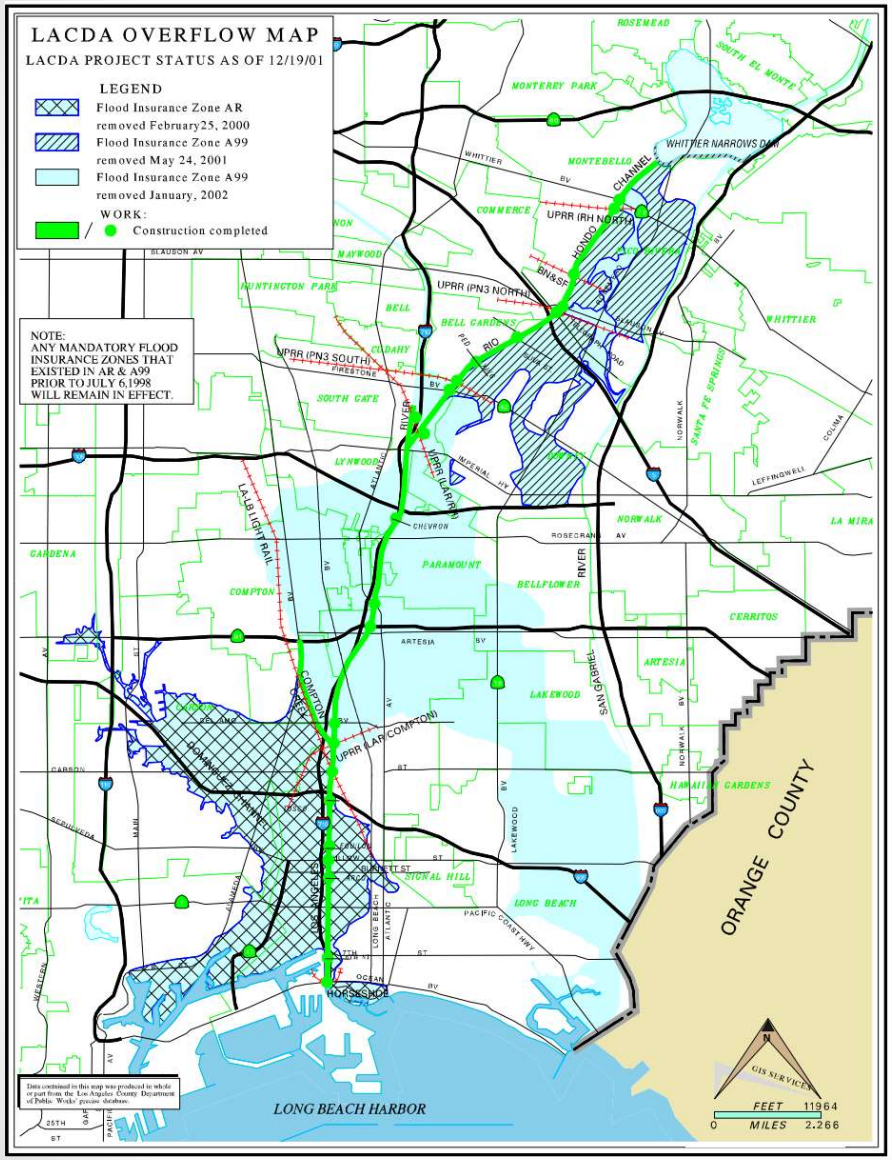
LACDA Project Results



Benefits

- Capacity for a **133**-year flood
- Prevention of about **$2.3** billion in flood damages (2000 Dollars) for
  - **177,000** structures
  - **500,000+** people
  - **14** communities
  - **82** square miles of area
- Lifted mandatory flood insurance for property owners within the FEMA 100-year floodplain

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Los Angeles County Flood Standards

- Based on rainfall frequency – more adaptable to changes in watershed characteristics
  - Major facilities & County Flood Hazard Maps: 50-year rainfall frequency (Capital Flood)
  - Local drainage: 25-year rainfall frequency (street + drain capacity)
- Hydrology anticipates likely future conditions
  - Development
  - Burns in undeveloped areas

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Flood Standards for Building Permits in Los Angeles County

- FEMA Base Flood or County Capital Flood, whichever is greater
- Capital Flood often greater than Base Flood

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Stormwater Management Limitations

- Facilities reduce flood risk but don't eliminate all flood risk
- Not possible to estimate "maximum flood"
- Not economically justified to protect from "maximum flood"
- Floods greater than Federal 100- Year Flood and County Capital Flood have and will in the future occur.

