

# Air Quality and Thermal Comfort Plan 2025-26

Facilities Committee Meeting, April 16, 2026  
Measure BJJ Committee Meeting, May 11, 2026  
OUSD Facilities Planning & Management, Sustainability Team



**OAKLAND UNIFIED  
SCHOOL DISTRICT**

*Community Schools, Thriving Students*

# Ask Of The Committee

**Purpose:** Present District's Heat Mitigation Plan and strategies that will be employed as we launch the Air Quality and Heat Mitigation funding \$8M allocated in the 3rd Draw of the Measure Y bond

**What we need:** Feedback, guidance, and questions.

# Agenda

1. Background and Research
1. Actions Taken to Date
1. Planning Process to Implement Mitigation Strategies
1. Proposed Future Scope of Work
1. Next Steps

# Heat Mitigation Background & Context



# Equity Approach

**OUSD defines equity as providing each student with the resources and conditions they need to succeed, with a focus on addressing disparities for historically underserved students. In facilities, this means prioritizing investments where conditions are poorest and student need is greatest.**

Drafted from OUSD's Equity Framework

# Understanding the Heat Challenge in OUSD

- Generational challenge; increasing in urgency due to changing climate conditions
- Oakland experiences urban heat islands with varying levels of exposure across communities
- **Rising temperatures, combined with lack of green spaces, aging infrastructure and limited cooling, are impacting student health and learning conditions**
- OUSD has many historic buildings and facilities that are outdated, requiring extensive and major repairs and improvements to accommodate HVAC upgrades
  - Many sites lack cooling and proper ventilation (33% of classrooms have cooling)
  - OUSD Facilities were not designed for the current or future climate reality
- The Draft 2026 Facilities Master Plan identifies “improving classroom heat and climate control” as a critical need, reinforced by the 2020 Climate Emergency Resolution and ongoing Sustainability efforts

# Factors Impacting Thermal Comfort in Schools

## Heat Island Impacts

2023→ Present

Lack of Trees and Green Spaces  
Excessive Asphalt & Concrete  
High Outdoor Temperatures  
Lack of Shade  
Site Layout and Density



## Building Systems Heat

2026→TBD

Building Layout  
Lack of Insulation  
Heat Retention of Building  
Roof Heat Gain  
Solar Gain through Windows  
Lack of Ventilation Systems  
Vandalism of AC Units  
Lack of AC  
Lack of Fans



**INCREASED HEAT IN SCHOOLS**

*OUSD is a national leader following heat island research to transform schoolyards by removing thousands of square feet of asphalt and concrete while adding over 700 trees, 60+ playstructure shades and nature areas.*

# Comparison of Citywide Temperature Change

Oakland continues to have a generally mild climate, with higher temperatures occurring on relatively few days each year. However, in recent years, we are seeing more frequent and intense heat events. Our facilities were not designed for these changing conditions.

Metric	Historical (30-Year)	Recent Trend (Last 5 Yrs)	Most Frequent Months
Hot Days ( $\geq 80^{\circ}\text{F}$ )	20–40 Calendar Days <b>10-20 School Days</b>	30–50 calendar days <b>15-25 School Days</b>	Between August - October
Very Hot Days ( $\geq 90^{\circ}\text{F}$ )	5–10 calendar days <b>2-5 School Days</b>	8–15 calendar days <b>4-7 School Days</b>	Between September, October
Heat Wave Frequency	Occasional	More frequent	September
Cooling at Night	More consistent - Temperatures reliably drop at night, allowing buildings to cool down	Less consistent - Temperatures stay elevated overnight so buildings don't cool properly	During Heat Events

Sources:

- 1) National Oceanic and Atmospheric Administration (NOAA), 1991-2020.
- 2) Cal-Adapt – Statewide climate data and projections.
- 3) Western Regional Climate Center (WRCC) – Regional climate summaries and historical weather data.

# Highest Leverage Short Term Strategy: Training, Engagement, and Implementation

High temperatures in schools is a persistent, generational infrastructure issue that cannot be solved through a single solution and requires a phased, systemwide approach

- 1. Site training, planning, and implementation are necessary to mitigate heat now while awaiting facility upgrades**
  - a. Operational alignment across school sites, turning heat systems off to prepare for heat waves
  - b. Site-level coordination during extreme heat days - Updating site emergency response plans to include extreme heat events
  - c. Staff training - behavioral change strategies
- 2. Identify a working group to research, identify and inform strategies and solutions moving forward**
  - Community and Local entity collaboration in a working group to prioritize heat mitigation in OUSD
- 3. Implement short term strategies and pilot projects**

