CALIFORNIA LAND RECYCLING CONFERENCE

Imagine | Innovate | Implement

September 29 – October 1, 2026 | Foster City

LANDFILL TO LANDMARK

Engineering, Regulatory, and Community Pathways to Redevelopment

OFFICE OF BROWNFIELDS

CENTER FOR CREATIVE LAND RECYCLING

SPEAKERS



ELHAM SHIRAZI

Geosyntec Consultants



SYED REHAN

Geosyntec Consultants



ALLEN CHIU

San Mateo County Solid Waste Program - Local Enforcement Agency (LEA)



MEGAN HORN

Studio-MLA



Geosyntec consultants

LANDFILL REDEVELOPMENT: WHAT EVERY DEVELOPER, ENGINEER, AND REGULATOR SHOULD KNOW

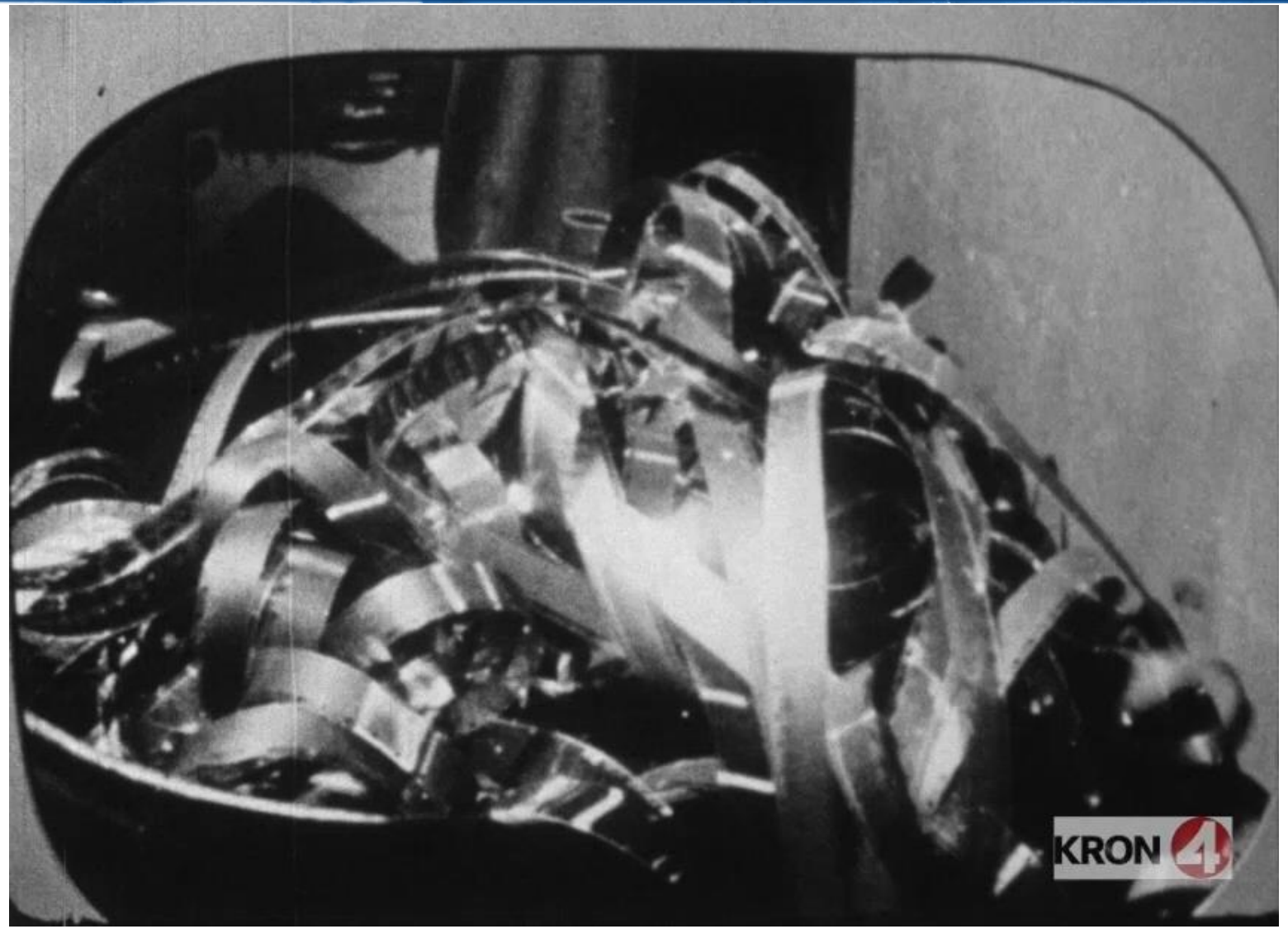
Syed Rehan, PE, BCEE

What You'll Learn



- Key challenges of redeveloping closed landfill sites
- Practical engineering solutions for managing risks
- Long-term stewardship and site management

Assignment Four – No Deposit, No Return



So, What Stands Between Him and His Vision?

- Regulations
  - 27 CCR § 21190. CIWMB—Post closure Land Use
    - Structural Improvements Criteria
  - 22 CCR, Section 64572: Water Main Separation



- Regulatory Agencies
  - CalRecycle (Department of Resources Recycling and Recovery)
  - Local Enforcement Agency, such as San Mateo County
  - State/Regional Water Quality Control Board (WDR)
  - Air Management District



When is Landfill Ready for Development?

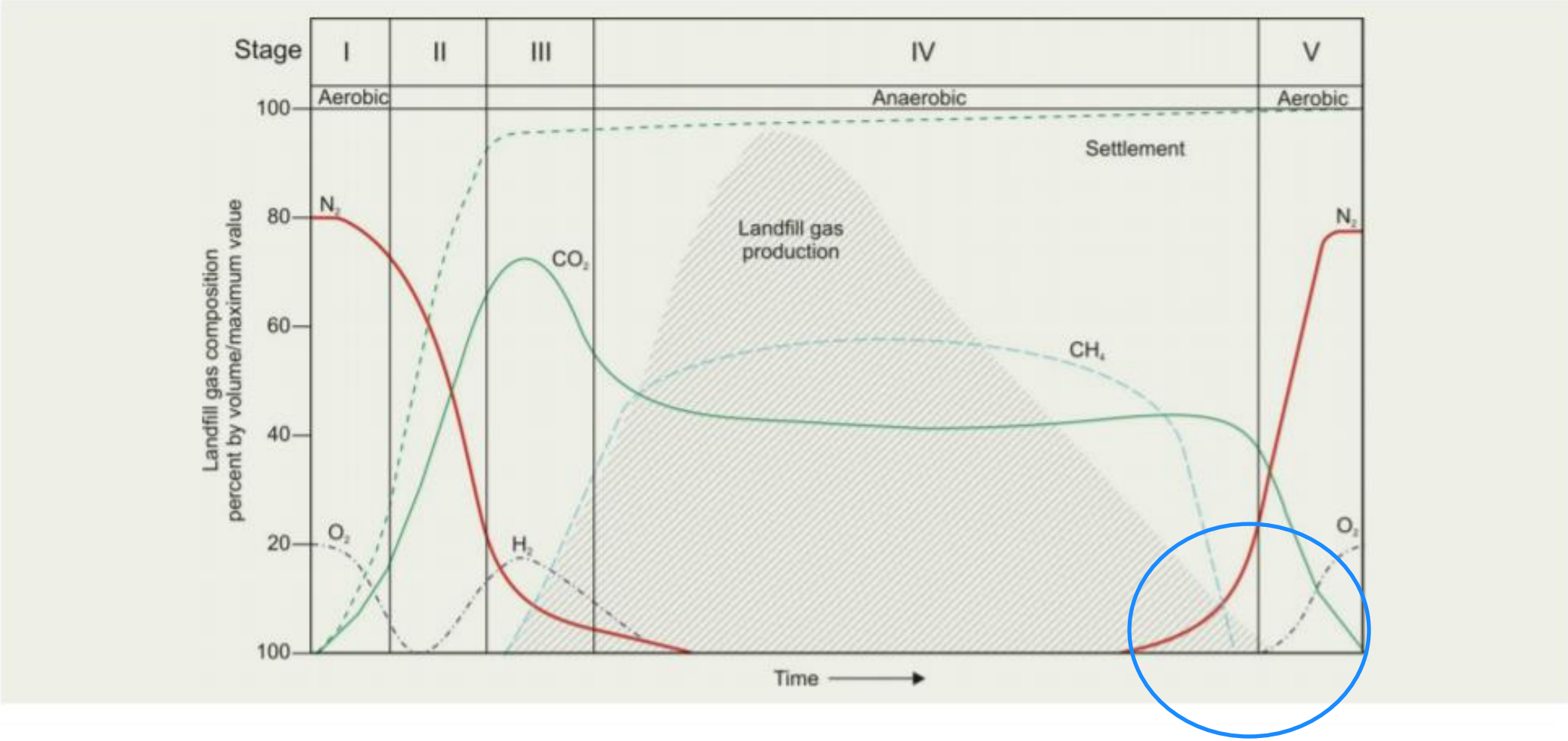


Figure 1. Changes In The Production And Composition Of Landfill Gas Over Time (Based On Farquhar And Rovers, 1973 With Additions)

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Post Closure: Structural Improvement Criteria



Structural Improvements Criteria
(27 CCR § 21190. CIWMB—Post Closure Land Use)

- Mitigating Gas Accumulation:
  - Buildings should be constructed to mitigate the effects of gas accumulation. This may involve active gas collection or passive vent systems.
- Methane Gas Sensors:
  - Automatic methane gas sensors must be installed in all buildings. These sensors trigger an audible alarm when methane concentrations are detected.
- Methane Gas Monitoring:
  - Periodic methane gas monitoring should be conducted inside all buildings and underground utilities.
- Differential Settlement:
  - Buildings and utilities must be designed to mitigate the effects of differential settlement.
- Utility Placement:
  - Utilities should not be installed in or below any low permeability layer of the final cover.

Structural Improvements Criteria
(27 CCR § 21190. CIWMB—Post Closure Land Use)

- Piling Installation:
  - Pilings must not be installed in or through any bottom liner unless approved by the RWQCB.
- Low Permeability Layer Repair:
  - If pilings are installed in or through the low permeability layer of the final cover, the low permeability layer must be replaced or repaired.
- Basement Construction:
  - Enclosed basement construction is prohibited.
- Additional Soil Layer or Building Pad:
  - An additional soil layer or building pad may be considered on the final cover to protect its integrity and function.
- On-Site Construction Near Disposal Areas:
  - These guidelines are applicable for construction within 1,000 feet of the boundary of any disposal area.

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Engineering Solutions



Landfill Gas Mitigation System (For Structures)



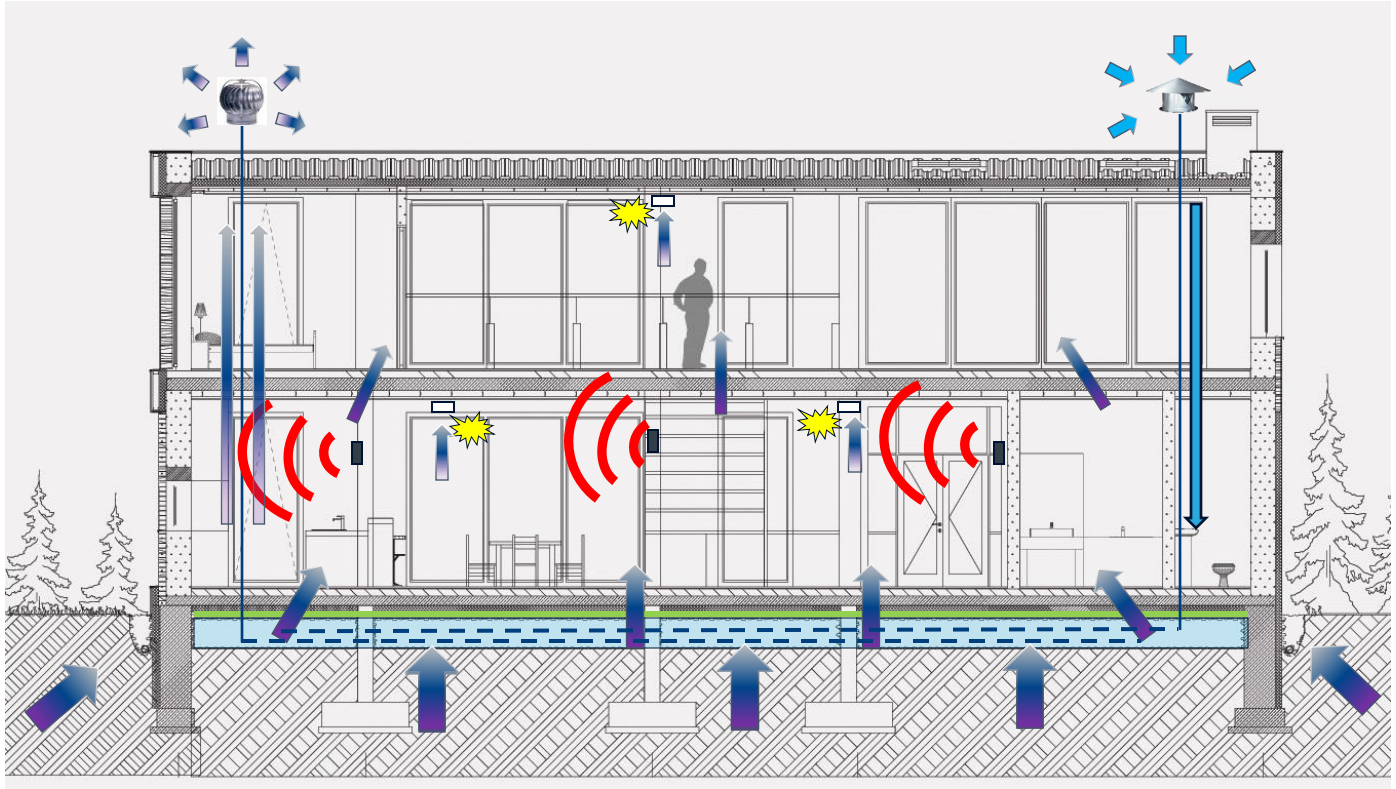
- Address the following criteria
  - Mitigating Gas Accumulation
  - Gas Sensors
  - Gas Monitoring

