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INTRODUCTION

CLIMATE CHANGE AND ENVIRONMENTAL RESILIENCE

ECONOMIC AND SOCIAL RESILIENCE

# INTRODUCTION

Resilience reflects the capacity of communities, institutions, and systems to survive and recover from planned or unexpected changes, whether sudden or long-term. Resilience strategies are often combined with sustainable planning in efforts to ensure the long-term vitality of a region through adaptation and growth.

For LA County, natural disaster threats are wide-ranging: earthquake, fire, landslide, severe weather, flooding, sea level rise, and more. Events like climate change related weather extremes can be slow to play out and less predictable than now seasonal events like wildfires, but they need to be addressed with equal haste.

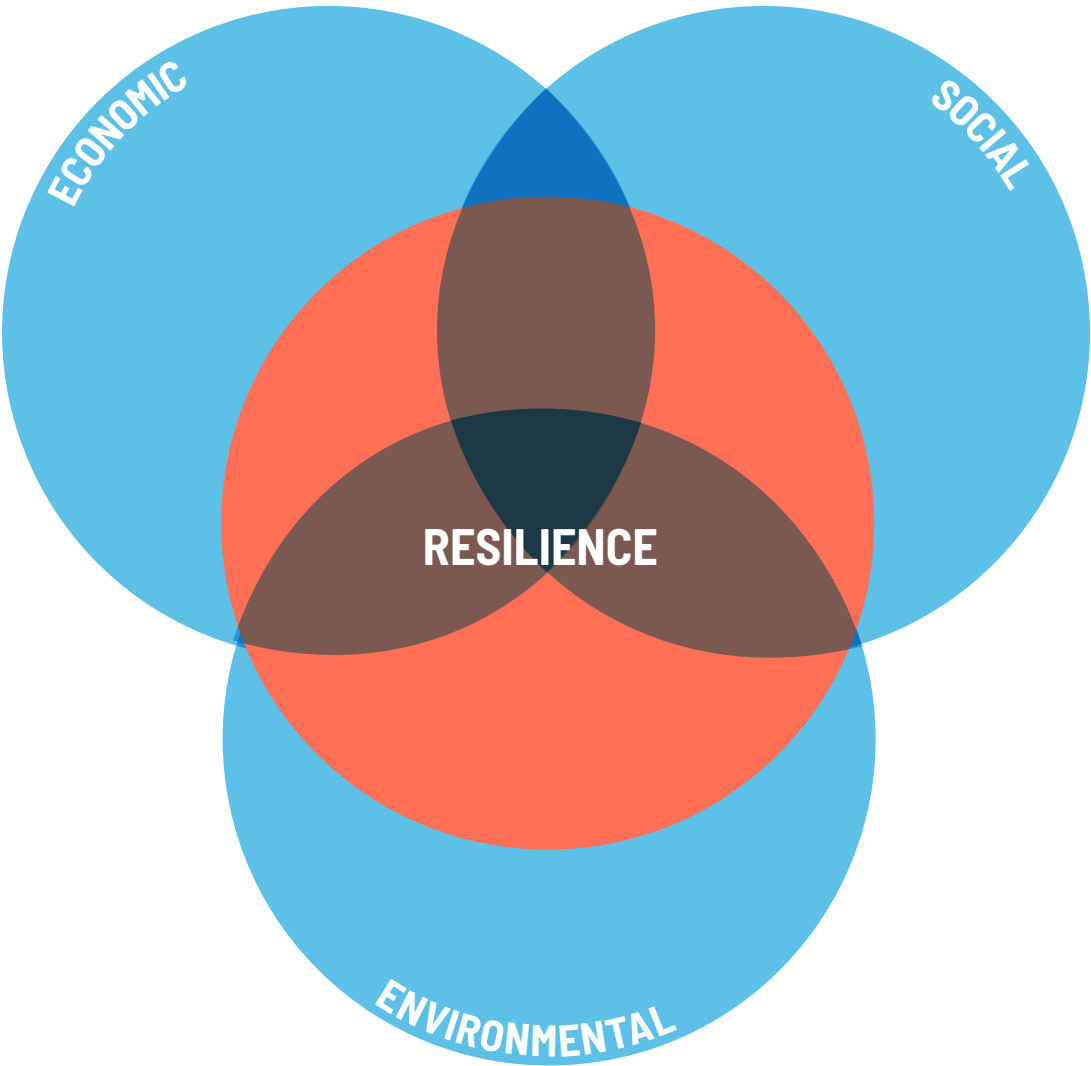
In addition to climate change and natural disasters, truly strategic resilience will require understanding a combination of environmental and social factors. The topics of social justice, climate change, public health, and economics are inextricably intertwined.

The projects of the Rio Hondo Confluence Area will help adjacent communities mitigate future uncertainties and disasters, ranging from public health to urban heat island to water

security. The projects’ commitment to flood risk management in particular, maintaining the existing flood risk reduction benefits for residential and commercial neighborhoods, is a core design strategy. The Imperial Wetlands project also commits to improve the quality of water flowing down the river, reducing pollutants flowing into the estuary and the Pacific Ocean. Improved water quality better prepares the county to meet its water resource needs. More broadly, the Water Education Center will serve to educate community members across generations on flood risk management, water supply, and water quality, which will embolden them to engage in more sustainable practices at home and increase their preparedness for natural disasters.