# Oakland Heat Exposure During Heat Waves, 2025

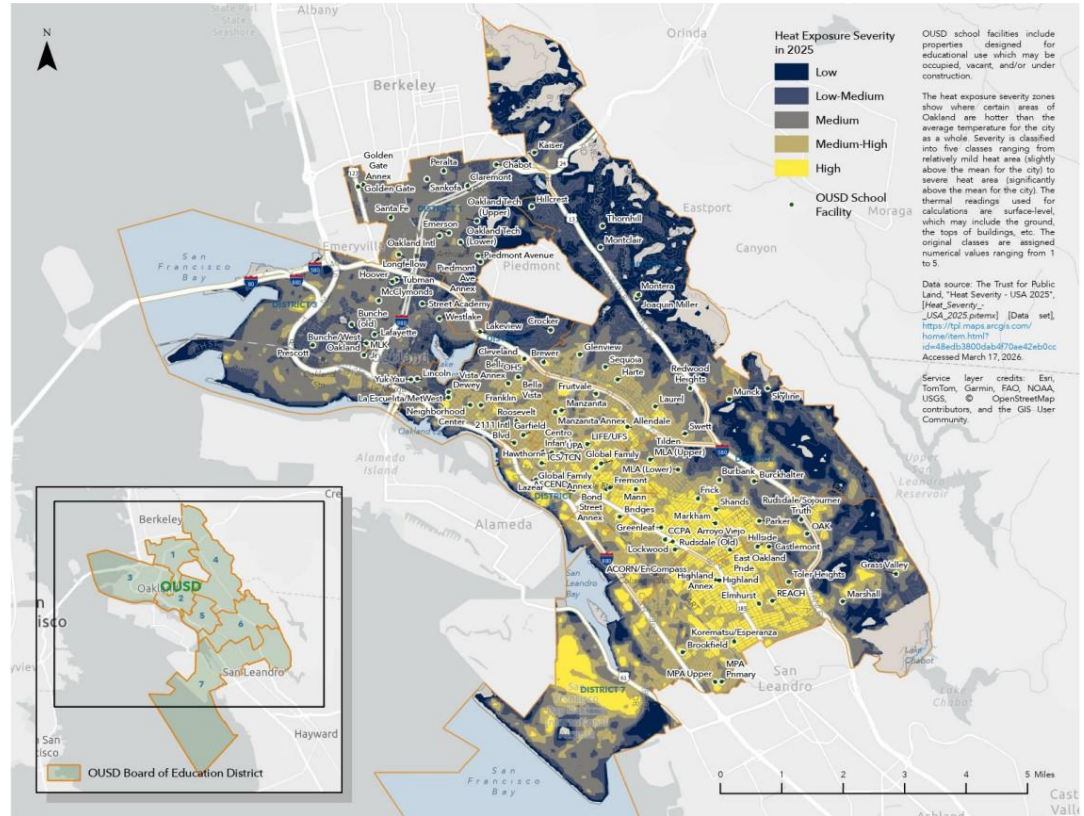
August - October

Map helps us understand how heat is experienced in Oakland during heat events

Heat is not evenly distributed

Some neighborhoods experience significantly higher temperatures

**Blue areas** → cooler, less heat stress  
**Grey/Tan areas** → moderate heat stress  
**Yellow areas** → highest heat exposure



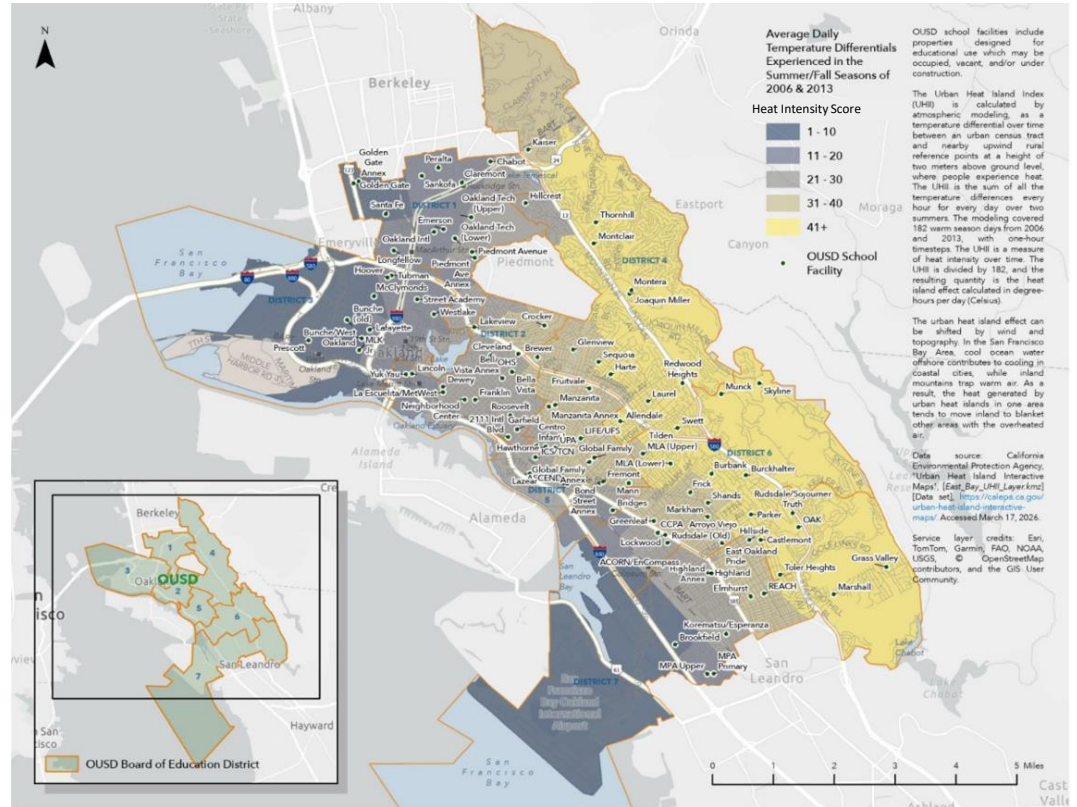
# Heat Exposure Shift During a Hot Day, 2006-2013

Map helps us understand where heat exposure is consistently highest across Oakland over time

Relative heat burden map, not actual temperatures

Shows where heat builds over time

**Blue areas** → cooler, less heat buildup  
**Grey/Tan areas** → moderate heat stress  
**Yellow areas** → most heat exposure + longest heat duration + least cooling