Landfill Gas Mitigation System Concept

When triggering the methane sensors:

- Visual and audio alarms
- Send signals to FACP

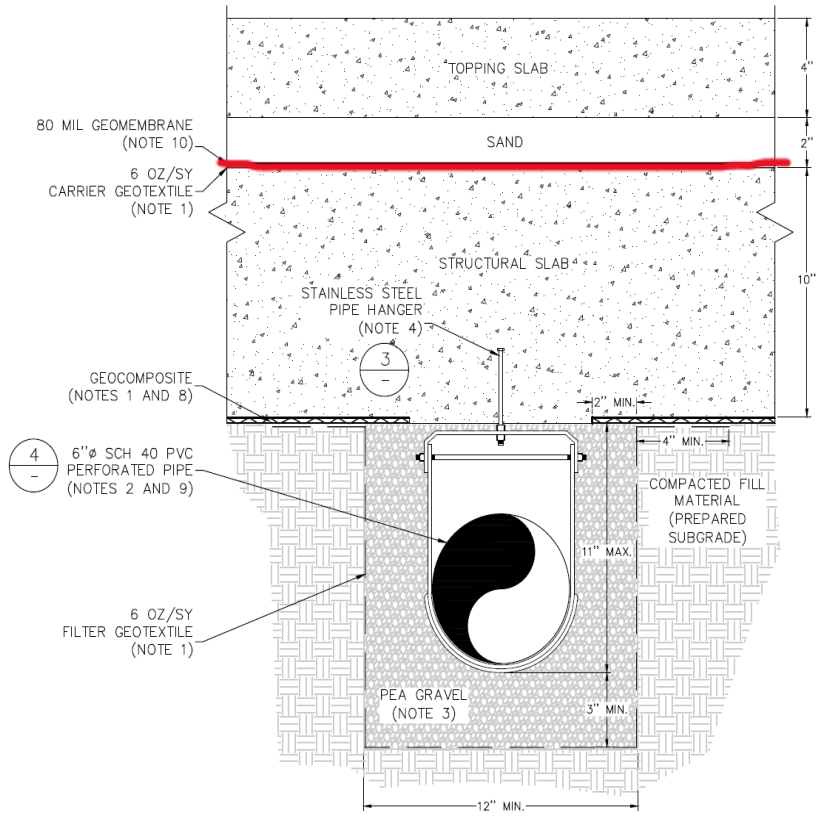
Passive Ventilation System Operation



- LGMS Components:
  - Ventilation layer
  - Vapor barrier
  - Ventilation risers
    - Rain cap
    - Wind driven turbine
  - Methane sensors and alarms

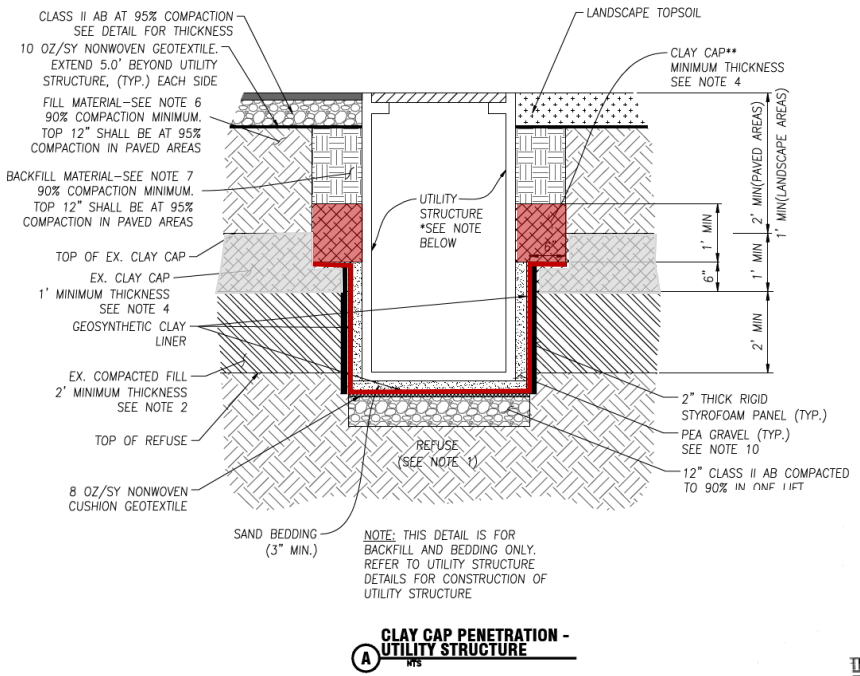
Landfill Gas Extraction

- Settlement Mitigation Measures
  - Extraction pipe hanger
  - Geocomposite secured to the slab rebar
  - Geomembrane over structural slab
  - Protective 4-inch concrete slab above geomembrane

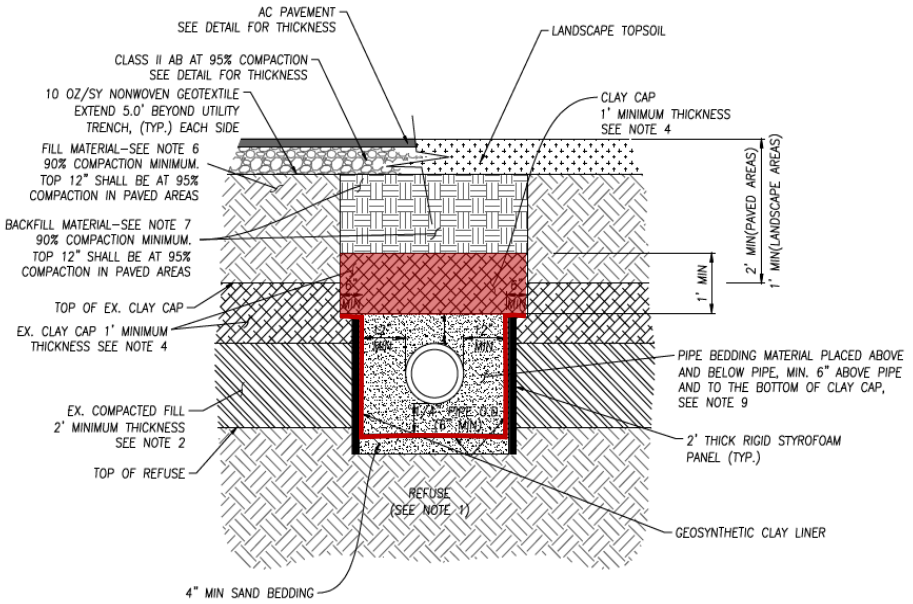


2 EV1.00 SECTION (TYPICAL) GAS MITIGATION SYSTEM
N.T.S.

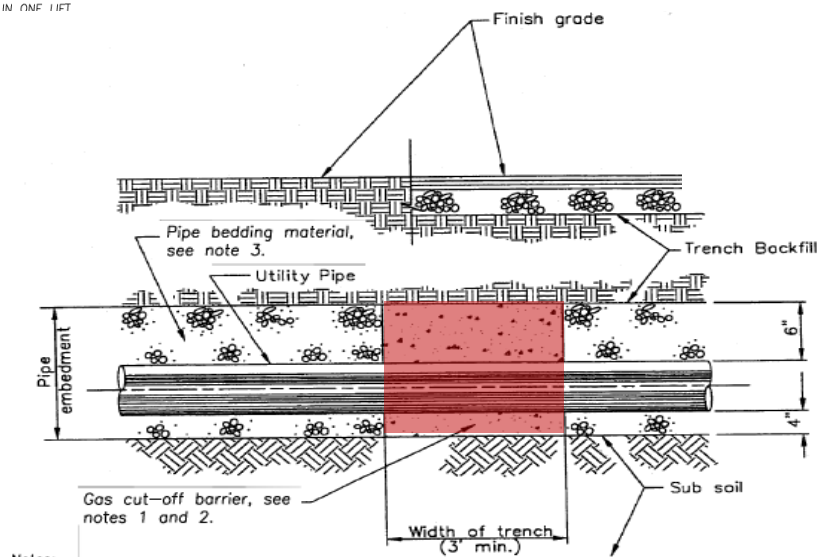
Low Permeability Layer Repair



CLAY CAP PENETRATION - UTILITY STRUCTURE (A) NTS



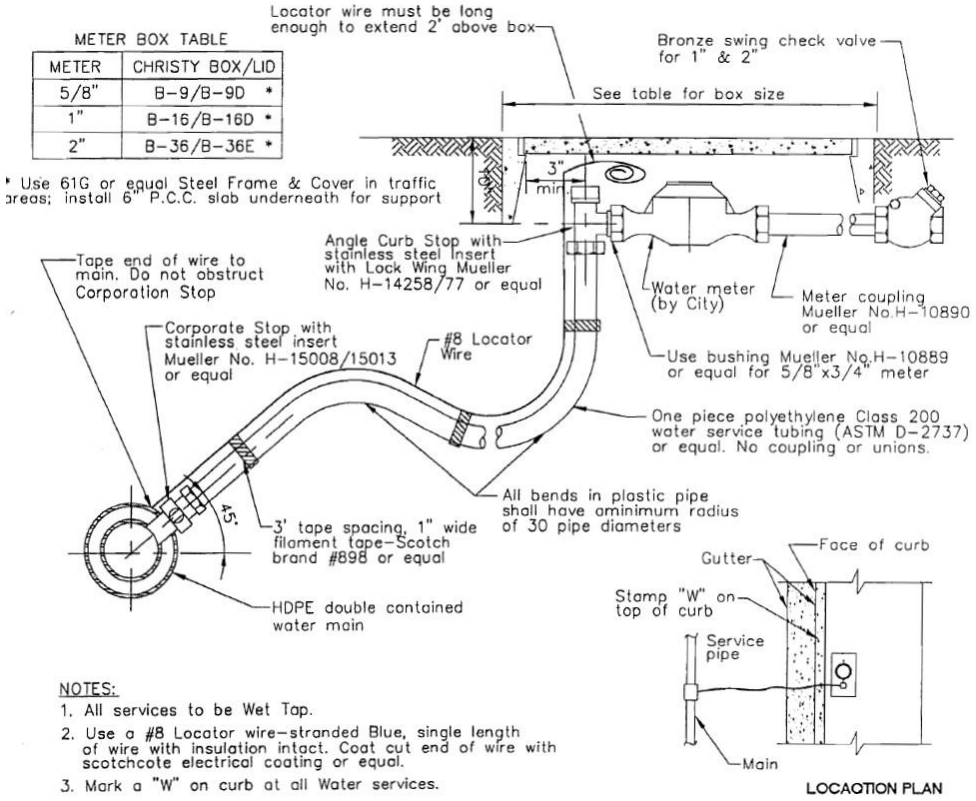
CLAY CAP PENETRATION - UTILITY TRENCH (B) NTS

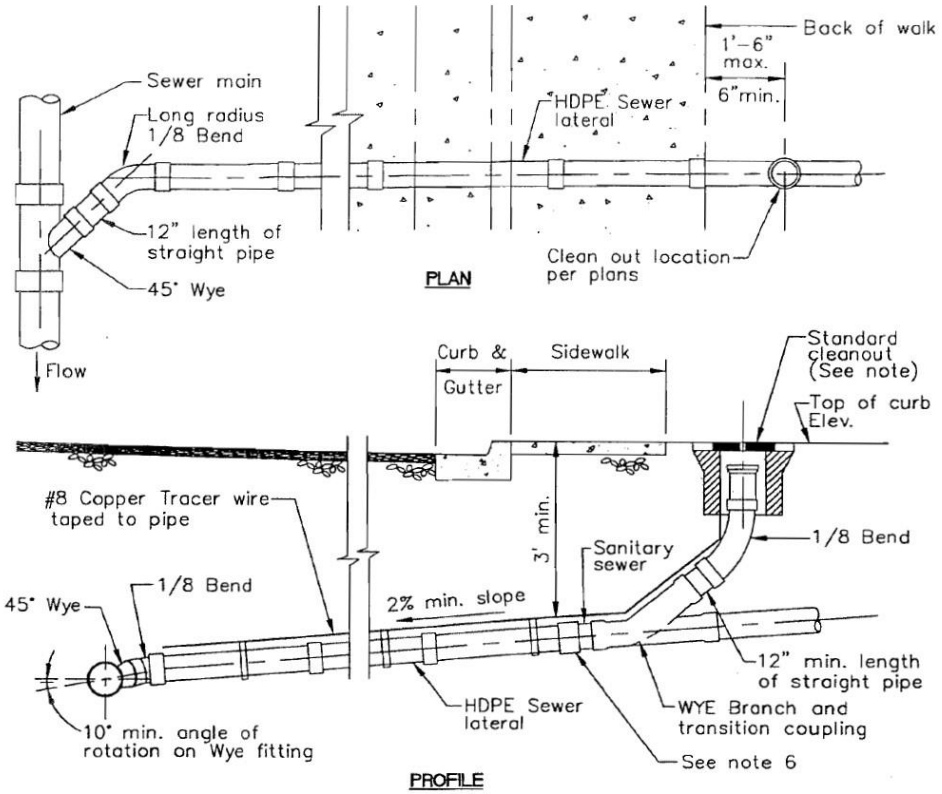


Cut off Barrier in utility Trench

Differential Settlement

- Buildings and utilities must be designed to mitigate the effects of differential settlement