Current events related to the COVID-19 pandemic and the uncertain impacts on public health and the economy will affect future progress and strategic timelines for projects.

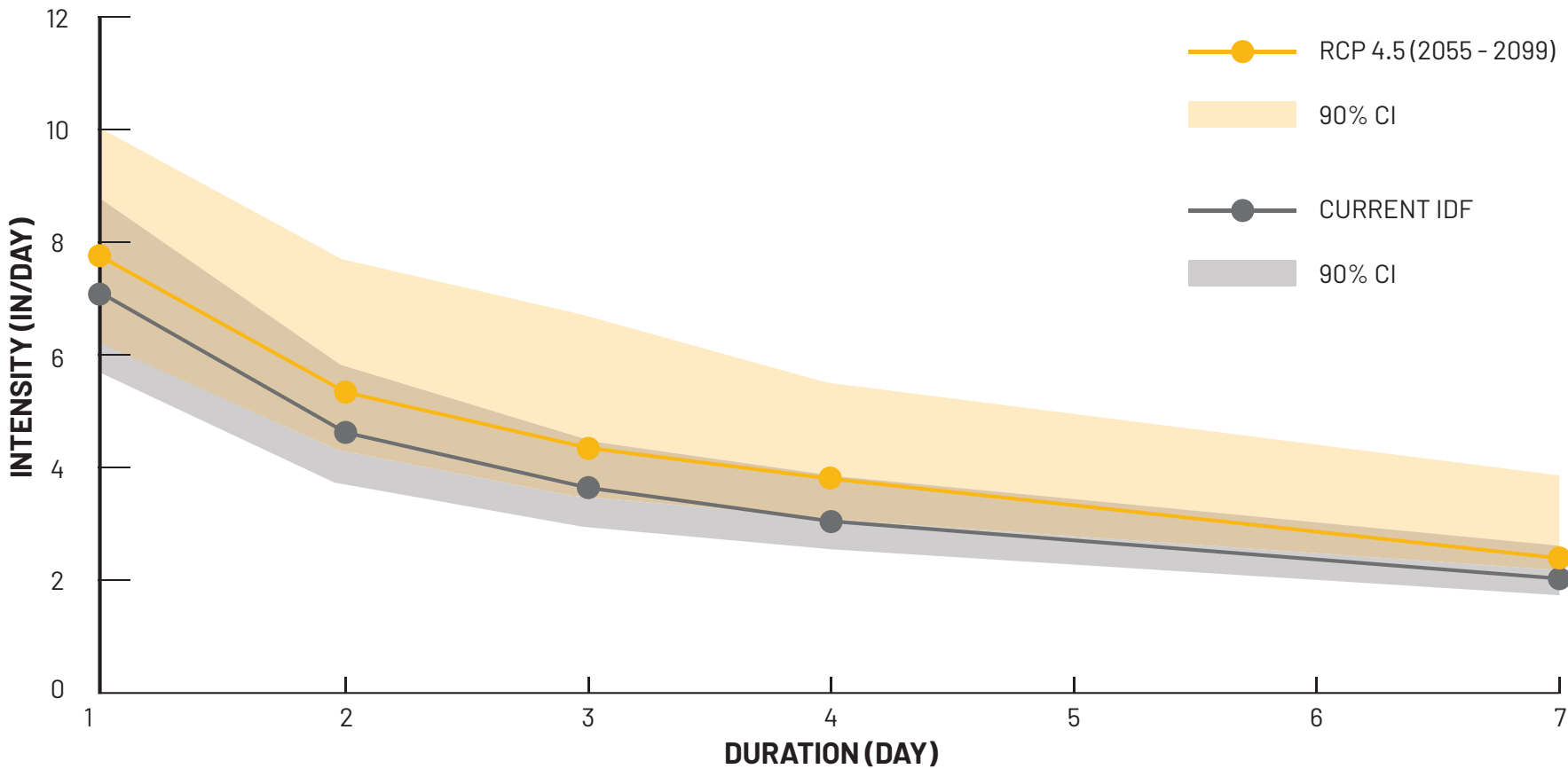
The sections on the following pages outline significant considerations and specific examples of how the RHCAP projects address these topics.



# CLIMATE CHANGE

## INTRODUCTION

Climate change within the Los Angeles region will lead to fundamental shifts over the next 75 years. Precipitation events will likely be less frequent and more intense when they occur. This can lead to more extreme droughts, devastating flood events, and reductions in water availability. Furthermore, although there is still much uncertainty, current climate change modeling for LA County indicates that the historical 1% storm event (100-year) may be more frequent, with a 1.5% probability of occurring annually (67-year).<sup>1</sup> Community and flood risk infrastructure resiliency will be increasingly important to address these topics and balance the needs of future water supply and flood risk reduction.