# Heat Mitigation Strategies - Implemented



# Exterior Heat Mitigation Efforts



# Overview of District Actions

## Exterior Efforts - Living Schoolyards & Greening

### 30+ Living Schoolyards Projects Completed

#### Different ground materials to decrease heat

- Every new play structure includes as many shade canopies as possible
- 700+ trees have been strategically placed and sourced to provide immediate and ever-expanding shade across the schoolyard
- Expanding gardens and green spaces on campuses



Expanding gardens/green spaces - Hoover ES



Trees & asphalt removal - Laurel ES



Shade installations with play structures - Global Family ES

# Overview of District Actions

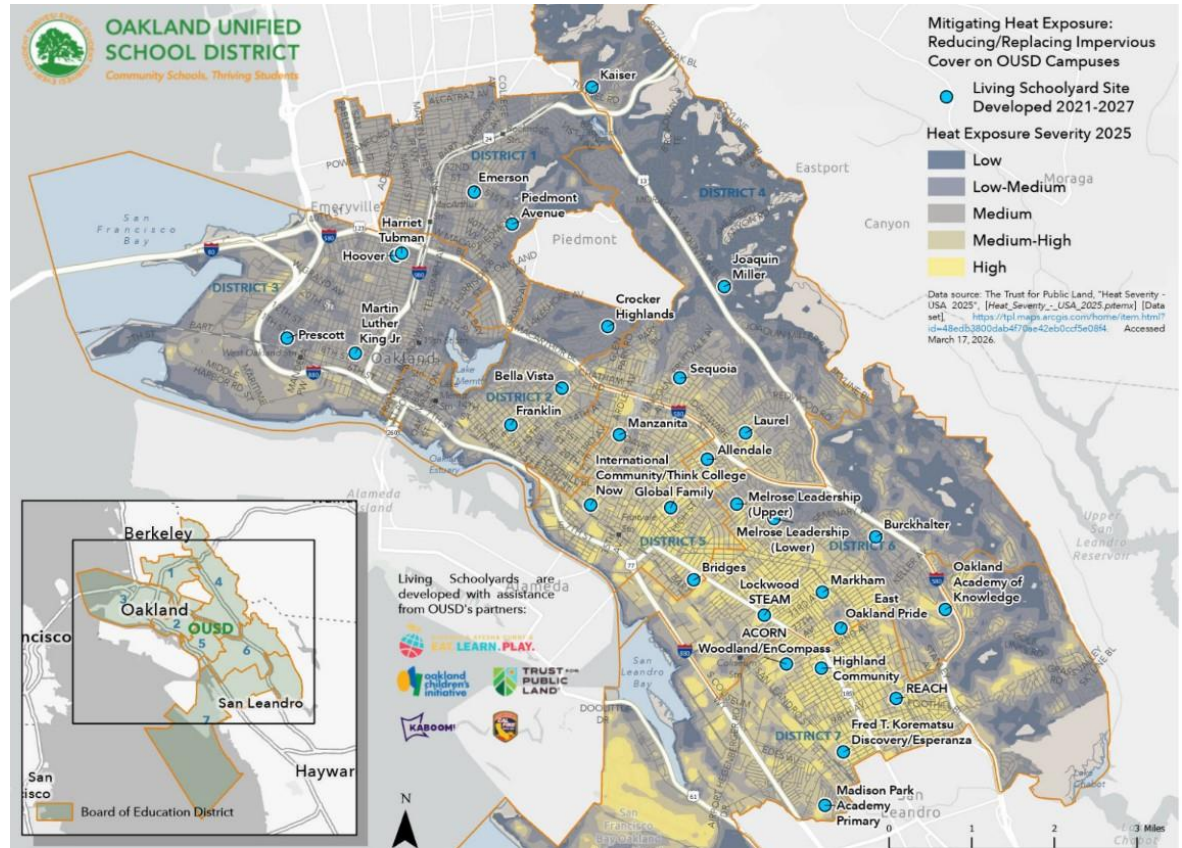
## *Exterior Efforts - LSY - Asphalt Removal*