Differential Settlement – Flexible Connections

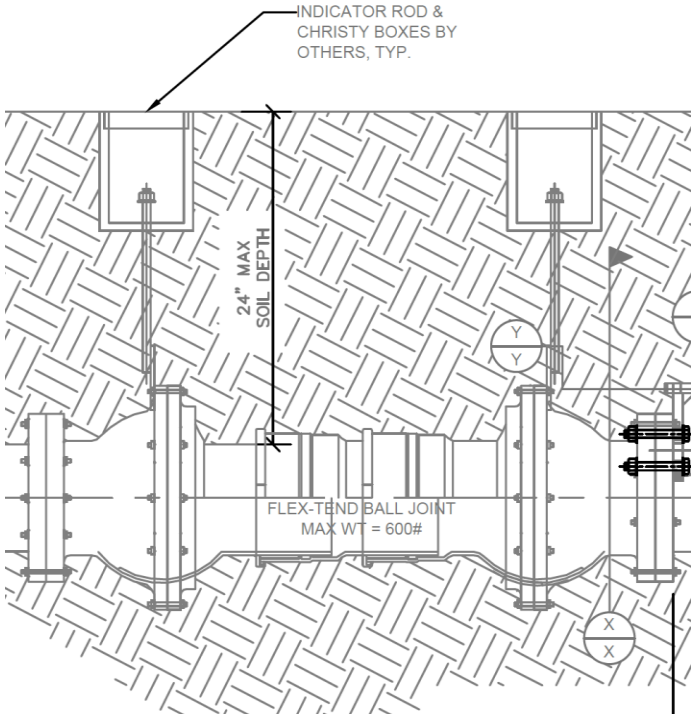
- Flex Tend valve for water line



EX-TEND® Linear Expansion Joint



EX-TEND® Flexible Joint



Title 22 Requirement

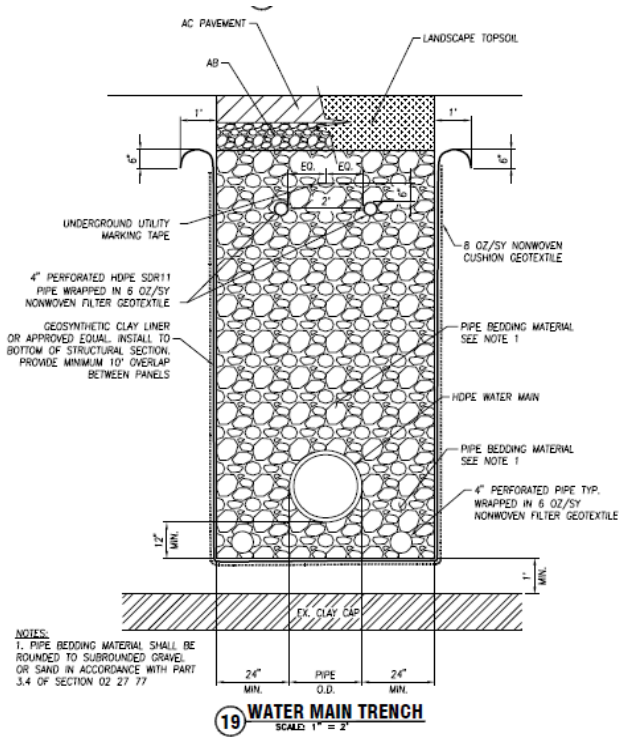
California Code of Regulations (CCR) Title 22, Section 64572: Water Main Separation

Section 64572 (f): “New water mains shall not be installed within 100 horizontal feet of the nearest edge of any sanitary landfill…”

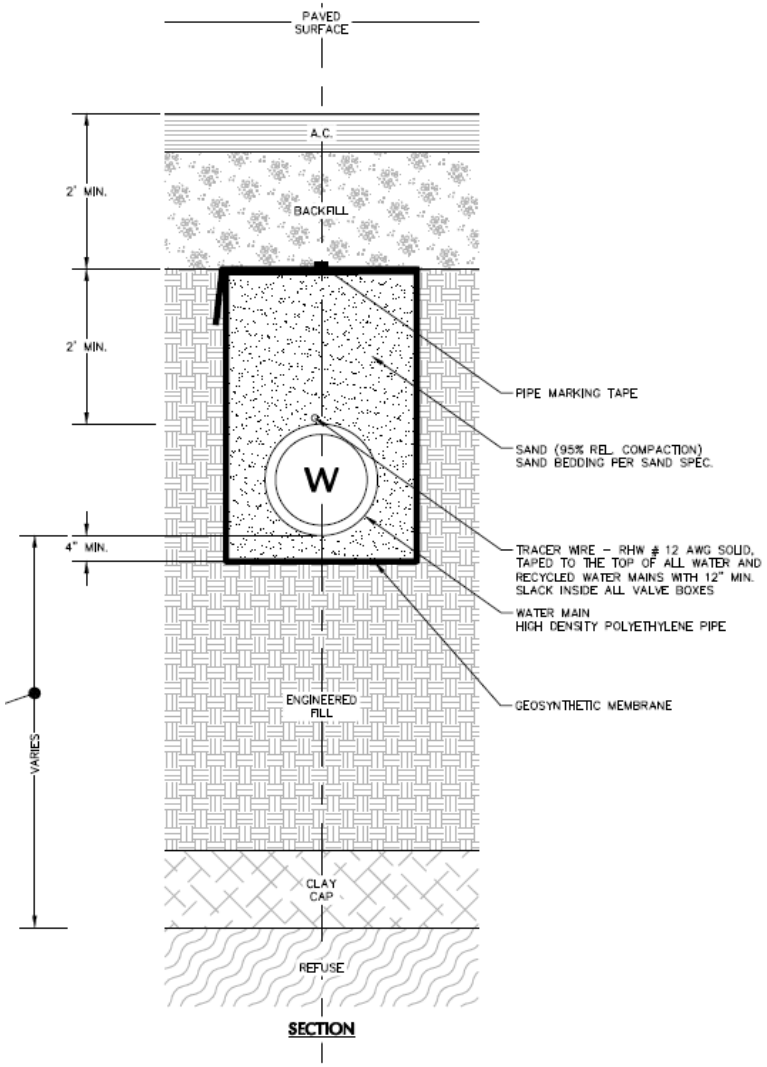
Regulation became particularly relevant after the water crisis in Flint, Michigan was in the media spotlight in 2014 for lead contamination in the city’s potable water system.



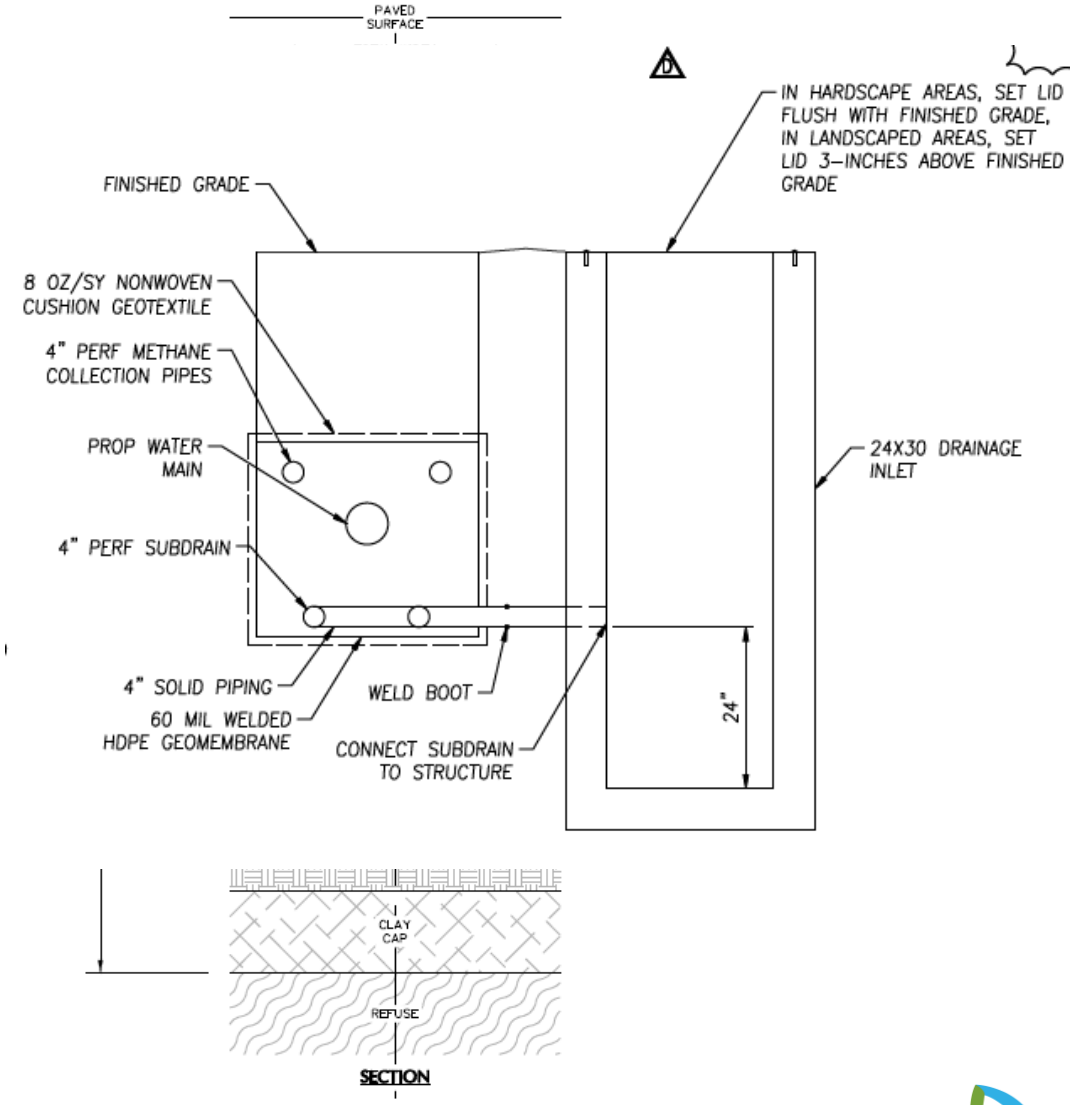
Different Levels of Engineering Controls



19 **WATER MAIN TRENCH**
SCALE: 1" = 2'



SECTION



SECTION

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Post Construction Monitoring & Maintenance



Routine Monitoring Activities

- Ground settlement
  - Visual Inspection
  - Survey monitoring: utility structures across the site and at foundation skirt walls and pile caps
- Subsurface structure monitoring for landfill gas
  - Sample probes, maintenance vaults associated with electric, gas, communications, as well as settlement vaults
- Landfill gas mitigation and monitoring system (LGMS)
- Cathodic protection system monitoring
  - Cathodic protection survey and anode test
  - Rectifier readings
- Trained building staff and provide information to the tenants about the existing site conditions and the associated risks







Plan for Continuous Maintenance

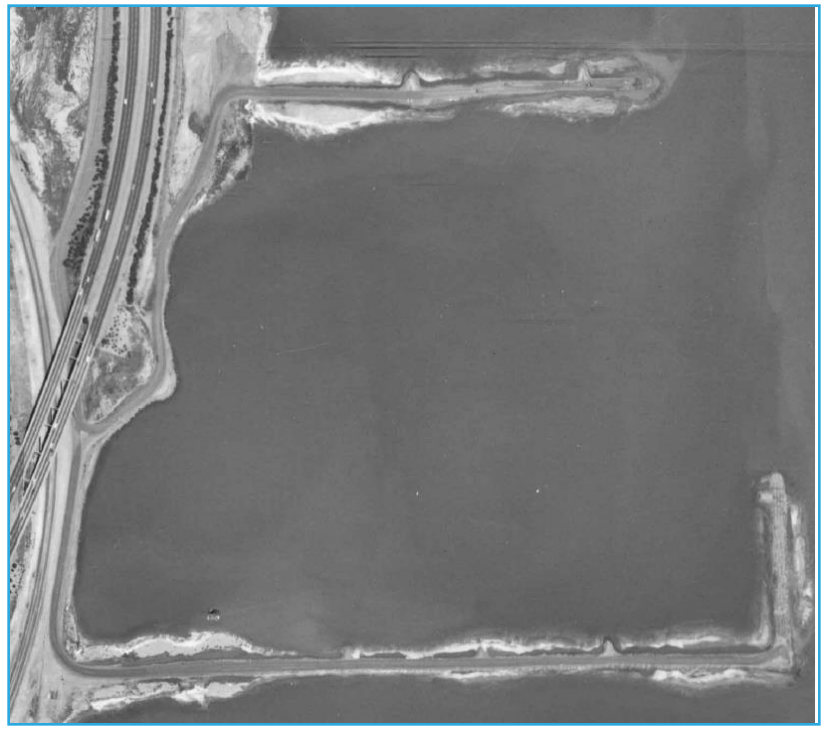


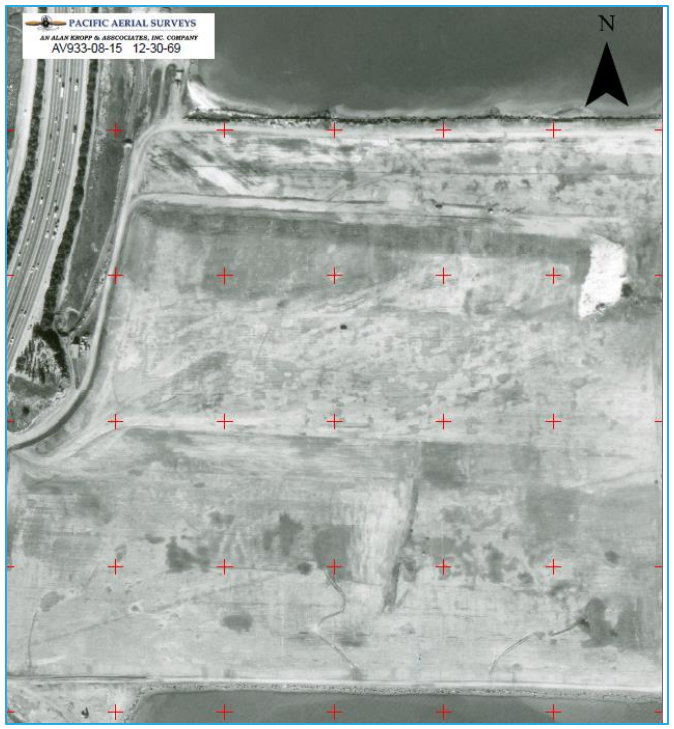






Summary







- Challenges - Engineering - Collaboration - Long-term Involvement


Geosyntec
consultants
THANK YOU!