RCP = Representative Concentration Pathways    IDF = Intensity-Duration-Frequency    CI = Confidence Interval  
RCP4.5 = Greenhouse gas concentration continue upward until about mid-2040s and then plateau

**This graph\* shows the comparison between current 1% (100-year) precipitation intensity-duration-frequency (IDF) curve and projected IDF for RCP 4.5 scenario in LA. Projections indicate larger storm events are likely in the future. For example, the 1-day (24 hour) storm total may increase from 7 inches to almost 8 inches.**

<sup>1</sup> USACE 2016. U.S. Army Corps of Engineers, Los Angeles District: Hydraulics Report, Floodplain Analysis, Los Angeles River: Barham Boulevard to First Street, floodplain Management Services Special Study, Los Angeles, California, October 2016.

\*Source: Modified from AghaKouchak, Amir, Elisa Ragno, Charlotte Love, and Hamed Moftakhari. (University of California, Irvine). 2018. Projected changes in California's precipitation intensity-duration-frequency curves. California's Fourth Climate Change Assessment, California Energy Commission. Publication Number: CCA4-CEC-2018-005.

# CLIMATE CHANGE

While uncertainty and disasters have occurred historically, the climate has become much more volatile and the need to adapt is clear. The LA River and Rio Hondo, which were originally engineered in the early to mid-20th-century prior to the appreciation of multi-benefit risk reduction strategies, operate in much the same way they did when first constructed nearly a century ago. The timeliness for investment also bears considerable weight on the savings to public agencies compared to future costs. According to a FEMA sponsored report regarding natural hazard mitigation, riverine preparedness to the 1% event has a 6:1 benefit to cost ratio and 5:1 benefit to cost ratio beyond the 1% event (for every dollar invested to get to convey the 1% event, 6 dollars are saved in the future and beyond the 1% event 5 dollars are saved in the future).<sup>2</sup> Furthermore, the 2014 Safeguarding California Plan, which is an updated policy guide to the 2009 California Climate Adaptation Strategy (Natural Resources Agency, 2014), identifies the need for funding to “reduce climate risks, human loss, and disaster spending” and that “return on investments can be maximized by prioritizing multi-benefit projects.” The plan also includes a directive to “incorporate climate change risks... into government activities to provide risk reduction measures for the state’s vulnerable populations.”<sup>3</sup> Along with the capital cost savings for storm events, the current context of economic, social, public health, and a broad range of additional environmental risks merits serious and urgent consideration for projects that will mitigate future disasters, natural and otherwise.

Analyses conducted during the LA River Master Plan process also indicate that 30% of renters living in LA County within the 1% floodplain are severely rent-burdened. Clearly, the importance of flood risk

resilience and its connection to pressing social issues is especially clear within the RHCAP adjacent communities where social vulnerability increases the devastating impacts of flood risk.

In 2011, the Gateway Cities Council of Governments (COG) Subregional Sustainable Communities Strategy" identified a "need for upgrading aging infrastructure" among other risk mitigation efforts for more sustainable community planning and economic resilience. That report cites this need in relation to the unique land use development of the SELA region which contains many brownfield sites and previous land uses that increase the vulnerability of infrastructure as well as public health. Critical infrastructure needed for community resiliency is vulnerable to damage in natural disasters. A Gateway Cities COG sponsored presentation on "Southeast Los Angeles County, CA Railroad and Goods Movement" (2009) highlighted the economic footprint resultant of the extremely high concentration of port, rail, and freight infrastructure in the SELA region including rail, warehouses, and distribution centers along with the region's relationship to the Ports of Long Beach and Los Angeles. Sea level rise, other climate risks, and other natural disasters all pose a threat to this critical infrastructure and could result in massive economic losses that could be abated by capital investments today.

In the nearby city of Los Angeles, the EPA has a Climate Resilience Evaluation and Awareness Tool (CREAT) that has shown that approximately half of the City of LA's stormwater and wastewater infrastructure is vulnerable to climate risks. "An additional 10% investment in capital costs would help the City to avoid 90% of future expenses and costs resulting from climate-related impacts."<sup>4</sup>

<sup>2</sup> "Natural Hazard Mitigation Saves: 2019 Report," December 2019. National Institute of Building Sciences. [https://cdn.ymaws.com/www.nibs.org/resource/resmgr/reports/mitigation\\_saves\\_2019/mitigationsaves2019report.pdf](https://cdn.ymaws.com/www.nibs.org/resource/resmgr/reports/mitigation_saves_2019/mitigationsaves2019report.pdf), page 9.

<sup>3</sup> Marrero, Lenise, and Inge Wiersema. "One Water LA: Planning for a Resilient Water Supply." Vol. 6, 30 Apr. 2018, doi:10.5991/opf.2017.43.0035.

<sup>4</sup> 100 Resilient Cities. "Resilient Los Angeles," March 2018. <http://100resilientcities.org/wp-content/uploads/2018/03/Los-Angeles-Resilience-Strategy-PDF.pdf>.



# CLIMATE CHANGE

As climate change intensifies, urban heat island and habitat fragmentation in the Southeast cities will intensify if steps are not taken to mitigate the large expanses of paving and development.