### Adding shade

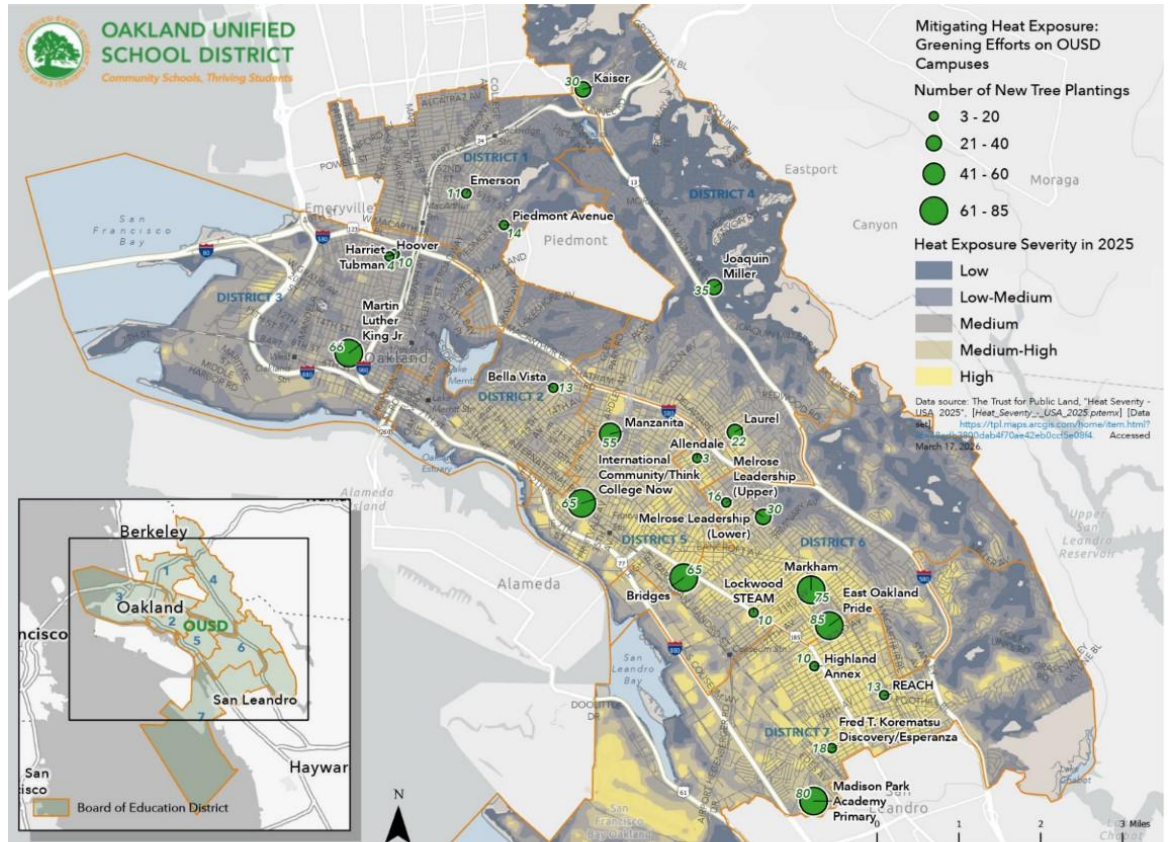
- Remove asphalt where not needed and add pervious surfaces (engineered wood fiber, corkeen, park tread, decomposed granite, etc.)
- Sport Court tiles and ground art decrease heat of remaining asphalt
- Solar Installation shade structures are being added in the near future (2026-27)



# Districtwide Living Schoolyards Projects: 30+

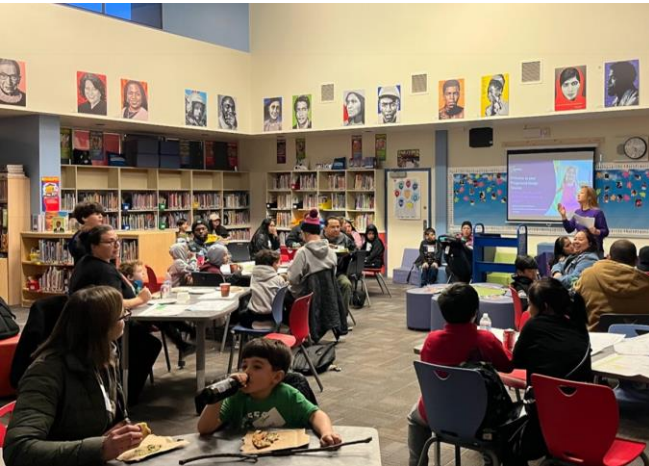


# Districtwide Trees Planted : 700+



Base map: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community. Disclaimer: Oakland Unified School District (OUSD) makes every reasonable effort to ensure the accuracy and completeness of data and the materials presented herewith. OUSD periodically updates and revises data as needed. OUSD provides this data for informational and planning purposes only. OUSD makes no claims, no representations, and no warranties, expressed or implied, regarding the accuracy, reliability, or completeness of data. OUSD shall not be held liable for improper or incorrect use of the data described and/or contained herein. Map prepared March 2026.

# Interior Heat Mitigation Efforts



# CalSHAPE CO2 and Temp Classroom Sensors

**CO2 and temperature sensors are being deployed Districtwide:**

- To date, installed in 33 schools lacrosse district
- District-wide deployment completed by July

## **Benefits of the sensors**

- Enables classroom-level visibility
- Will identify highest-need spaces based on classroom conditions
- Supports targeted, cost-effective interventions rather than one-size-fits-all solutions

## **How this data informs our heat mitigation approach**

- Guide mitigation strategy deployments based on highest needs
- Inform long-term investments (HVAC, building upgrades)





# Equity Centered Working Rubric - Summer 2026

Criteria	Impacted (4)	Affected (3)	Moderate (2)	Lower (1)
<b>1. Student Groups</b>	PK-2	3-5	6-8	9-12
<b>2. Equity Frame</b> <small># of UPP + Special Education/Enrollment</small>	>90%	89%-55%	54%-35%	<34%
<b>3. Sun Exposure</b>	Direct sun ≥ 8 hrs OR peak afternoon exposure (west facing)	6–8 hrs sun exposure (south facing)	4–6 hrs sun exposure (east facing)	Limited or shaded < 4 hrs (north facing)
<b>4. Heat Severity Index (Site-Level) and Heat Exposure Shift</b>	High heat zone (top quartile districtwide) AND High Heat Retainment	Moderate-high heat zone AND moderate heat retainment	Moderate heat zone OR Moderate heat retainment	Lower heat exposure zone and/or low heat retainment
<b>5. Classroom Location</b>	2nd & 3rd floor	1st floor classroom	Interior classroom / partial exposure	Portable, shaded or protected
<b>6. Classroom Usage</b>	Full Day	80% to 60%	Partial Day (40-60%)	>40%, After School Only, Pull out or admin space