San Mateo LEA

LANDFILL REDEVELOPMENT POSTCLOSURE DEVELOPMENT IN SAN MATEO COUNTY

Allen Chiu, REHS
Solid Waste Program Lead
Environmental Health Specialist IV

SAN MATEO COUNTY HEALTH
ENVIRONMENTAL HEALTH SERVICES



Agenda

- Who are the players?
- What are the rules?
- Landfill Basics and Environmental Considerations
- San Mateo's Solid Waste Program
  - Program Overview
  - 3-tiered application for postclosure development
- Lessons Learned / Project Considerations

What is the LEA?
Local Enforcement Agency (LEA)

- **State Certified Agency:**
  - By the California Department of Resources Recycling and Recovery (CalRecycle), a branch of CalEPA
- **Responsibilities:**
  - Primary regulators for solid waste facilities and operations within San Mateo County
  - Conduct routine inspections
  - Conduct complaint investigations
  - Enforce corrective actions and issue Notices of Violation
  - Ensure compliance with state minimum standards for the protection of public health, safety, and environmental protection
  - Oversee the County's Solid Waste Postclosure Development Program

CalRecycle's Mission: *To protect California's environment and climate for the health and prosperity of future generations through the reduction, reuse, and recycling of California resources, environmental education, disaster recovery, and the transition from a disposable to a fully circular economy.*

SAN MATEO COUNTY

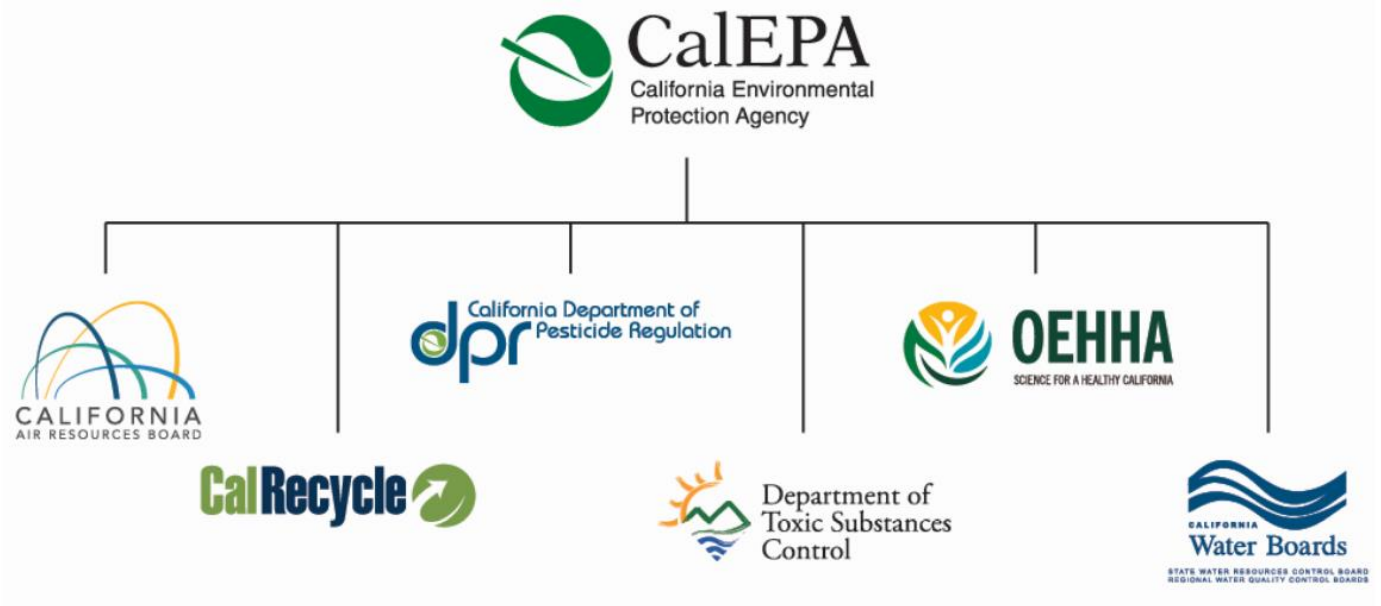
- Atherton (Town)
- Belmont (City)
- Brisbane (City)
- Burlingame (City)
- Colma (Town)
- Daly City (City)
- East Palo Alto (City)
- Foster City (City)
- Half Moon Bay (City)
- Hillsborough (Town)
  Menlo Park (City)
- Millbrae (City)
- Pacifica (City)
- Portola Valley (Town)
- Redwood City (City – County Seat)
- San Bruno (City)
- San Carlos (City)
- San Mateo (City)
- South San Francisco (City)
- Woodside (Town)



SAN MATEO COUNTY HEALTH
ENVIRONMENTAL HEALTH SERVICES

Other Responsible Agencies

- Bay Area Air District (BAAD) – formerly BAAQMD
- CalRecycle
- Local Building & Planning Agencies
- San Francisco Bay Regional Water Quality Control Board (RWQCB)

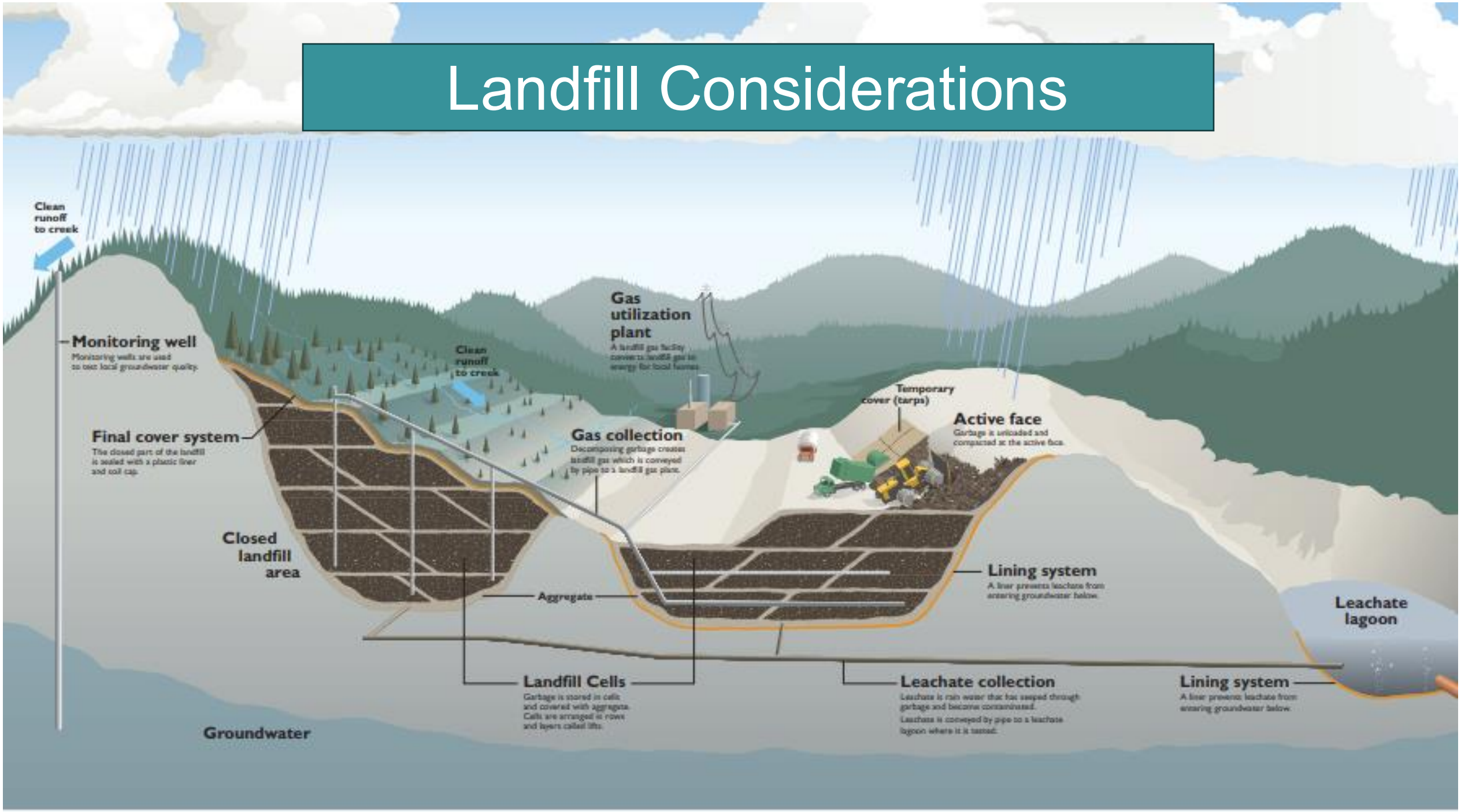




What are the rules?

- **Public Resources Code (PRC)**
- **California Code of Regulations (CCR), Title 14 & 27**
- **San Mateo County Ordinance**

Landfill Considerations



Program Elements:



ACTIVE LANDFILLS

Ex: Ox Mountain Sanitary Landfill



CLOSED LANDFILLS

Ex: Mussel Rock



POSTCLOSURE DEVELOPMENT

Ex: Kilroy Oyster Pt



- Construction/Demolition Processing
- Compostable Materials Handling/Processing:
  - Composting
  - Anaerobic Digestion
- Transfer/Processing
- Waste Haulers









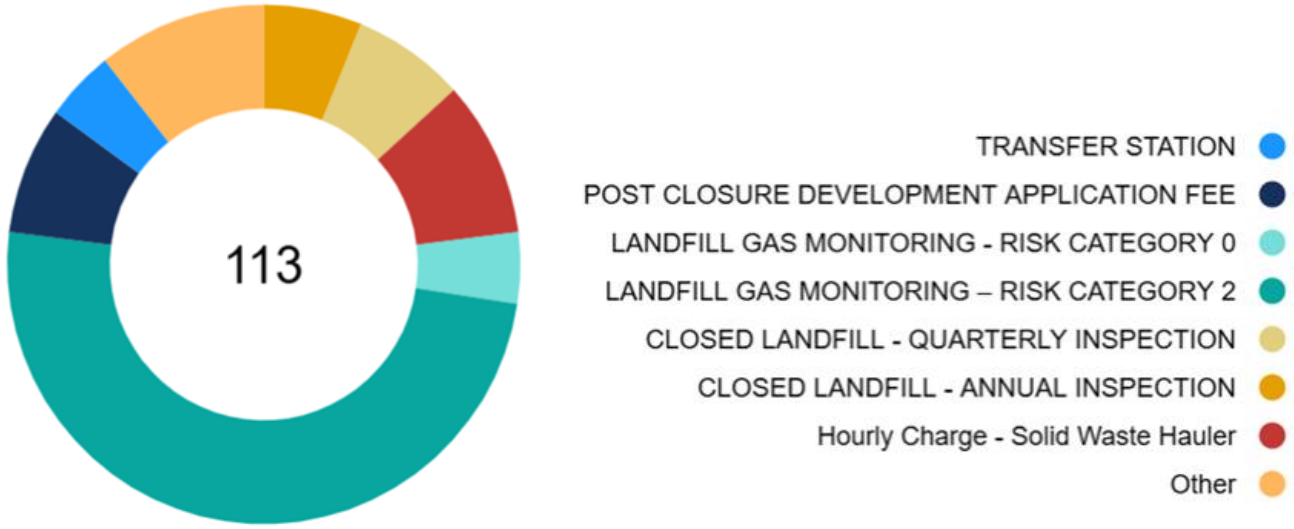
Postclosure Development Over the Years







Solid Waste Program by the Numbers

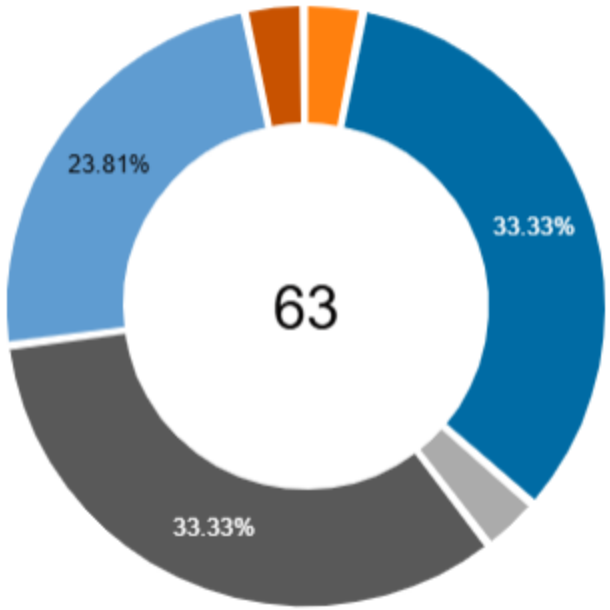


FY 24/25 Permitted Facilities & Operations:

- **Active landfill** – 1
- **Closed landfills** – 17
- Transfer stations – 5
- Compostable materials handling – 5
- Solid waste haulers – 12
- **Postclosure developments** – 62*
- Other (Permit actions/pending projects) – 11



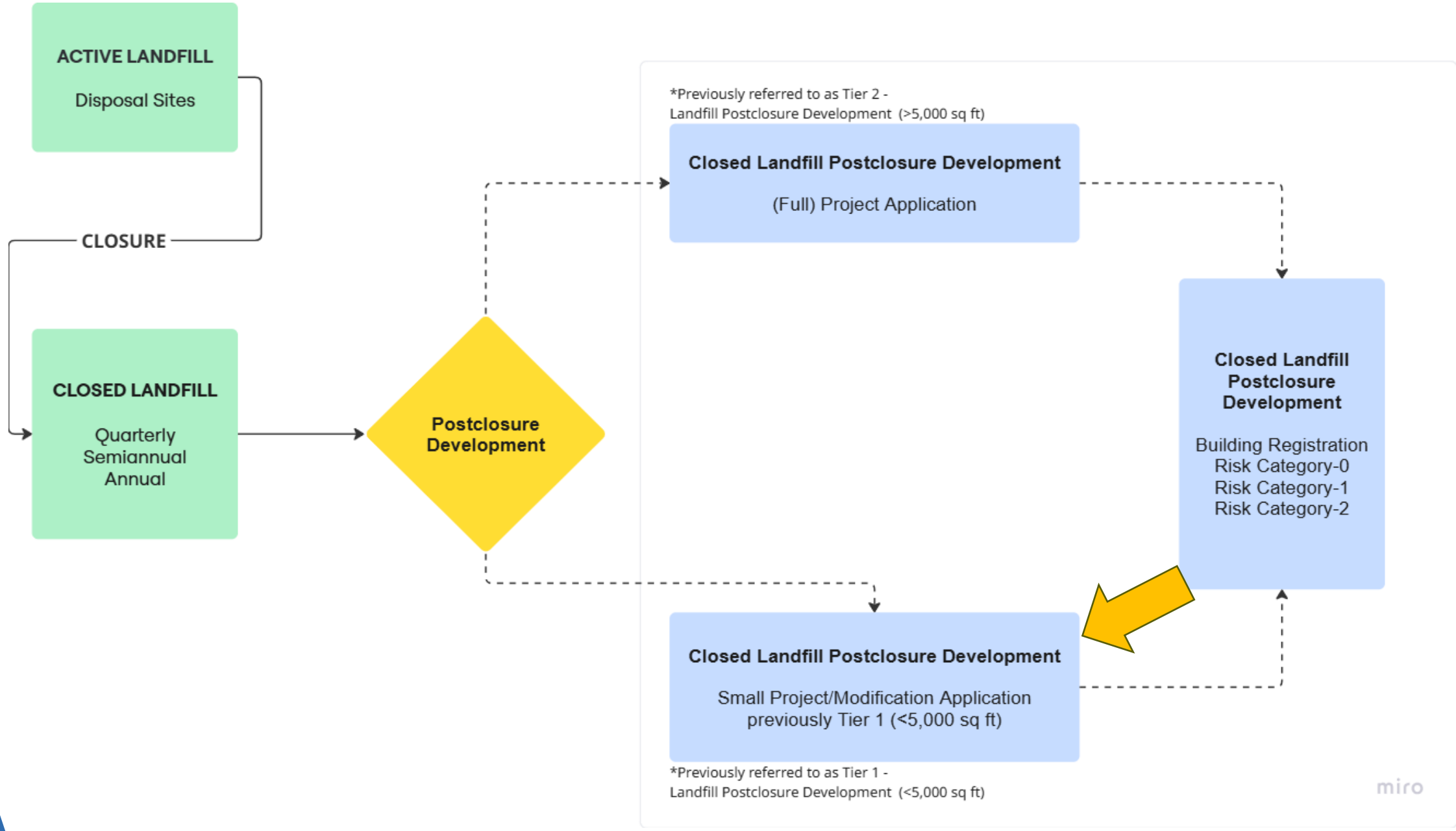
Solid Waste Program by the Numbers



- BELMONT
- BRISBANE
- BURLINGAME
- REDWOOD CITY
- SOUTH SAN FRANCISCO
- Other

Postclosure developments FY 25'/26' – 63

SOLID WASTE POSTCLOSURE DEVELOPMENT WORKFLOWS

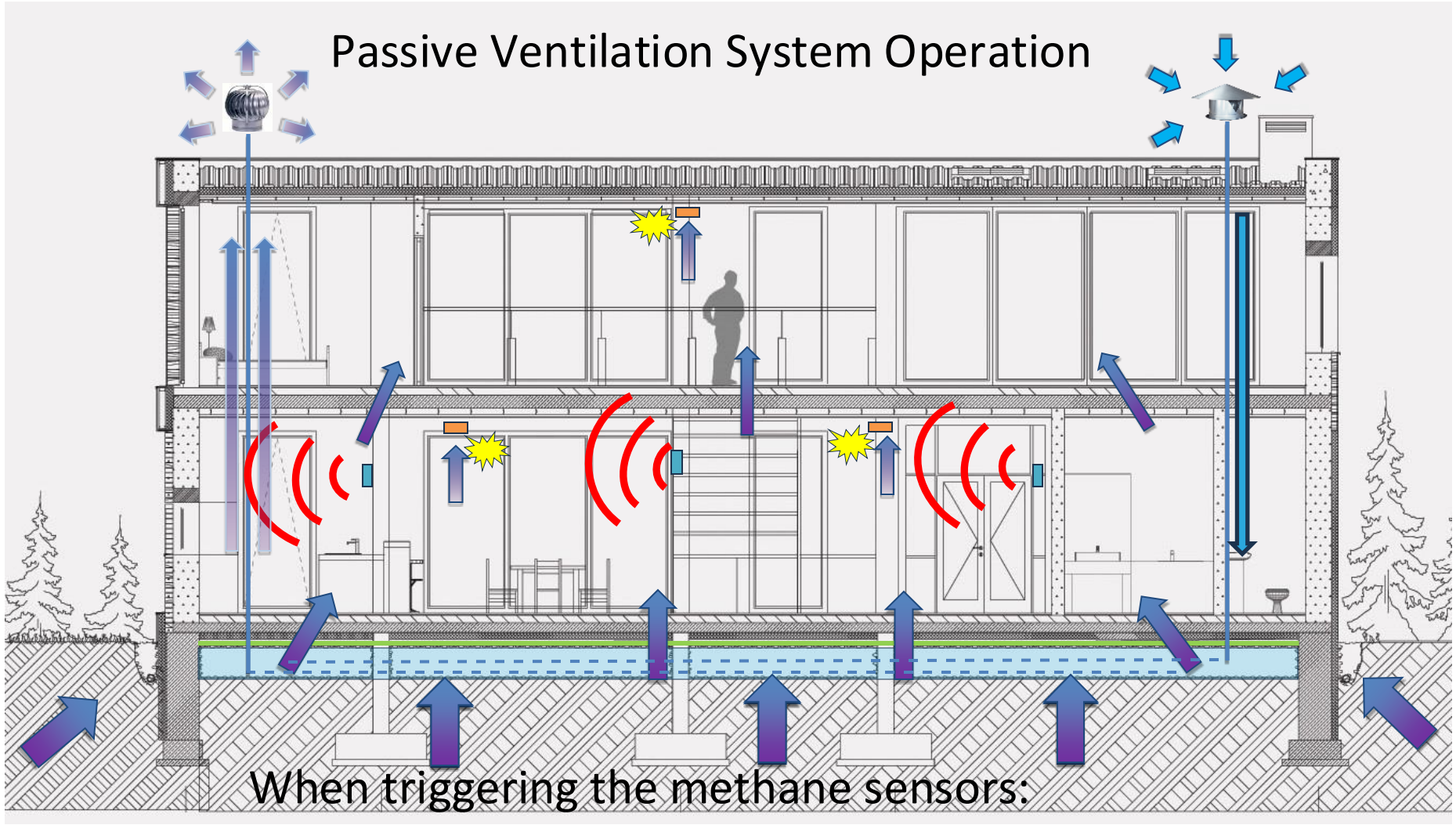




Lessons Learned / Project Considerations

- Familiarity with regulatory landscape and landfill redevelopment
- Experience matters – from change orders to implementing contingencies when, not if, site conditions are not as expected to drafting the extensive environmental documents that will govern these sites
- Hand-off from in-progress construction to postclosure maintenance and monitoring

Landfill Gas Monitoring Inspection



When triggering the methane sensors:

- Visual and audio alarms
- Send signals to FACP

Scope:

- Ventilation layer
- Vapor barrier
- Ventilation risers
  - Rain cap
  - Wind driven turbine
- Methane sensors and alarms

SAN MATEO COUNTY HEALTH

ENVIRONMENTAL HEALTH SERVICES

Allen Chiu, REHS
achiu@smcgov.org



After the Last Truck

Transforming Landfills into Public Spaces

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LOS ANGELES COUNTY Parks & Recreation

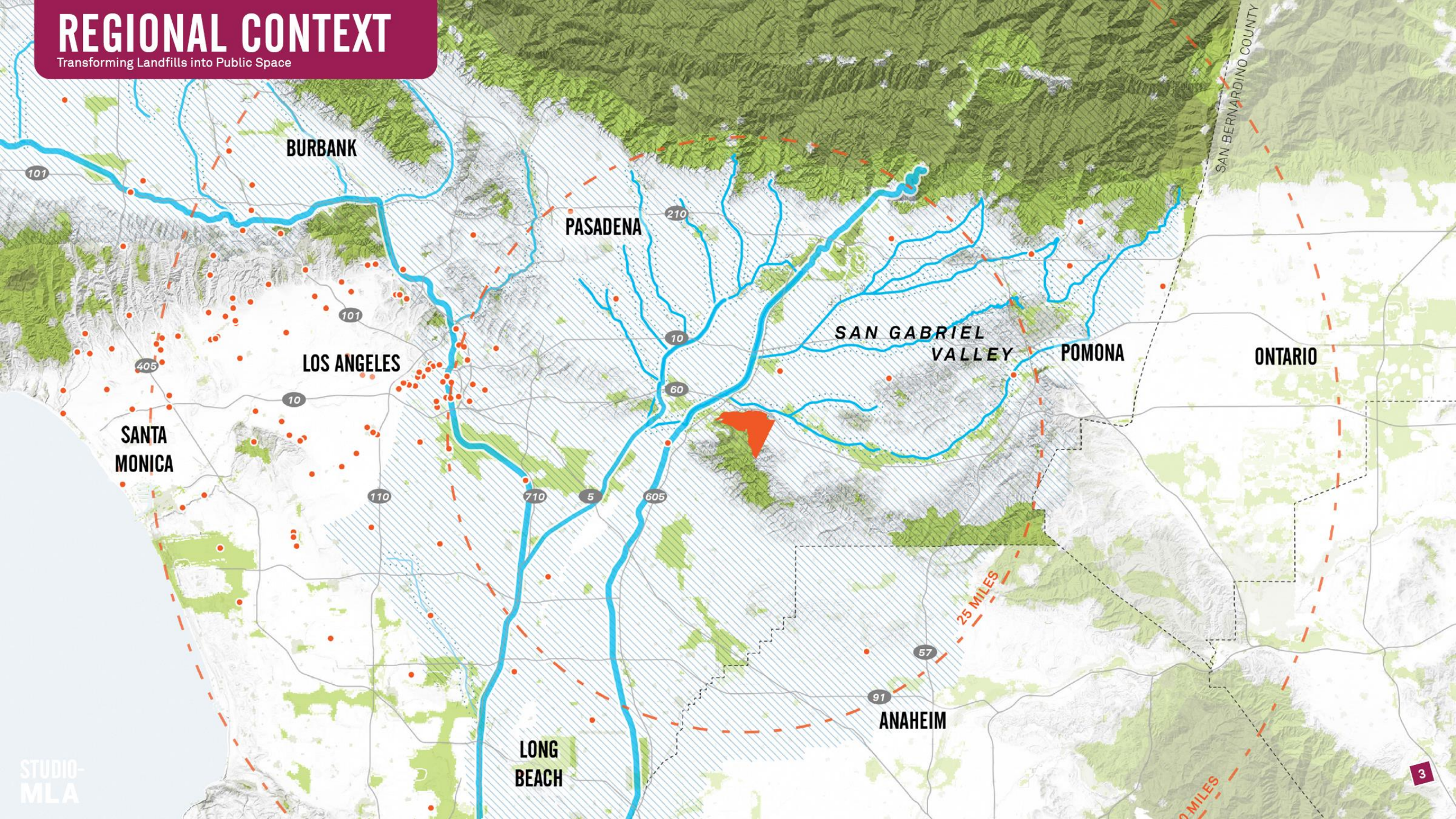


Shaped by layered histories of Indigenous settlement; conquest and colonization; exploitation of land, labor, and resources through large landholding regimes; regional economies; suburbanization; and transpacific circuits of immigration and capital