Understanding the UC Irvine Hydrologic Model

- Did not include many stormwater management components, including:
  - Storm drains
  - Minor tributary flood channels
  - 47 pump stations in low-laying costal areas
- Assumed a 100-year event occurring over the entire LA County drainage area
- Not calibrated and verified against the 100-year floods defined at the stream gaging stations that have records.

Continuing Improvements of Stormwater Management Facilities

The County and the Corps continue to enhance their facilities

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Corps Dam Safety Modification Project

Project elements include:

- ❑ Hardening
- ❑ Parapet walls
- ❑ Seepage control system
- ❑ Utility relocation
- ❑ Modifications of Rosemead Blvd and Lincoln Ave

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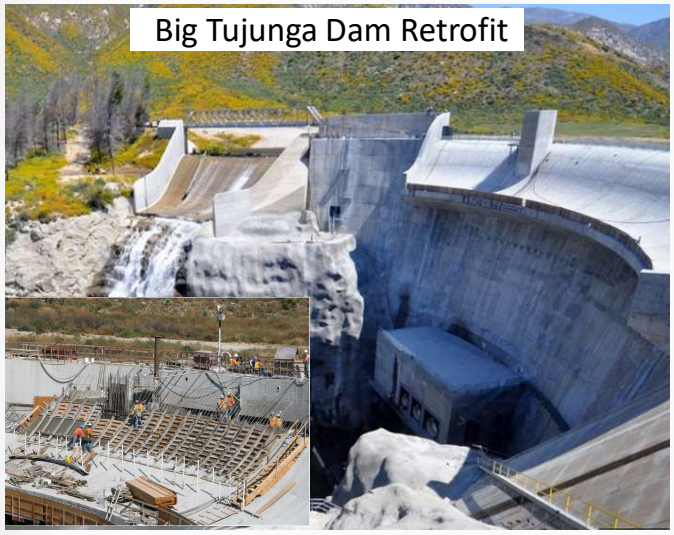
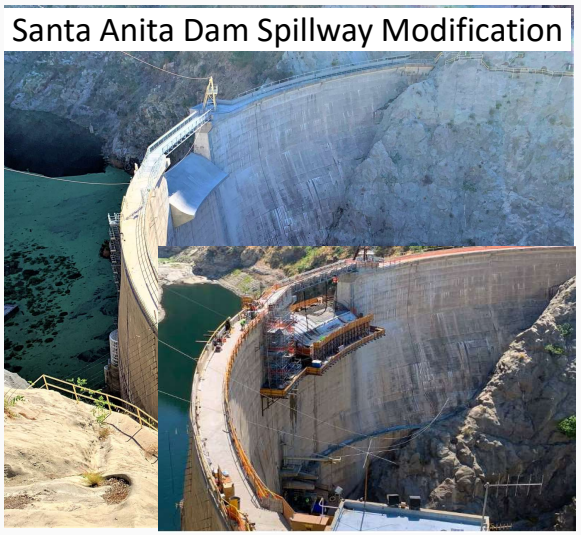
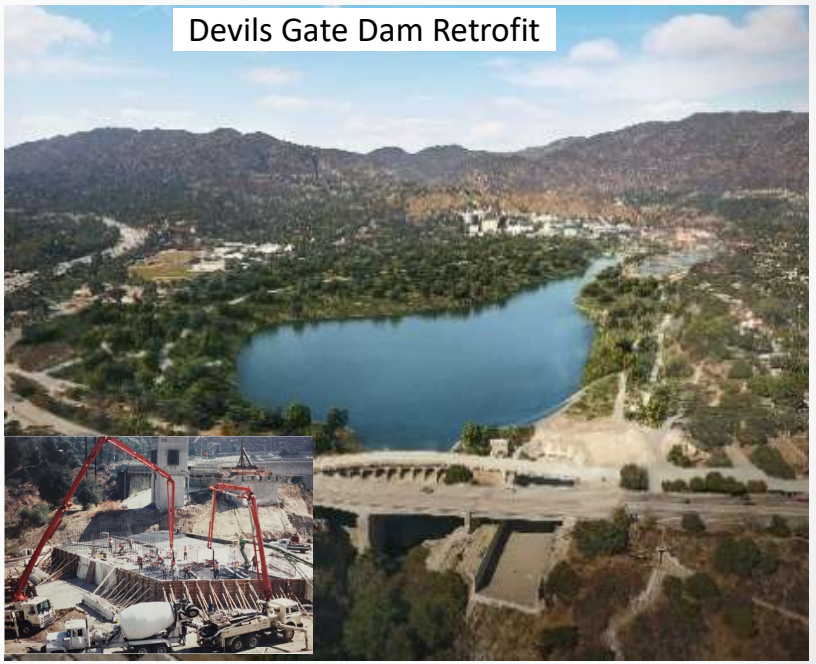
Dam Retrofit Program
Los Angeles County