Urban heat island effect and its myriad of public health impacts closely ties in with rising temperatures and climate change. Neighborhoods lacking trees and extensive paving can be 10 degrees higher than those with ample green space and vegetation.<sup>5</sup> Average temperatures in the City of LA have risen 5 degrees (10 degrees in the summer) on average over the last 100 years.<sup>6</sup> According to a 2015 study by Trust for Public Land, the RHCAP area is already categorized as a high urban heat island hotspot. While the area currently has about 4-6 days above 95 degrees, the area is predicted to have as many as 37-54 days above 95 degrees by 2080.<sup>7</sup>

5 Schneider, Benjamin. "L.A. Bets That Equity Is the Path to Resilience." CityLab, March 8, 2018. <https://www.citylab.com/environment/2018/03/la-bets-that-equity-is-the-path-to-resilience/554993/>.  
6 Dovey, Rachel. "Los Angeles Tests Heat-Beating Streets." Next City, May 22, 2017. <https://nextcity.org/daily/entry/los-angeles-tests-heat-beating-streets>.  
7 Alex Hall Research Group, UCLA. Climate Change in the Los Angeles Region Project. Accessed May 12, 2020. [http://research.atmos.ucla.edu/csrl/LA\\_project\\_summary.html](http://research.atmos.ucla.edu/csrl/LA_project_summary.html).



## FEMA FLOOD RISK

- City Boundary
- Rail Lines
- Stream/Waterbody
- FEMA 1.0% Annual Chance of Flood
- FEMA 0.2% Annual Chance of Flood

1 mi. N

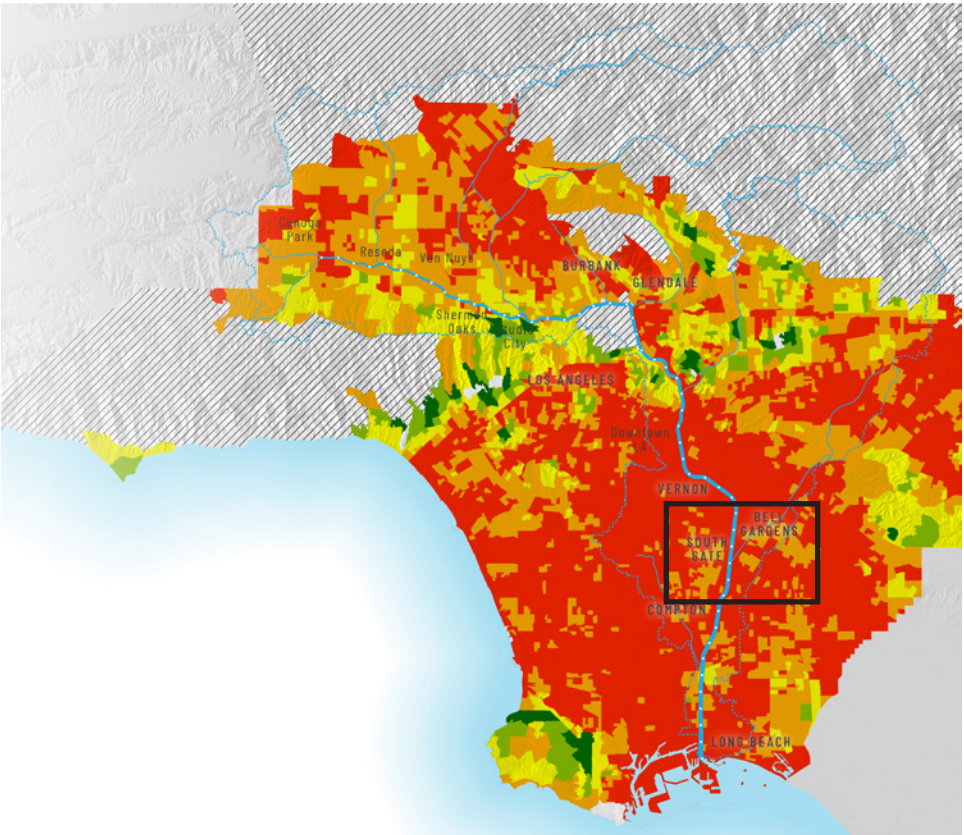
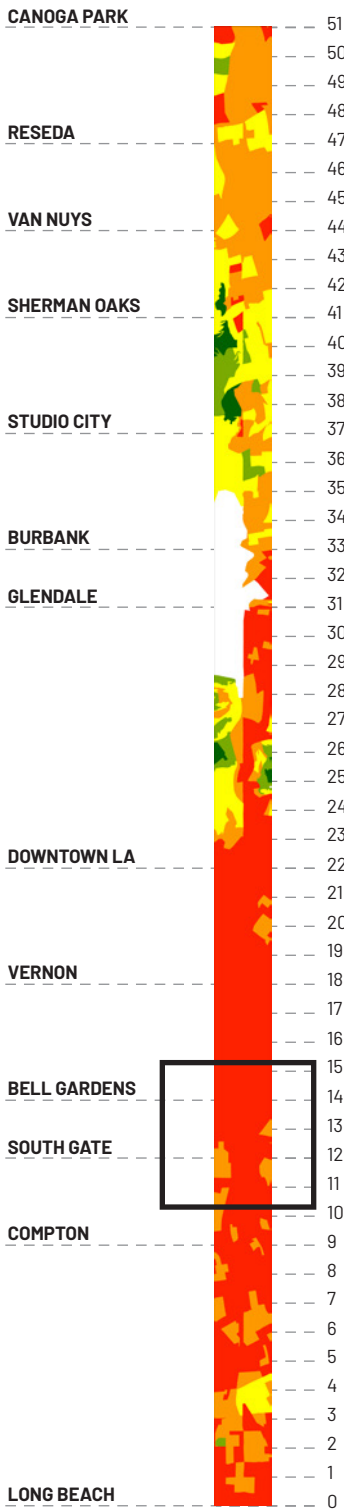
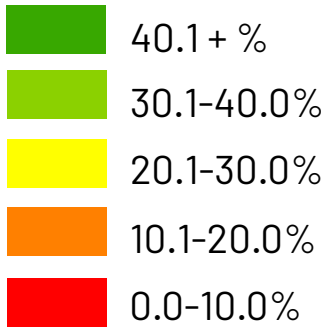
Source: Los Angeles Region Imagery Acquisition Consortium (LARIAC) and Pictometry International Corp