WENDY CHENG, A BRIEF HISTORY (AND GEOGRAPHY) OF THE SAN GABRIEL VAL-

REGIONAL CONTEXT

Transforming Landfills into Public Space



STUDIO-MLA

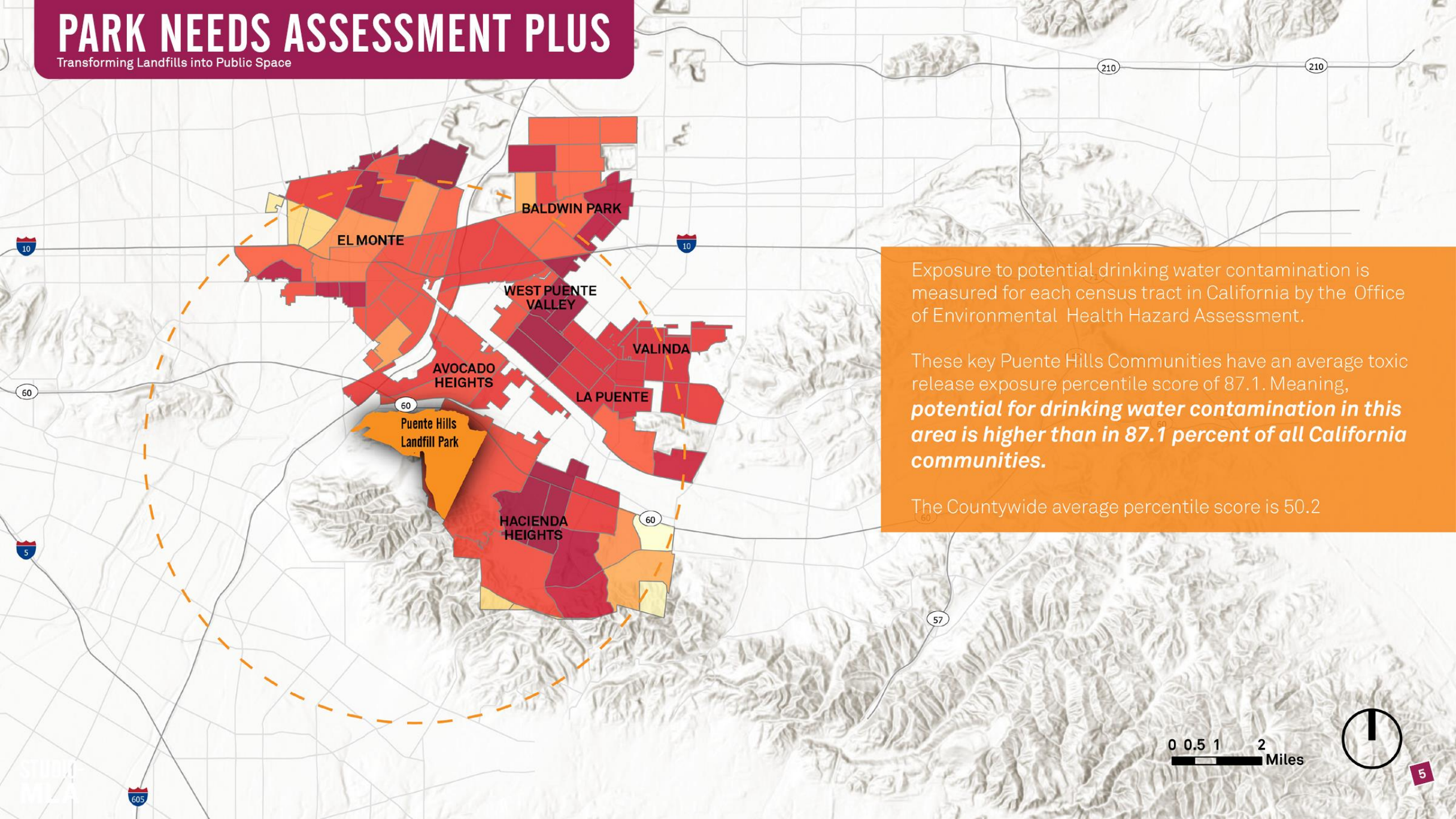
As is widely acknowledged, low-income people of color are most likely to experience the toxic accumulation of industrial pollutants and hazardous wastes, or to live near facilities for waste disposal, energy production, and other infrastructures incompatible with human (and more-than-human) wellbeing. These landscapes of cumulative risk lead to illnesses... rarely traced to the source, and the polluters have long avoided accountability.

Seeking environmental justice entails not only the redistribution of such burdens, but also the development of alternatives to these harmful practices and, most importantly, the pursuit of repair through sustained work and commitment.

ALISON B. HIRSCH, FIELD NOTES ON DESIGN ACTIVISM

PARK NEEDS ASSESSMENT PLUS

Transforming Landfills into Public Space



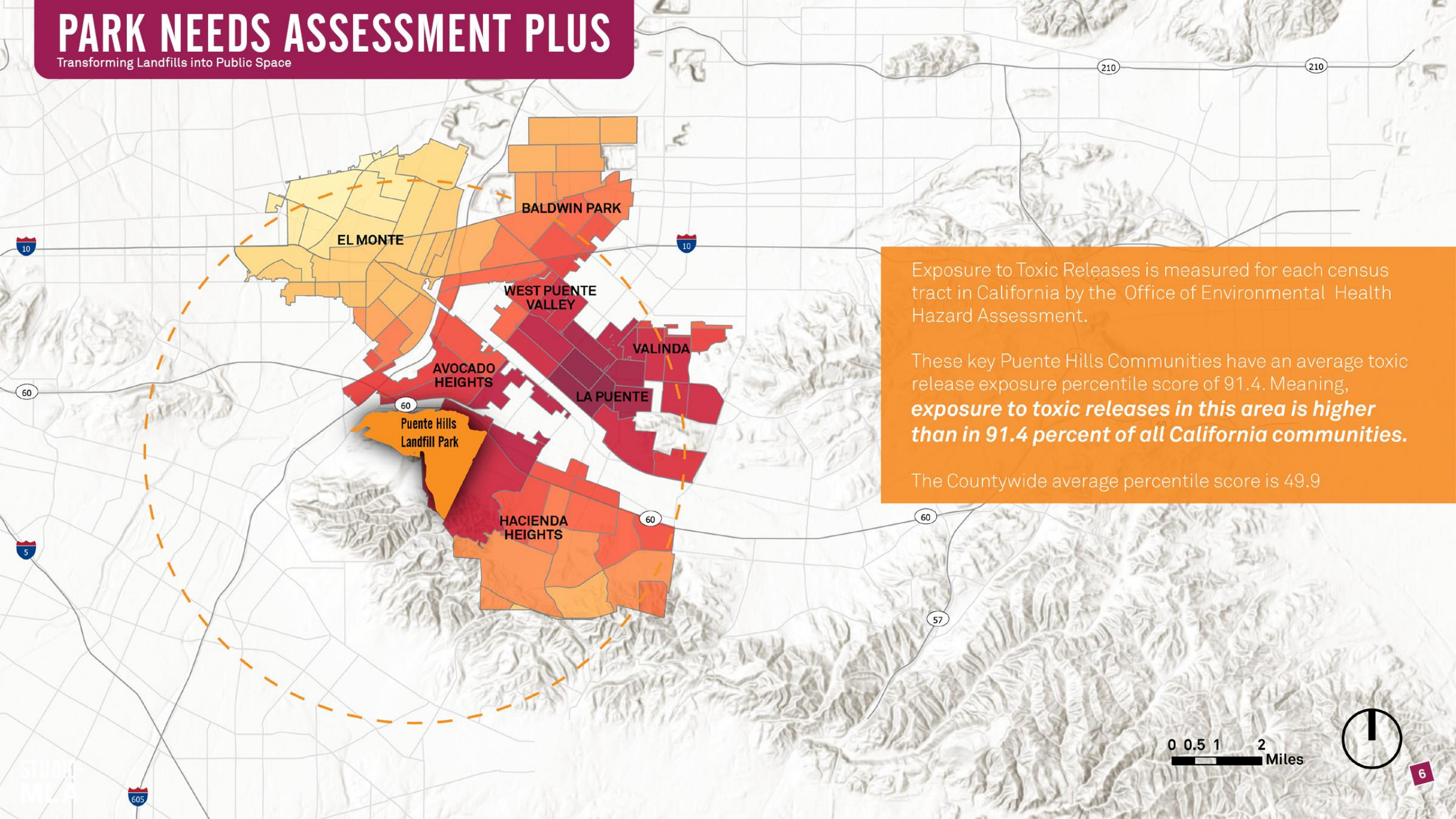
Exposure to potential drinking water contamination is measured for each census tract in California by the Office of Environmental Health Hazard Assessment.

These key Puente Hills Communities have an average toxic release exposure percentile score of 87.1. Meaning, ***potential for drinking water contamination in this area is higher than in 87.1 percent of all California communities.***

The Countywide average percentile score is 50.2

PARK NEEDS ASSESSMENT PLUS

Transforming Landfills into Public Space



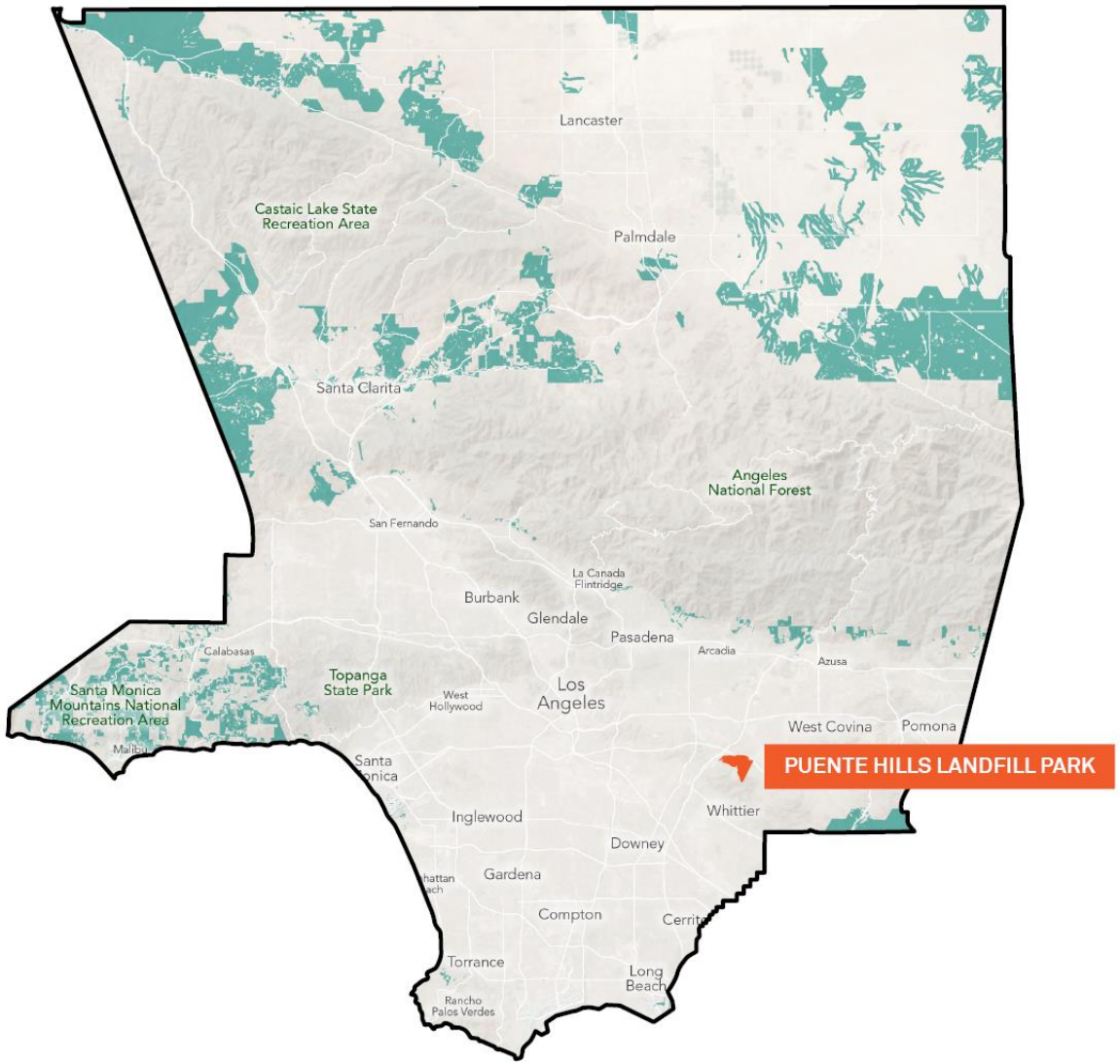
Exposure to Toxic Releases is measured for each census tract in California by the Office of Environmental Health Hazard Assessment.