# Equity Centered Working Rubric - 2027

*Once CalSHAPE temperature data is available at 83 sites*

Criteria	Impacted (4)	Affected (3)	Moderate (2)	Lower (1)
<b>1. Student Groups</b>	PK-2 Elementary SDC Medically Fragile Programs	3-5 Middle SDC	6-8 High School SDC	9-12
<b>2. Equity Frame</b> # of UPP + Special Education/Enrollment	>90%	89%-55%	55%-35%	<34%
<b>3. Indoor Temperature (CalSHAPE Data)</b> <ul style="list-style-type: none"> <li>South-Facing Classrooms</li> <li>Floor</li> </ul>	≥ 85°F for ≥ 3 hrs/day OR frequent spikes above comfort range	80–84°F for sustained periods	75–79°F occasionally elevated	< 75°F consistently
<b>4. Classroom Usage</b>	Full Day	80% to 60%	Partial Day (40-60%)	>40%, After School Only, Pull out or admin space

# Heat Mitigation Strategies - Proposed

\$8M allocated in Draw 3  
of Measure Y Spending  
Plan to Air Quality and  
Heat Mitigation  
(May 2026)



# What We're Learning & How It Shapes Our Approach

## What the Data is Showing

- Classroom **conditions vary significantly** across sites, buildings, and time of day
- Some classrooms **consistently experience** higher heat exposure
- **Passive strategies alone are not sufficient** in all cases
- A one-size-fits-all solution will **not meet districtwide needs**

## How This Informs Our Strategy

- **Data-informed:** Using temperature, building, and site data to guide decisions
- **Equity-centered:** Prioritizing highest-need students and most impacted schools
- **Targeted & tiered:** Matching solutions to classroom conditions and severity
- **Scalable & sustainable:** Balancing immediate impact with long-term feasibility, cost, and maintenance

# Planned Strategies for Heat Mitigation-Tier 1

Tiers	Strategy	Scope of Work	Scale	Estimated Costs	Considerations
Tier 1 - Immediate, Low Cost, Primarily Passive Strategies	Low-cost, low complexity, scalable (potential for additional pilots)	<b>Window Films:</b> Install at sites without major capital projects; proven reduction in indoor temps by ~5–10°F, lowers cooling costs	Districtwide	\$	Not applicable to Fire Rated windows
		<b>Tree Planting, Living School Yards and Plantings on South Facing Walls:</b> Increasing Green Space and Canopy cover on campuses to provide natural shade and evaporative cooling	Districtwide - where feasible	\$	Design, asphalt removal
		<b>Reflective Blinds:</b> Replace outdated blinds or add where none exist (pending further assessment data)	Districtwide - where feasible	\$\$	Existing blind condition and effectiveness
		<b>Reflective Roof Coating (“cool roofs”):</b> White or reflective coatings on roofs to reduce heat gain building-wide	Districtwide	\$	Accessibility, Roof Shape
		<b>Exterior Shade Screens:</b> Overhangs or canopies over windows	Districtwide - where feasible	\$\$	Classroom location, construction feasibility

Note: Estimated costs subject to change, assessed during procurement and design process.

# Planned Strategies for Heat Mitigation-Tier 2

Tiers	Strategy	Scope of Work	Scale	Estimated Costs	Considerations
Tier 2 - Immediate, Active or Complex Systems	Moderate complexity; focussed investments based on need and feasibility	<b>Cooling Rooms</b> : Install at sites lacking at least one room with cooling; focus on elementary populations, first Focus on front office and libraries	Districtwide	\$\$	Electrical capacity, structural integrity (if infrastructure is through roof)
		<b>Ceiling Fans:</b> In priority classrooms and cooling rooms	Highest Priority Sites	\$\$	Electrical/structural capacity/integrity (ex)
		<b>Targeted Portable Heat Pump HVAC Systems</b> (full electrification)	Pilot - Hottest Classrooms	\$\$\$	Electrical capacity
		<b>Classroom Night Flushing Systems:</b> Fans in windows/wall vents to assist replacement of hot air with cool air in indoor spaces	2nd or 3rd story classrooms without A/C	\$\$	Security, pest management, responsible party
		<b>Solar Turbine Roof Fans:</b> Install on rooftops to extract hot air from attic/plenum spaces	Where feasible	TBD	Electrical and roof capacity/integrity
		<b>Exterior Shade Window Coverings</b> (as feasible)	Districtwide - where feasible	\$\$\$	Complex/Scalable

Note: Estimated costs subject to change, assessed during procurement and design process.

# Planned Strategies for Heat Mitigation-Tier 3

Tiers	Strategy	Scope of Work	Scale	Estimated Costs
Tier 3  Long-Term Investments	High Complexity, High Cost, Active Cooling and Overhall of Building Systems	<b>Comprehensive HVAC Upgrades &amp; Building Envelope Improvements:</b> Comprehensive modernization including ventilation, cooling systems, and insulation.	HVAC and Building Envelope	\$9-12M per site
		<b>Incorporated in Major Modernization Projects</b> Garfield, McClymonds, Roosevelt, Melrose (MLA), Fremont, CCPA	<b>231 classrooms (11% of Classes)</b>	\$32 M Committed Measure Y
		<b>Chillers to Ventilation System:</b> A centralized system that uses chilled water to cool air distributed through existing ventilation, efficiently serving multiple classrooms or buildings.	Site by Site Increased Electrical Costs	\$800K – \$1.8M per site
		<b>Evaporative Coils and Condenser to Existing Units:</b> A retrofit that adds cooling to existing systems using coils and condensers, providing improved comfort at a lower cost and faster timeline.	Site by Site Increased Electrical Costs	\$2M – \$4M per site
		<b>Individual Packaged Units (Floor-Mounted):</b> Standalone classroom units that provide immediate heating and cooling but require electrical upgrades to support increased power demand.	Site by Site Increased Electrical Costs	\$1.8M to \$4.0M per school

Note: Estimated costs subject to change, assessed during procurement and design process.