# CLIMATE CHANGE

Utilizing urban tree canopy data from a 2012 study by the US Forest Service, the average urban tree canopy percentage in block groups within a mile of the RHCAP is 6.9%, while block groups immediately adjacent to the project area average only 3.9% canopy coverage with some as low as 2%. This is considerably lower than the 12.3% average along the 51 miles of the LA River corridor, and is also lower than the county urban tree canopy average of 10.2%. The lack of tree canopy makes this area particularly susceptible to the negative health impacts of extreme heat.

Percent Tree Canopy Coverage



The river's highest tree canopy need is located in the stretch from Downtown LA to Long Beach. In the project area, the lack of tree canopy makes this area particularly susceptible to the negative health impacts of extreme heat.

Source: OLIN, 2019. Based on EarthDefine, USDA Forest Service, California Department of Forestry and Fire Protection, Urban Tree Canopy, 2012, <https://www.fs.usda.gov/detailfull/r5/communityforests/?cid=fseprd647442&width=full>



# CLIMATE CHANGE

LAND COVER: GROUND COVER AND TREE CANOPY + IMPERVIOUS SURFACE



GROUND COVER AND TREE CANOPY

- City Boundary
- Rail Lines
- Stream/Waterbody
- Tree Canopy
- Herbaceous Ground Cover
- Barren

Source: Los Angeles Region Imagery Acquisition Consortium (LARIAC) and Pictometry International Corp



IMPERVIOUS SURFACE

- City Boundary
- Rail Lines
- Stream/Waterbody
- Buildings
- Roads
- Other Paved Areas

Source: Los Angeles Region Imagery Acquisition Consortium (LARIAC) and Pictometry International Corp



# CLIMATE CHANGE

## DESIGN STRATEGIES TO ADDRESS CLIMATE CHANGE

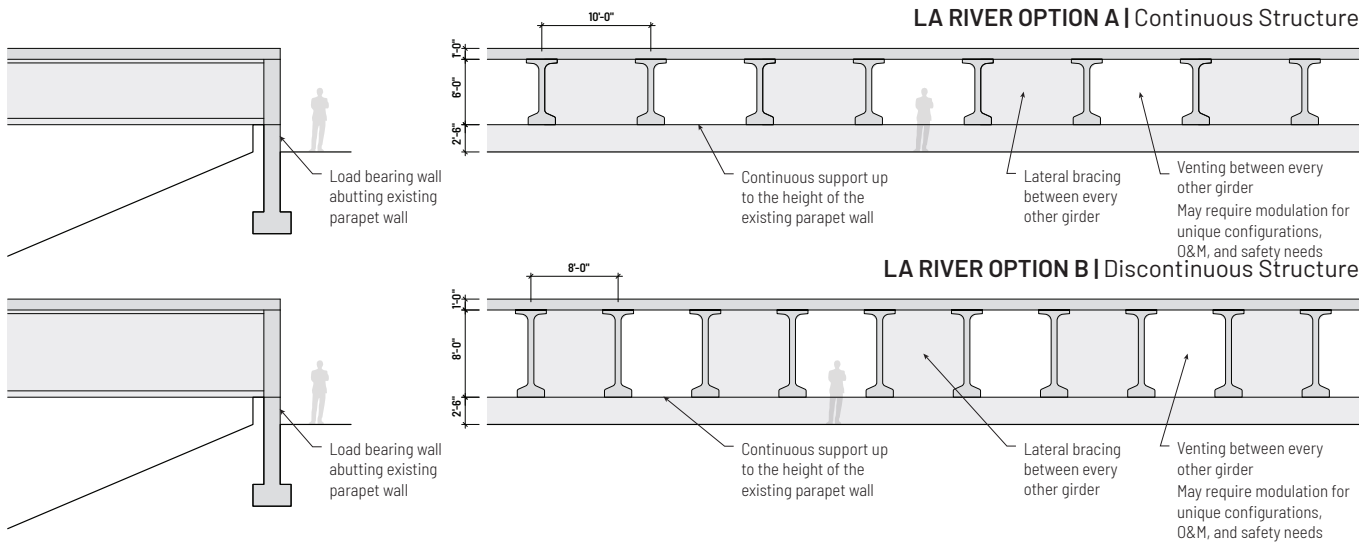
Coupled with design strategies contained within regional planning documents, strategies within this Concept Report are anticipatory of future climate realities.