These key Puente Hills Communities have an average toxic release exposure percentile score of 91.4. Meaning, ***exposure to toxic releases in this area is higher than in 91.4 percent of all California communities.***

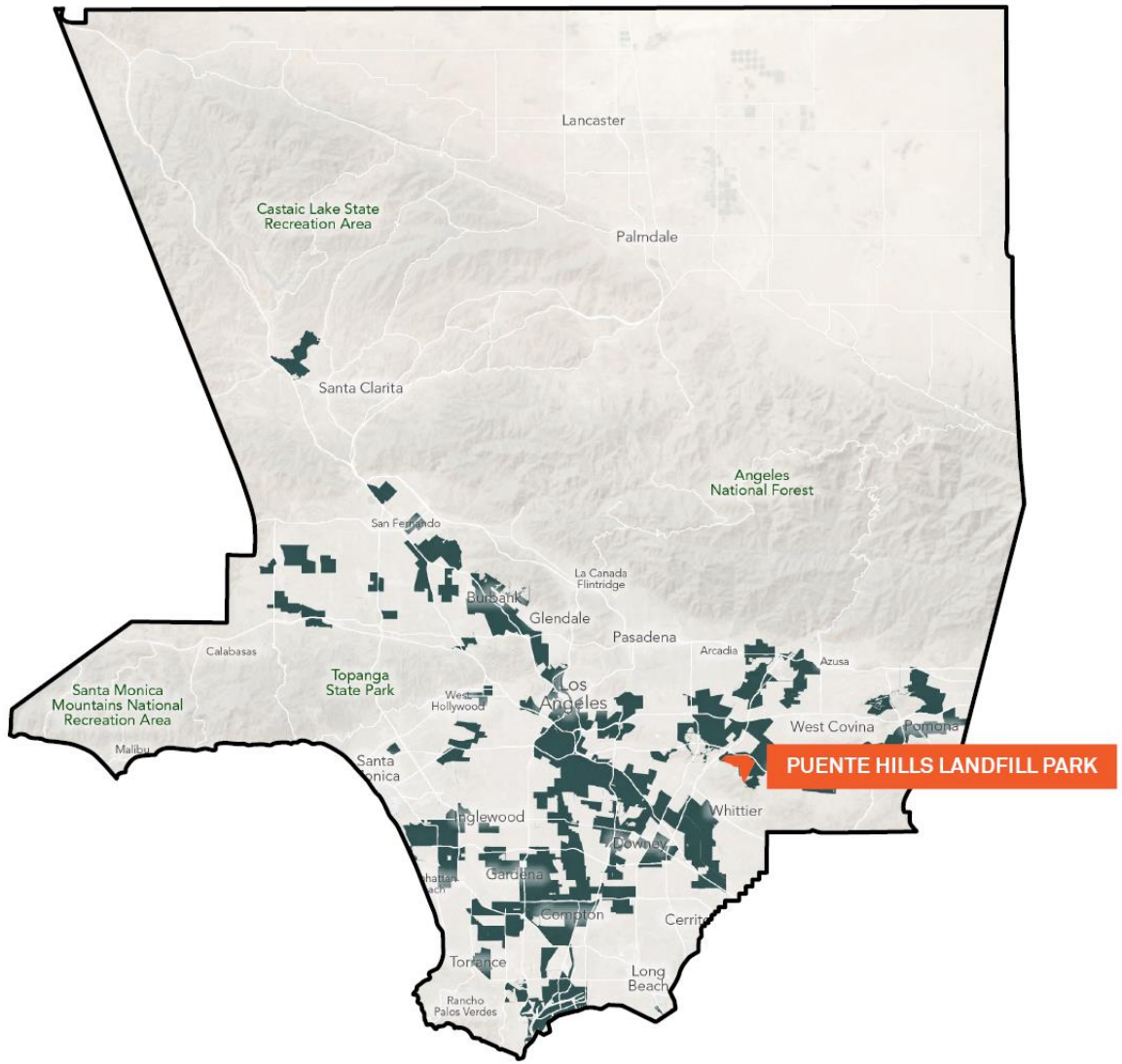
The Countywide average percentile score is 49.9

30X30 PLAN

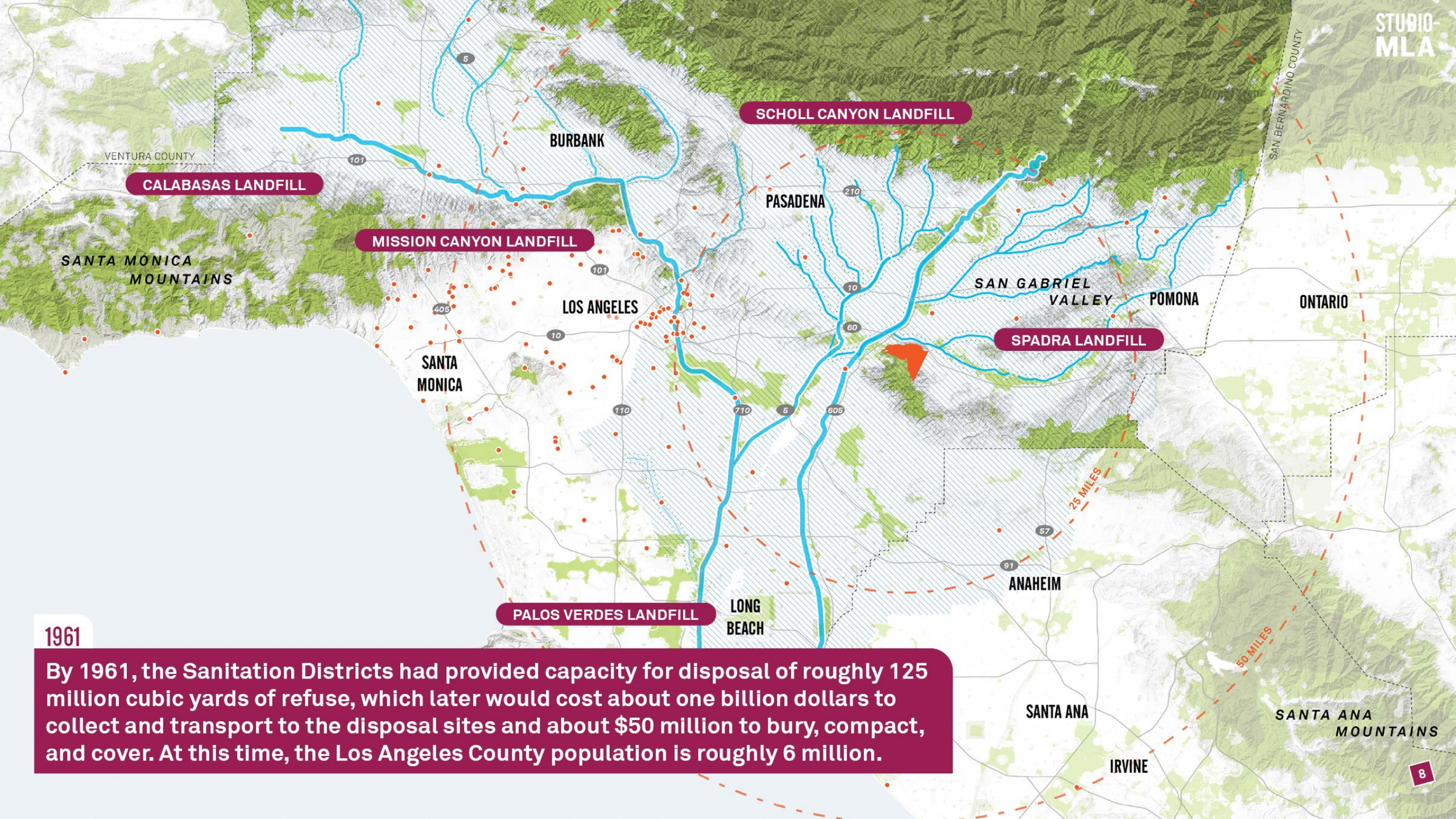
Transforming Landfills into Public Space



Non-Public Lands of Highest Environmental Benefit



Areas of Highest Environmental Burden



1961

By 1961, the Sanitation Districts had provided capacity for disposal of roughly 125 million cubic yards of refuse, which later would cost about one billion dollars to collect and transport to the disposal sites and about $50 million to bury, compact, and cover. At this time, the Los Angeles County population is roughly 6 million.

POST-WAR BOOM

Transforming Landfills into Public Space

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1950 TO 1970

North Whittier Heights remained a subdivision of citrus and avocado groves for decades afterward, with a massive change occurring throughout the region with post-war population and development surges. Tract homes began to appear by 1960, around the time that the name of community was changed to Hacienda Heights–a reference to the 'hacienda' that was the Workman Homestead.

MEGA-LANDFILL IN THE MAKING

Transforming Landfills into Public Space

STUDIO-MLA



1970

In 1970, the Sanitation Districts purchases the land for the present-day Puente Hills Landfill for $9 million. The ultimate capacity of the entire site was estimated to be 125 million tons of refuse. At this time, the Los Angeles County population is roughly 7 million.

MEGA-LANDFILL IN THE MAKING

Transforming Landfills into Public Space



STUDIO-MLA

MEGA-LANDFILL IN THE MAKING

Transforming Landfills into Public Space



"If Puente Hills were an elephant burial ground, its tonnage would represent about 15 million deceased pachyderms--equivalent to every living elephant on earth, times twenty. If it were an automobile burial ground, it could hold every car produced in America for the past fifteen year."

EDWARD HUMES, GARBOLOGY: OUR DIRTY LOVE AFFAIR WITH TRASH



STUDIO-MLA

1983

The Los Angeles County Department of Regional Planning approved Conditional Use Permit (CUP) No. 2235-(1) which allowed for the continued operation and expansion of the Puente Hills Landfill. The CUP required the Sanitation District to enter into an irrevocable agreement with Los Angeles County to designate the refuse-filled portions of the site as open space in perpetuity.

2002

The County extended the permit for the Landfill's operations with CUP Case No. 02-025-(4) and conditions related to the final recreation use of the site were further refined.

2013 LANDFILL CLOSES

Transforming Landfills into Public Space



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COUNTY LEADERSHIP

Transforming Landfills into Public Space

STUDIO-MLA



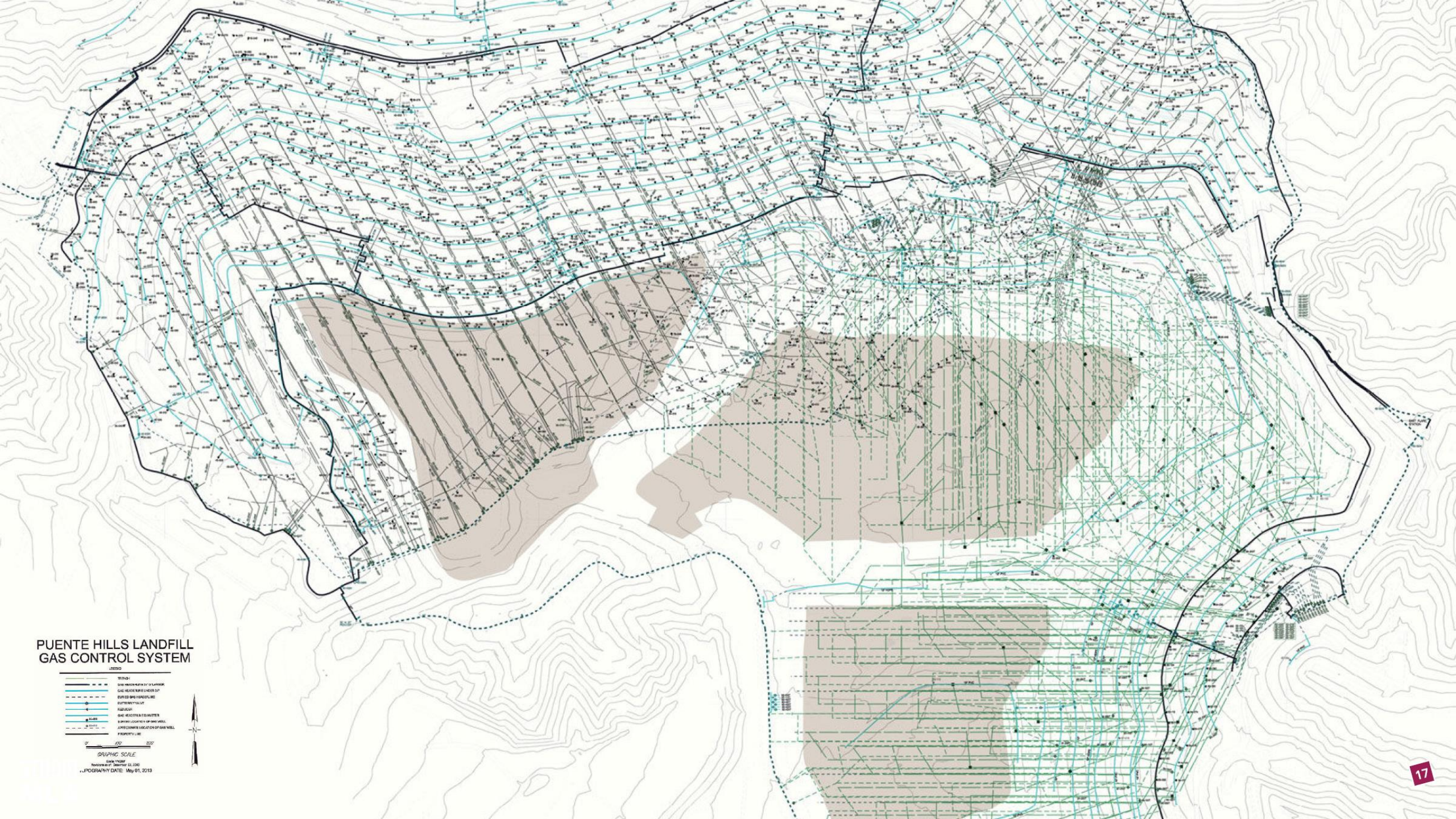
Los Angeles County 2020 population: 10,014,009