## **Immediate Next Steps (Beginning Summer 2026) - Phase 1**

In addition to major modernization projects, tree planting and living schoolyard expansion :

- 1. Install Outdoor Temperature Sensors at all School**
- 2. Near-term upgrades: Reflective window films prioritizing 2nd story buildings**
  - 2nd story, Elementary Schools
    - Tier 1 Targeted Universalism: Horace Mann, Fruitvale, Markham, Lockwood Steam, Webster/East Oakland PRIDE, Whittier/Greenleaf, Lincoln, Franklin, Allendale, Sankofa, Burckhalter, Piedmont, Hoover, Reach Academy
    - Tier 2: Sequoia, Laurel, Redwood Heights, Bella Vista, Montclair, Cleveland, Chabot, Glenview, Crocker, and Maxwell
    - Tier 3: All single story elementary schools
  - 2nd Story, Middle Schools
    - Tier 1 Targeted Universalism: Frick, CCPA, Life Academy, and Elmhurst.
    - Tier 2: Edna Brewer, Claremont
- 1. Cool Roof Applications (Assessment Underway)**

## **Immediate Next Steps (Beginning Summer 2026) - Phase 2**

In addition to major modernization projects, tree planting and living schoolyard expansion :

### **Summer 2026**

- 1. Ensure all elementary schools without A/C will have a cooling room on campus**
- 2. Launch Tier 1 and 2 Pilots :**
  - Solar Turbine Roof Fans where feasible (3 sites)
  - Pilot Night Flush Ventilation Systems in 2nd Story Building
  - Exterior Shade Screens (2nd Story Window)
  - Reflective Blinds (2nd Story Window)

### **2026--27 Requires contracting and bidding that will not meet board deadlines**

1. Individual Site Assessments Based on Sensor Data
2. Ceiling Fans
3. Portable Heat Pump HVAC Systems in Our Hottest Classrooms

# Heat Mitigation - Funding Strategies

- **\$8M in Measure Y (May 2026)**
- **Potential Gaps in Funding**
  - *Based on district financial status, the General Fund (01) may not be able to cover fans and other non-capital expenditures such as portable AC units and floor fans.*
- **External Funding Opportunities**

# Pursuing Upcoming Grant Opportunities

## **Wildfire Smoke Prevention Grant - EPA (Actively Applying)**

- \$1.8M to fund indoor air quality monitoring, reporting, and mitigations
- Will be able to help fund necessary HVAC upgrades and further emergency response planning efforts

## **Extreme Heat Community Resilience Program (EHCRP) - CA Governor's Office (Planning to Apply Once Released, Est. May 2026)**

- Up to \$4M to fund indoor and outdoor heat mitigation strategies throughout district
- Leverages and expands current heat mitigation efforts

# Next Steps

## Heat Mitigation Implementation Roadmap

### **NOW (Spring 2026) – Build the Foundation**

- Complete sensor deployment including outdoor sensors and apply equity rubric to identify highest-need classrooms
- Begin Bid and Contracting Process for Implementation in Summer 2026 to address heat issues in 2nd story elementary schools

### **SUMMER 2026 – Immediate Action**

- Deploy targeted cooling solutions and pilot strategies across elementary schools
- Develop site training and standardized heat response protocols in partnership with Risk Management and Network Team

### **2026–27 SCHOOL YEAR – Analysis and Planning**

- Report out findings to Facilities Committee and community.
- Establish formal Working Group to inform District Strategy.
- Monitor data and identify effective strategies to apply to additional high-need sites as defined by sensor data and equity rubric
- Advance design standards, specifications, and procurement for expansion of Tier 1 and Tier 2 strategies

### **LONG-TERM (2027 and Beyond) – System Transformation**

- Bring forward a formal Districtwide Heat Mitigation & Cooling Plan in 2027



Thank you for  
making  
me  
happy  
and  
for  
being  
my  
friend

Thank you  
for  
home  
refuge  
6

Thank you  
for  
helping  
me  
0.9

KA BOOM  
THANK YOU  
DUUSD  
Thank You  
everybody

GOLDEN STATE  
PS

17

# Any Questions?

For more information, please reach out:

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# Appendix



**OAKLAND UNIFIED  
SCHOOL DISTRICT**

*Community Schools, Thriving Students*

# Overview of District Actions

## *Interior Efforts - Addressing Infrastructure Challenges*

- The district has significant challenges/opportunities to bring buildings up to modern standards.
  - Insufficient electrical capacity, large and extensive investments, ductwork, etc. Requires major renovations and facility upgrades to solve
- **Current Major Modernization Projects:** 231 classrooms + active systems (Garfield, McClymonds, Roosevelt, Melrose (MLA), Fremont, CCPA)
- **Other Projects:**
  - **Energy Efficiency Audit:** Identified upgrades opportunities include: HVAC, LED lighting, building envelope improvements, and window replacements.
    - Upgrading the building envelope will increase the effectiveness of implemented heat mitigation strategies.
  - **Electric Water Heater Replacement :** Contributes to building efficiency upgrades
  - **CalSHAPE Sensors :** Tracks CO2 and Temperature → Informs where intervention is needed

These projects are designed to be funded through energy savings, creating a self-sustaining model that accelerates infrastructure improvements.