- Construction program started in 1990s
- Seismic upgrades and enlarged spillways to lift State DSOD restrictions
- New/refurbished outlet works


Big Tujunga Dam Retrofit


Santa Anita Dam Spillway Modification


Devils Gate Dam Retrofit


Morris Dam Inlet/Outlet Rehabilitation

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Reservoir Capacity Restoration Projects in Los Angeles County

- Sediment removal since 1930s
- 83.5 million cubic yards removed (2023)
- Latest projects
  (10.9 million cubic yards goal)
  - Cogswell (2 million cubic yards)
  - San Gabriel (4.9 million cubic yards)
  - Santa Anita (400,000 cubic yards)
  - Big Tujunga (2.1 million cubic yards)
  - Pacoima (1.5 million cubic yards)
- Challenges
  - Sites for sediment placement
  - Opposing stakeholders
  - Increasing mitigation requirements and costs


Cogswell Reservoir 1991


Cogswell Reservoir 2022


Big Tujunga Reservoir 1970


Santa Anita Reservoir 2012

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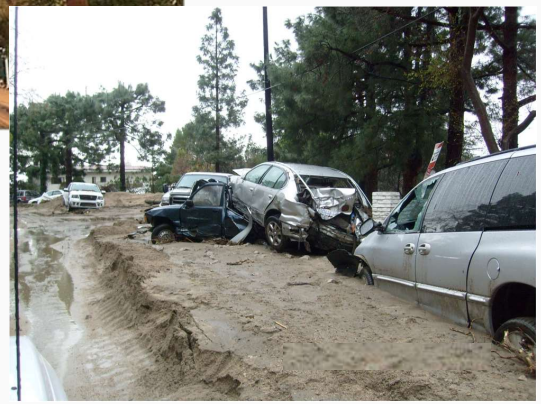
Emerging Flood Risks in Los Angeles County from Climate Change

- Rising sea levels
- More intense rainfall events
- Larger, more severe wildfires

  → Debris flows



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Dealing with Climate Change
Federal Flood Risk Management Standard

- To meet increased flooding from climate change
- 3 methods allowed
  - Flood based on locally-selected climate change models (Federally preferred)
  - High freeboard
  - 500-year flood
- All Federal agencies required to meet the standard
  - Agencies developing regulations to comply
- Standard required for all Federally-funded projects, such as those involving:
  - Federal grants
  - FHA Loans

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Dealing with Climate Change
FEMA Technical Mapping Advisory Council
2024 Recommendations

- Double the current 100-year and 500-year floods by using higher data confidence level.
  - More homeowners with mortgages mandated to buy flood insurance
  - Greater impact for disadvantaged homeowners
- New "Flood Prone Area" zone for regulation of floodplain developments
  - "Development" definition includes **all** human alteration activities
  - Stricter requirements increases up-front building/project costs
- Implementation timeline TBD

TMAC
TECHNICAL MAPPING ADVISORY COUNCIL

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Dealing with Climate Change County

- Joint Study with UCLA
  - Estimate projected temperature rise in Los Angeles region
  - 50+ global models considered
  - 3 temperature rise scenarios
- Looking at impacts to Capital Flood from projected rise in temperatures

Dealing with Climate Change Maintenance

- Maintenance of infrastructure is essential.
- Reducing capacity of stormwater management facilities increases flood hazards.