### FLOOD:

While it is cost prohibitive to design and engineer a channel large enough to “protect” against every possible flood, understanding the behavior of the channel during large flood events is critical to assessing risk. The current flood carrying capacity of the LA River in and around the RHCAP Area was optimized in the early 2000s to contain the Maximum Deliverable Discharge (MDQ), which is estimated to be equivalent to about a 0.2% (500-year) flood event with the exception of the overflow weir which limits channel capacity to the 0.75% (133-year) event at that location. The MDQ is the maximum flow rate that this section of the LA River system could experience due to upstream constrictions and breakouts. The designs contained within this concept report maintain that capacity and recommend features to increase that capacity while also providing the multi-beneficial aspects lacking in these communities.

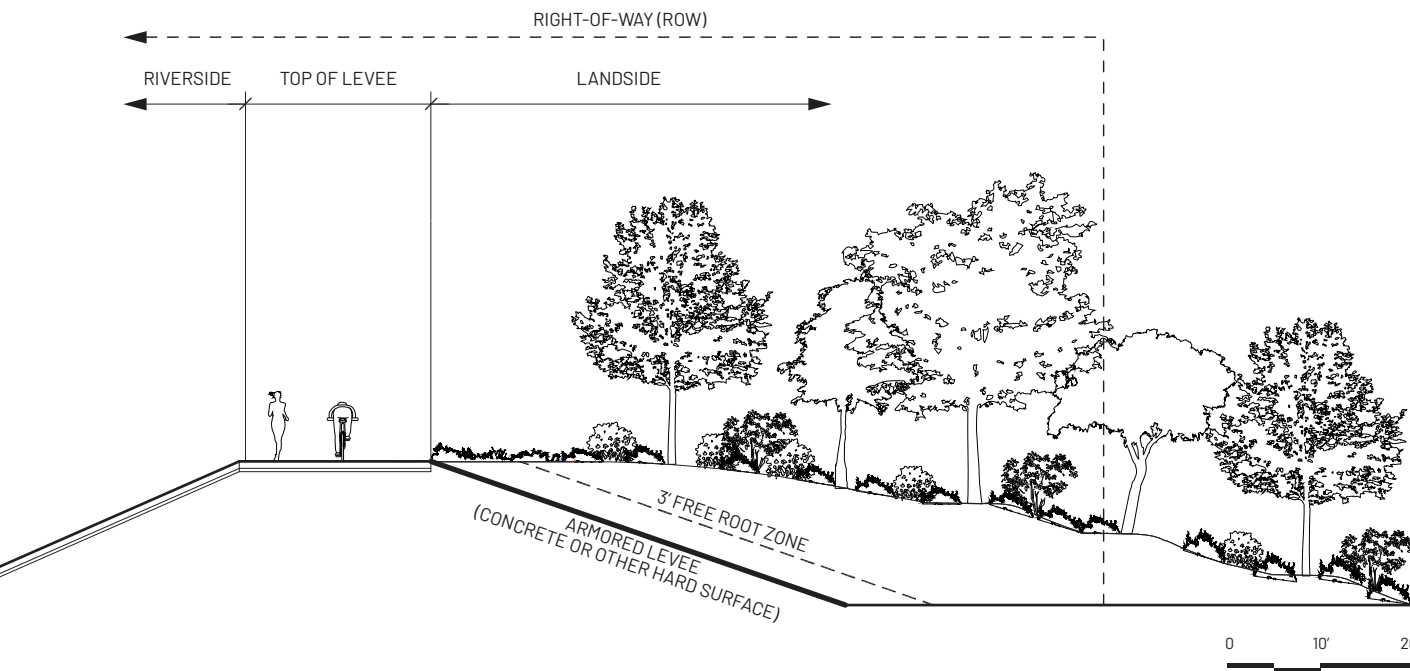
Elevating bridges and platform parks well above the 0.75% flood elevation reduces the risk of flooding and catastrophic losses to infrastructure and the surrounding communities. In locations where it may not be possible to elevate existing infrastructure, specifically near the UPRR crossings where design flows are already constricted, purposeful “venting” provides space for wave runup and levee overtopping during the design flood event or during even greater channel capacity exceedance events to limit the possibility of catastrophic failure.

One typical detail explored in this report involves armoring the landside of levees and covering them with a planting berm. In an overtopping event, this strategy reduces the potential for a catastrophic levee failure as the landside of the levee erodes.



### LA RIVER PLATFORM PARK OPTIONS A + B: VENTING

Design example (cross section on left and elevation of edge of platform to the right) of minimum clearance between the top of the existing levee walls and the bottom of a platform structure to allow for flood overflow, venting, wave action, and maintenance vehicle access. It provides space for wave runup and levee overtopping during the design flood event or during even greater channel capacity exceedance events.