$80 MILLION FOR THE PARK

Transforming Landfills into Public Space



STUDIO-MLA


PUENTE HILLS LANDFILL
GAS CONTROL SYSTEM
LEGEND
TRENCH
GAS HEADER/LINE 24" OR LARGER
GAS HEADER/LINE UNDER 24"
BURIED GAS HEADER LINE
BUTTERFLY VALVE
REDUCER
GAS VELOCITY/FLOW METER
SURVEY LOCATION OF GAS WELL
APPROXIMATE LOCATION OF GAS WELL
PROPERTY LINE
0
100'
200'
GRAPHIC SCALE
TOPOGRAPHY DATE: May 01, 2013

AGENCY, COB, DESIGN EXCELLENCE

Transforming Landfills into Public Space



ROLE OF CBOS IN PROJECT

Transforming Landfills into Public Space



Emerald Necklace

Amigos de los Rios

ACTIVE SGV

Asian Pacific Islander Forward Movement

California Wilderness Coalition

COFEM
Consejo de Federaciones Mexicanas

day one

National Parks Conservation Association

Outward Bound Adventures Since 1962

Sierra Club



CBO AND THE PROJECT'S FUTURE

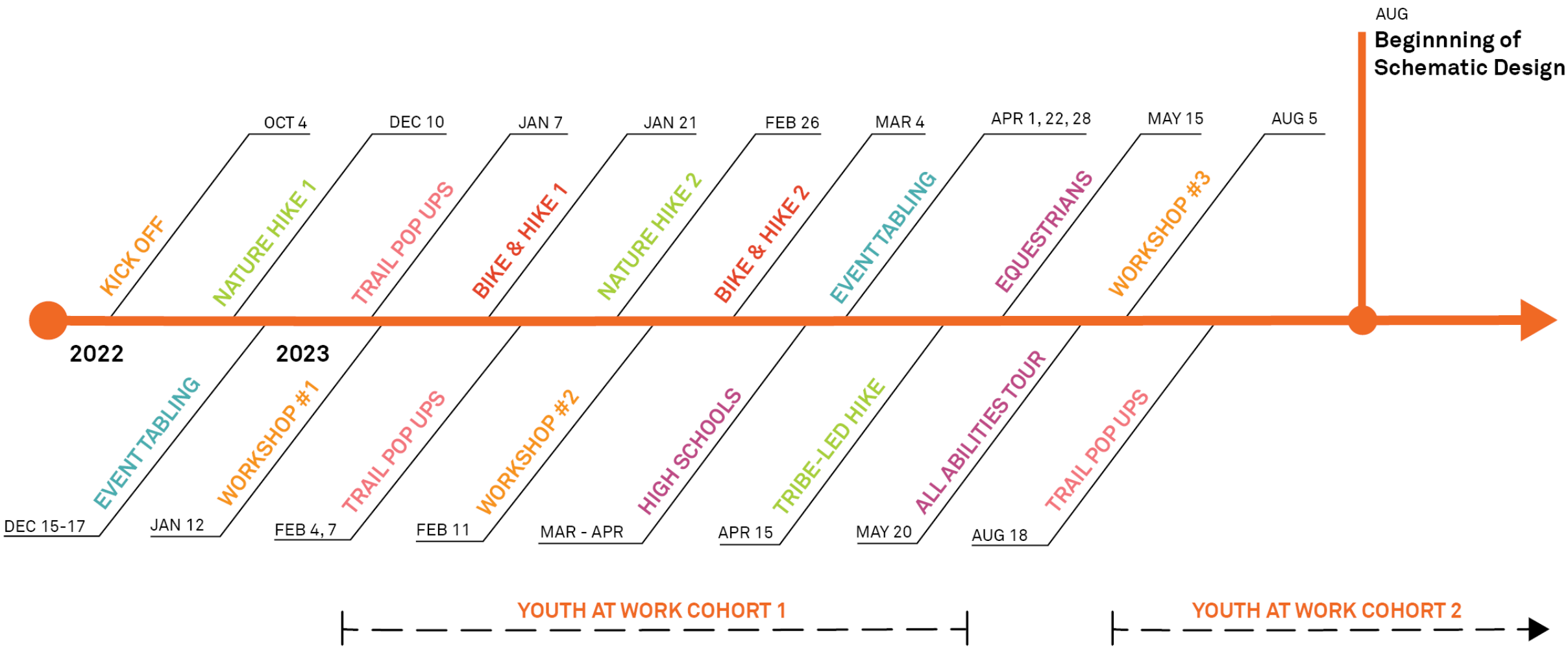
Transforming Landfills into Public Space



STUDIO-MLA

A YEAR OF ENGAGEMENT

Transforming Landfills into Public Space



EXPERIENCE-BASED ENGAGEMENT

Transforming Landfills into Public Space

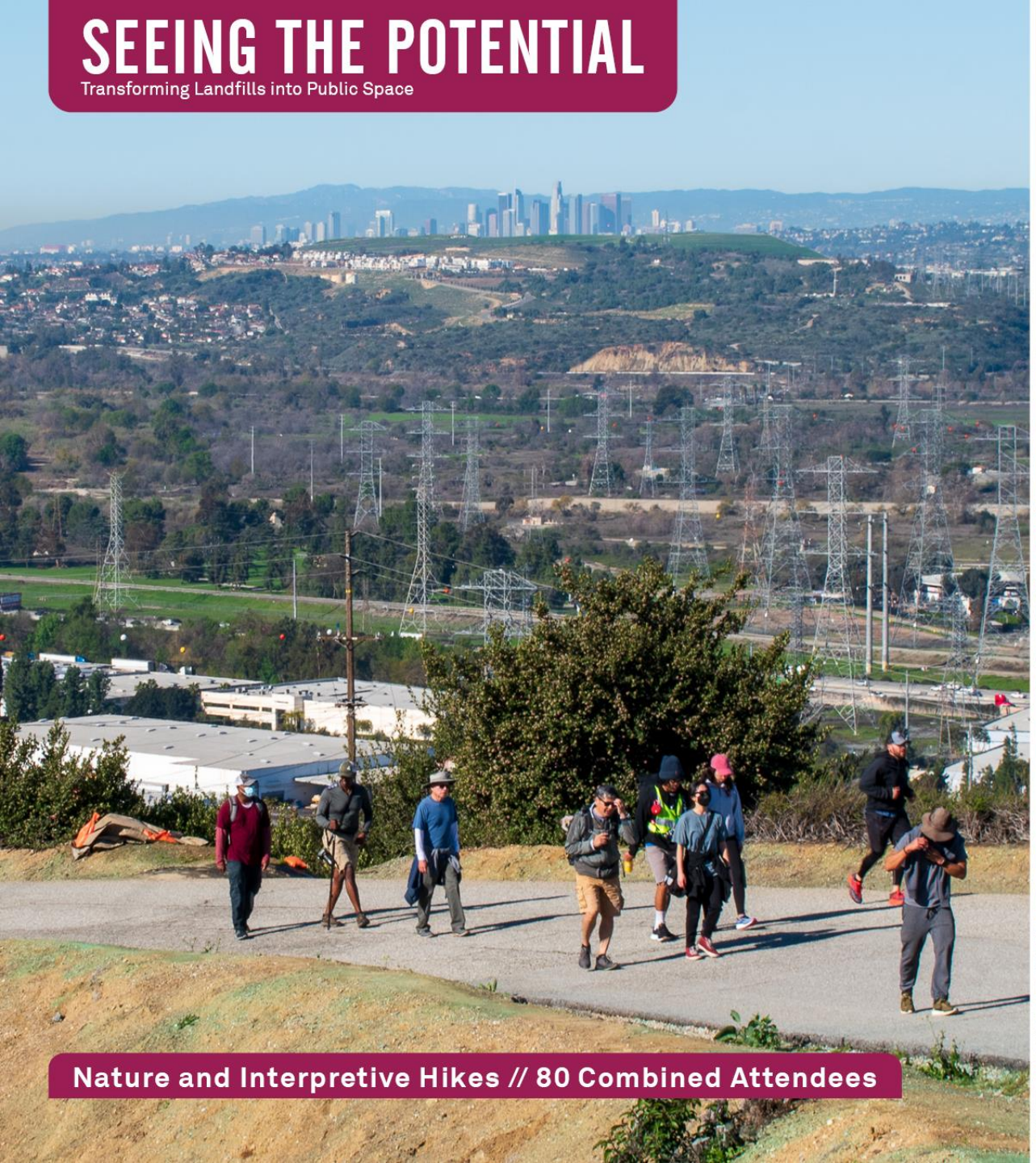


Nature and Interpretive Hikes // 80 Combined Attendees

SEEING THE POTENTIAL

Transforming Landfills into Public Space

STUDIO-MLA





Nature and Interpretive Hikes // 80 Combined Attendees

COMMUNITY BUILDING

Transforming Landfills into Public Space

STUDIO-MLA



Bike and Hike Events // 161 Combined Attendees

TWIST ON THE TRADITIONAL

Transforming Landfills into Public Space



Public Workshop One // 250+ Attendees

A SHARED VISION

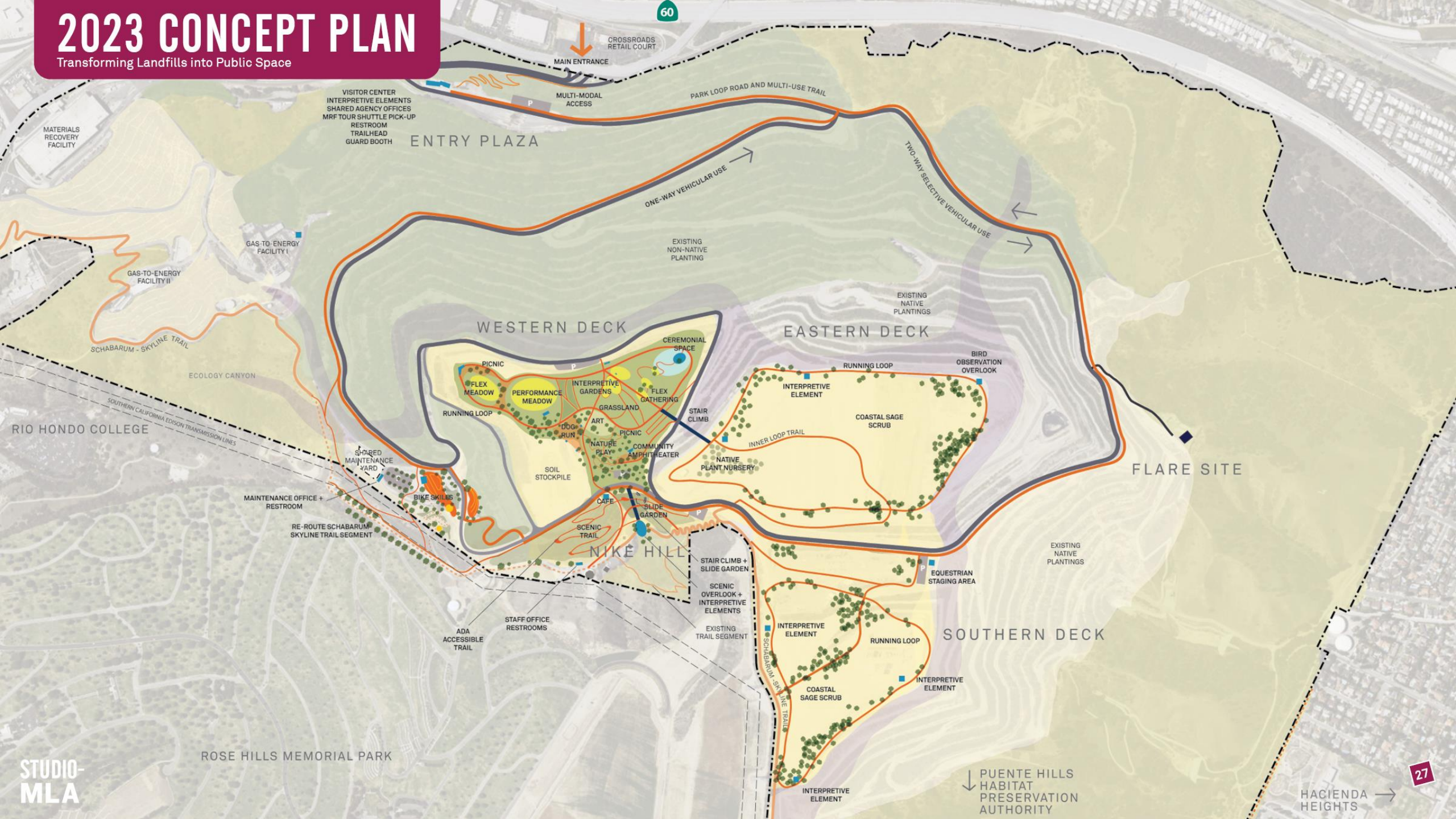
Transforming Landfills into Public Space



STUDIO-MLA

2023 CONCEPT PLAN

Transforming Landfills into Public Space



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STUDIO MLA



STUDIO-MLA

LOS ANGELES COUNTY Parks & Recreation

CALIFORNIA LAND RECYCLING CONFERENCE

Imagine | Innovate | Implement

September 29 – October 1, 2026 | Foster City

THANK YOU!

IMAGINE, INNOVATE, IMPLEMENT
THE FUTURE OF LAND RECYCLING

We appreciate your feedback, follow this QR code to submit an evaluation form on Whova.

Join the conversation, use #CALRC2026 to share your photos, insights and highlights!

OFFICE OF BROWNFIELDS

CENTER FOR CREATIVE LAND RECYCLING