# Projects Overview: Alignment to OUSD Policies

Policy Alignment	Project	Outcome (Heat Reduction)
Sustainability Policy: Energy Efficiency & Electrification	<ol style="list-style-type: none"> <li>1. Districtwide Energy Efficiency Investment Grade Audit</li> <li>2. Water Heater Replacement Projects</li> </ol>	<ol style="list-style-type: none"> <li>1. Districtwide proposed various energy efficiency infrastructure upgrades</li> <li>2. 65 schools converting gas to electric water heater systems, reducing fossil fuel usage throughout District</li> </ol>
Sustainability Policy: Renewable Energy & Resilience	<ol style="list-style-type: none"> <li>1. Solar Phases 1–2</li> <li>2. Battery Backup Systems</li> <li>3. Renewable Energy Procurement Contract</li> </ol>	<ol style="list-style-type: none"> <li>1. 29 school sites; 4.7 MW, some solar shade structures.</li> <li>2. 2 schools, resiliency against outages.</li> <li>3. Districtwide renewable power supply</li> </ol>
Sustainability Policy: Facilities (Air Quality, Heat, and Ventilation)	<ol style="list-style-type: none"> <li>1. HVAC Assessments, Calshape CO2/Temp Sensors</li> <li>2. Heat mitigation site condition assessments</li> </ol>	<ol style="list-style-type: none"> <li>1. 70+ schools assessed and monitored</li> <li>2. Districtwide building envelope, ventilation, electrical analysis</li> </ol>
Sustainability Policy: Living Schoolyards	<ol style="list-style-type: none"> <li>1. Tree Planting, Asphalt Removing, Shade Structure Projects, Expansion of Green Spaced</li> </ol>	<ol style="list-style-type: none"> <li>1. 30+ projects</li> <li>2. Green Spaces absorb heat and provide cooling</li> </ol>
Facilities Master Plan	<ol style="list-style-type: none"> <li>1. Building health and assessments</li> <li>2. Student and Site Demographics</li> <li>3. Ventilation assessments</li> </ol>	<ol style="list-style-type: none"> <li>1. District-wide evaluation</li> <li>2. Informs approach for prioritization and tiering</li> </ol>

# Passive Strategies - Approach for Near Term Action

## Data Collection

- Building characteristics (age, envelope, insulation, windows)
- Ventilation and cooling conditions (A/C, fans, airflow)
- Site conditions (heat exposure, roof exposure, shading, heat island)
- Indoor sensor data (e.g., CO2 and temperature monitors)

## Identify High Need Sites

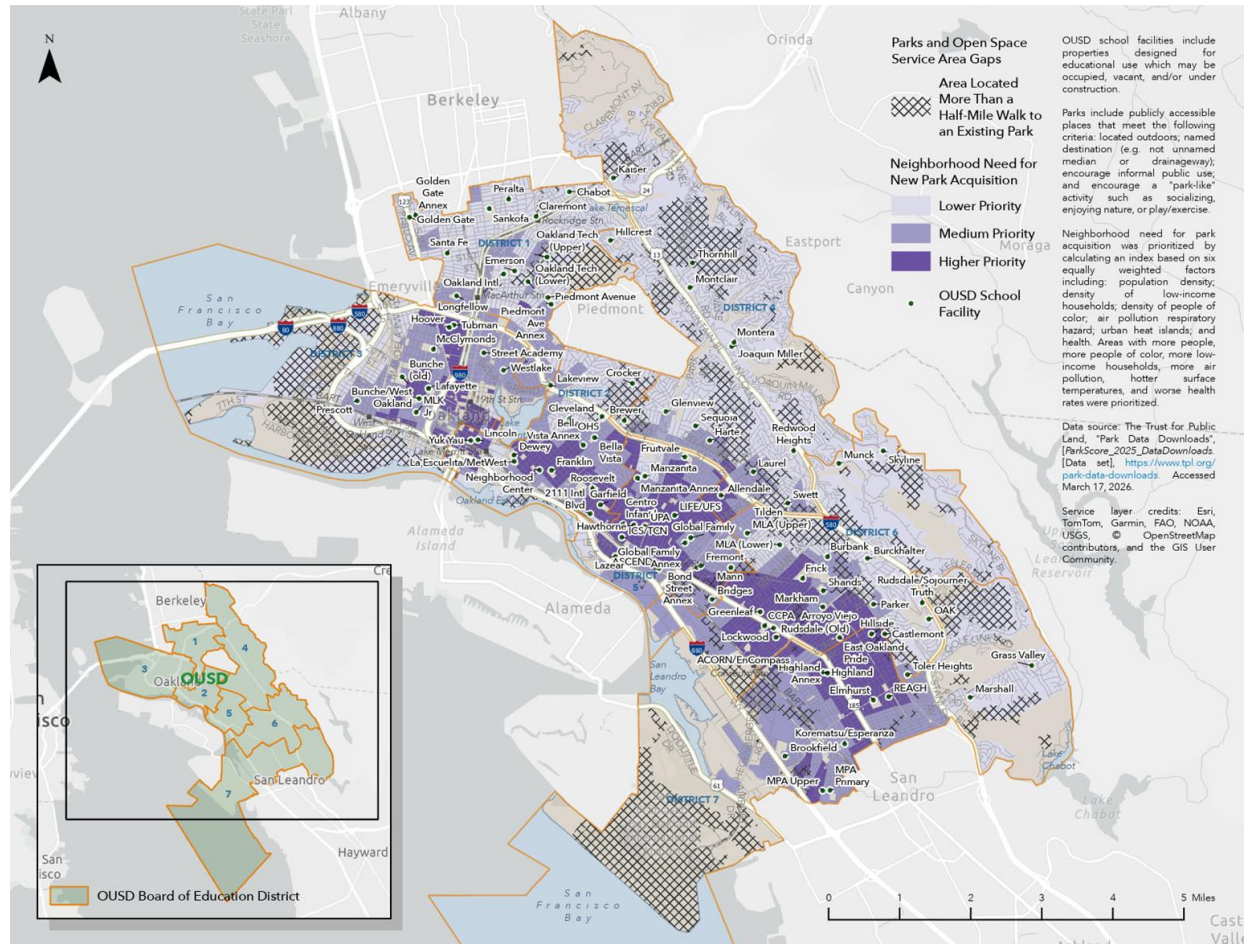
- Prioritize vulnerable populations (youngest)
- Identify classrooms without adequate cooling or ventilation
- Flag buildings with highest heat exposure and indoor temperatures
- Apply equity lens (geographic distribution)