### LA RIVER MASTER PLAN DESIGN GUIDELINES STRATEGY

Levee Stabilization Section. Planting scenarios should follow the above details when possible to provide the best growing conditions and allow the planted media to have the best chance of success. Common on levee landside conditions.



## RESILIENCE

# CLIMATE CHANGE

### DESIGN STRATEGIES TO ADDRESS CLIMATE CHANGE

#### URBAN HEAT ISLAND:

Additionally, RHCAP projects address a wide range of needs also related to environmental justice and public health such as urban heat island. Dominated by impervious surfaces, barren rights-of-way, and a lack of tree canopy, the project area currently lacks the benefits of shade, habitat, and a collective reduction in the high urban heat island effect in adjacent communities.

Within the project area, the approximately 114 acres of concrete channel along the LA River and Rio Hondo are likely a significant contributor to the local heat island effect. The RHCAP proposes two platform parks with extensive tree planting, reducing the solar-exposed impervious surface by 32 acres. Access to the river from adjacent communities is also improved through the addition of tree canopy and new parks, trails, and open space on currently barren rights-of-way adjacent to the channel and proposed platform parks. As configured the current design concepts add over 2500 trees.



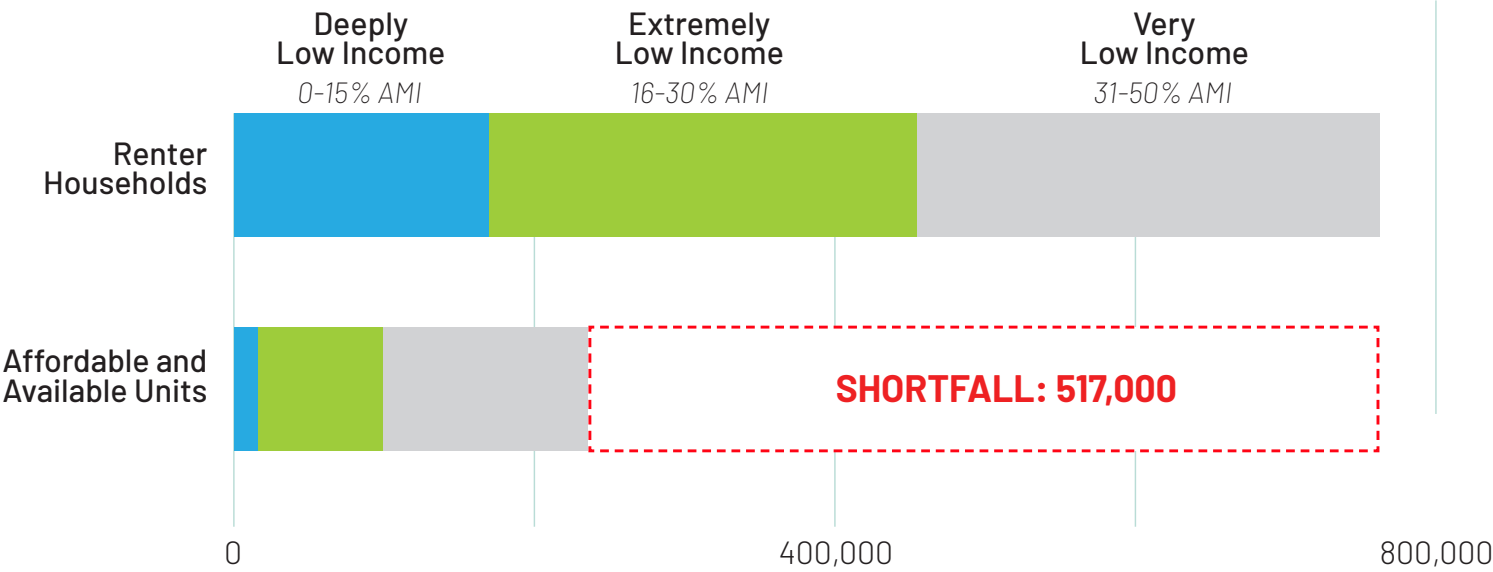


# ECONOMIC AND SOCIAL

## INTRODUCTION

As illustrated in the Needs Analysis chapter’s section on “Housing Affordability” and the Additional Research chapter’s section on “Affordable Housing and Permanent Supportive Housing,” LA County faces significant challenges with respect to housing affordability, instability, and homelessness. Displacement risk is most pervasive between Downtown LA and Long Beach including many neighborhoods at risk of displacement near the RHCAP site. In 2019, LAHSA’s homeless count revealed that there were nearly 59,000 individuals experiencing homelessness within LA County’s Continuum of Care, which excludes Glendale, Pasadena, and Long Beach.<sup>1</sup>

The county’s economic and social resilience directly relate to its posture on environmental justice. Socioeconomic disparities, inequity, low access to resources, and housing instability make people even more vulnerable than they would be otherwise because they have less flexibility and greater hurdles to overcome to rebound.<sup>2</sup>



## LA COUNTY NEEDS TO ADD MORE THAN 517,000 AFFORDABLE HOMES TO MEET CURRENT DEMAND

Area Median Income (AMI) is calculated by the U.S. Department of Housing and Urban Development for Metropolitan Fair Market Rent Areas (HMFAs) based on median family income. LA County is part of the Los Angeles-Long Beach-Glendale HMFA. In 2020, AMI is \$77,300.