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Working Together

- Support, not oppose or penalize, facility maintenance and stormwater management use.
- Recognize flooding of neighborhoods does not benefit the environment.
- Be aware that temporary inconvenience is necessary to avoid or lessen greater impacts and suffering.
- Acknowledge all areas, all income groups need to support each other's right to be reasonably safe from flooding.

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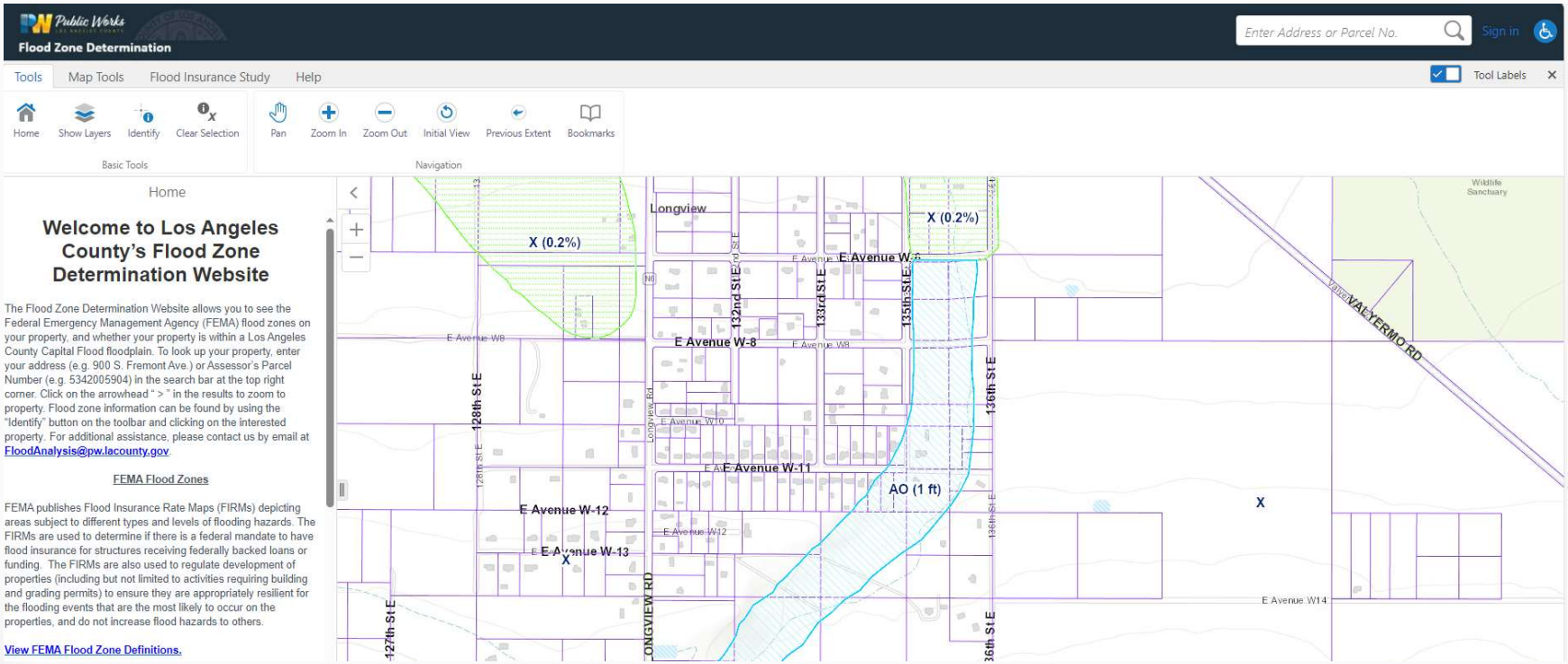
Individual Property Owner/Resident Responsibilities
Know Your Risk

Get the FEMA Flood Zones for your property at:

https://waterforla.lacounty.gov/flood-preparation/



Individual Property Owner/Resident Responsibilities
Consider Flood Insurance Options

No Area is completely free of flood risk.