## Implement Mitigation Strategies

- Deploy near-term solutions
- Tailor strategies to site-specific conditions
- Focus on actions that can be implemented before next school year
- Document findings to inform long-term HVAC and capital upgrades

# Oakland Access to Parks & Open Space Service Area Gaps

- Map shows need for park access across the city



# Bond Cycle and Next Draw for Heat Mitigation

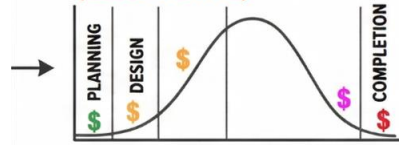
## \$8M for heat mitigation in Bond Draw 3

### 1 ESTIMATED PROJECT COST



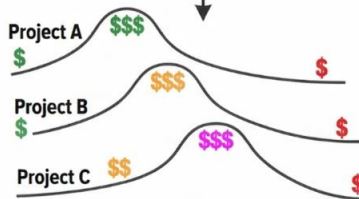
Calculate total needed for each unique project.

### 2 PROJECT SCHEDULE (BELL CURVE)



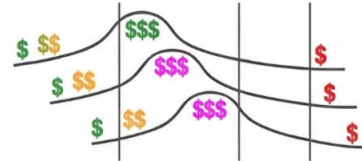
Spending on individual projects generally follows a bell-curve shape, with minimal upfront funding needed.

### 3



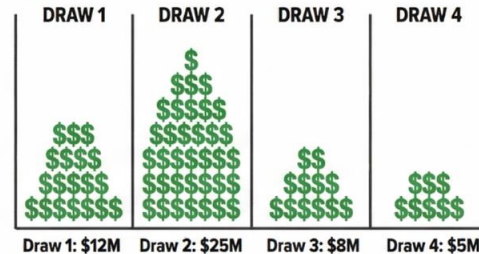
Multiple projects are offset to optimize staff capacity and resources.

### 4 SPENDING PATTERNS



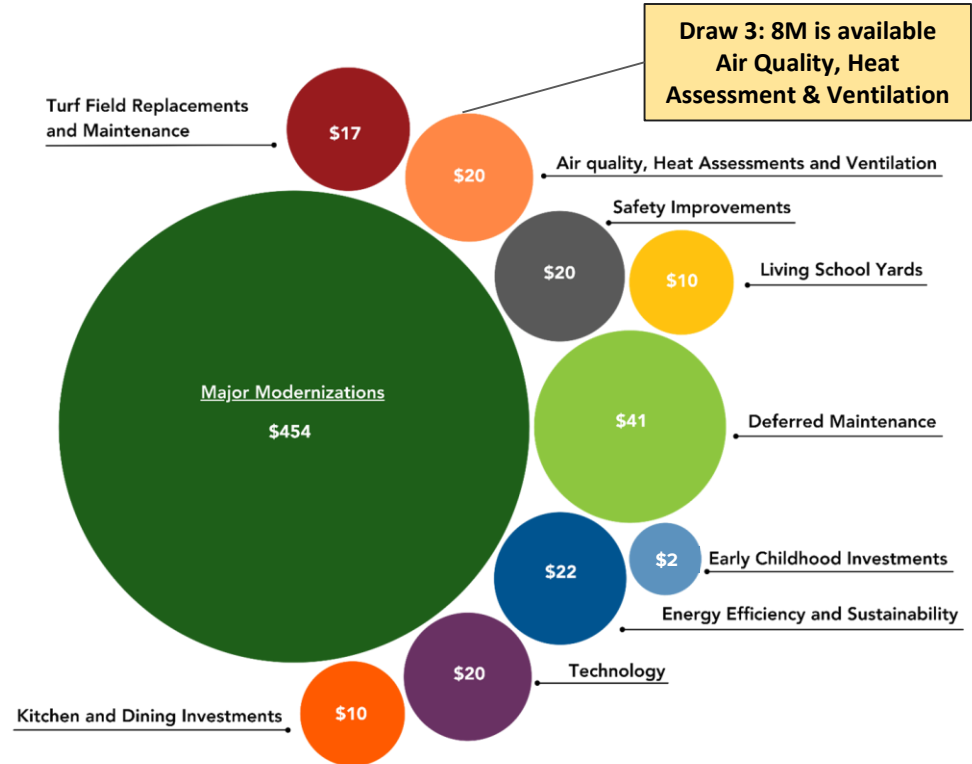
Stacking projects creates overlapping phases and spending.

### 5 DETERMINING BOND DRAWS



# Major Initiatives Within the Bond Program (in Millions)

- These priorities were identified through the 2020 Facilities Master Plan, Measure Y Development, and Implemented through the Spending Plan.
- Measure Y has a **\$60M Contingency** that is holding to cover escalation costs in the Major Modernizations.
- Once we hit the 4th Draw and the major projects are further along, we will use the new prioritization to guide remaining contingency funds.



Notes:

1. Budget investments as of February 2025.
2. All values in Millions of Dollars, rounded down to the nearest whole number.
3. Early Childhood Investments is funded by Measure AA.