Most homeowners' insurance policies *do not* cover flood damages.

FEMA

NATIONAL FLOOD INSURANCE PROGRAM

Go to https://floodsmart.gov

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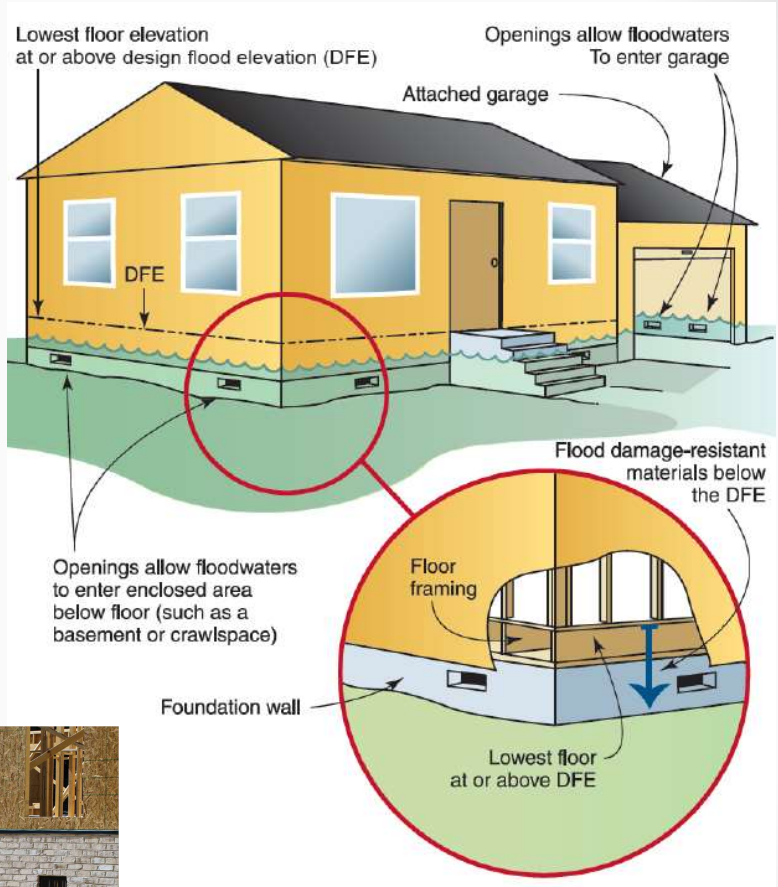
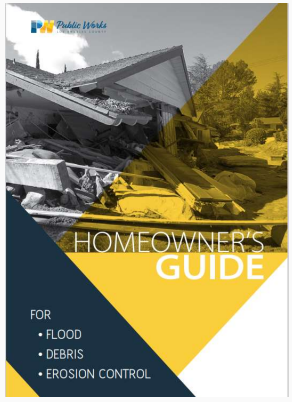
Individual Property Owner/Resident Responsibilities
Protect Your Property

- Consider implementing flood resiliency measures on your structures
- Engage a drainage/erosion control specialist to develop interim and long-term drainage measures on your property
- Go to **https://waterforla.lacounty.gov/flood-preparation/**
- Installing measures and cleaning up on-site debris are the property owner's responsibility
- Hire licensed, bonded contractors and professionals





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Individual Property Owner/Resident Responsibilities
Other Preparation Actions

Ready LA County

Go to **https://ready.lacounty.gov**

1. HAVE A PLAN

2. KEEP SUPPLIES

3. STAY INFORMED

4. GET INVOLVED

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Thank You!

Questions?

Flood Risk Management in Los Angeles County

Contact Information - Los Angeles County Public Works

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