<sup>1</sup> Greater Los Angeles Homeless Count 2019 Results.” LAHSA, June 4, 2019. <https://www.lahsa.org/documents?id=3437-2019-greater-los-angeles-homeless-count-presentation.pdf>.  
<sup>2</sup> Schneider, Benjamin. “L.A. Bets That Equity Is the Path to Resilience.” CityLab, March 8, 2018. <https://www.citylab.com/environment/2018/03/la-bets-that-equity-is-the-path-to-resilience/554993/>.



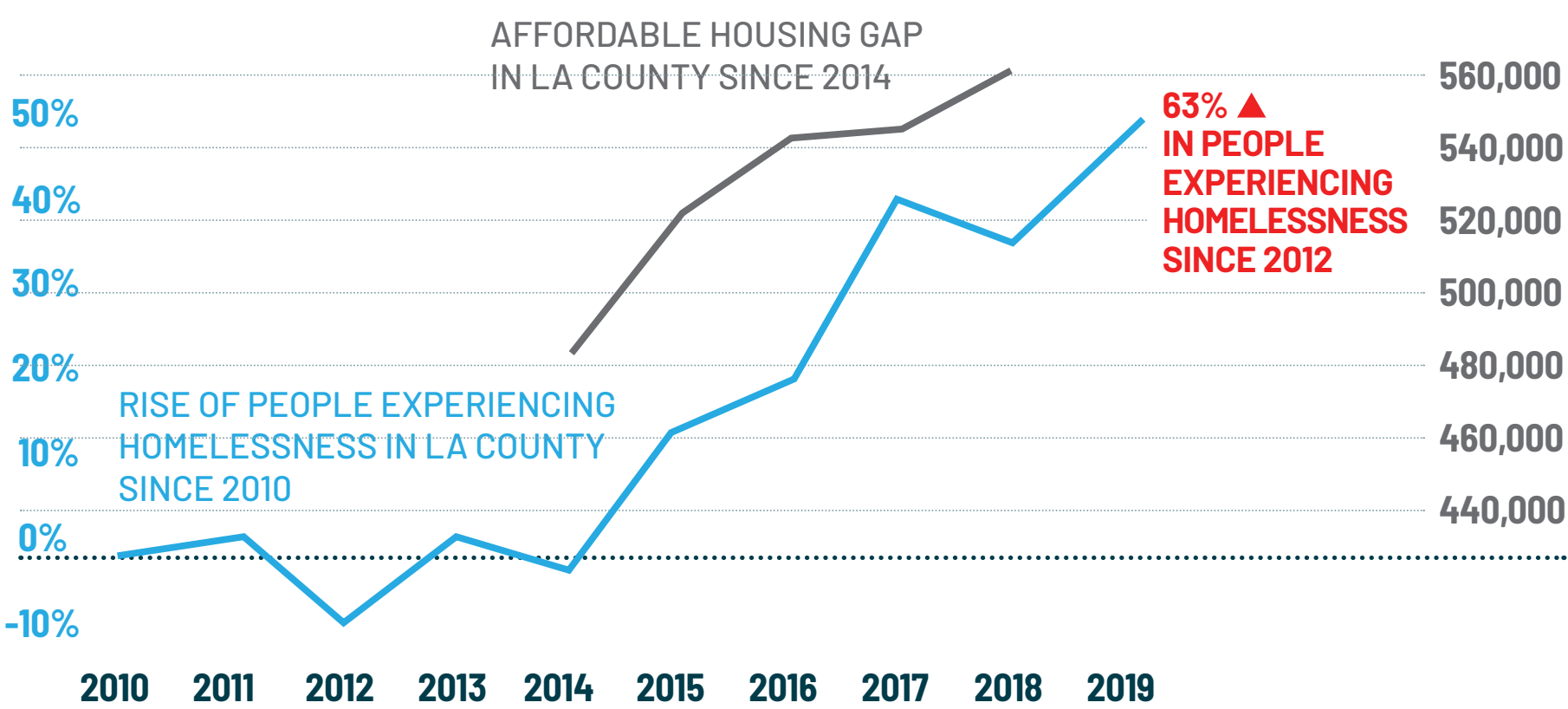
# ECONOMIC AND SOCIAL

## INTRODUCTION

In light of the recent COVID-19 pandemic, the Safer at Home Order, and unforeseeable and severe economic downturns, only 45% of LA County residents still hold a job, compared with 61% in mid-March 2020. Approximately 1.3 million jobs have been lost, in which those lost disproportionately affect Black and Latino residents.<sup>1</sup> The recent pandemic underscores the inextricable links among economic, social, and public health risks. A clear and alarming correlation has emerged between race, economic inequality, infection and mortality rates that mirror the demographics of those affected by job loss.<sup>2</sup> Furthermore, persons experiencing homelessness are at an elevated high risk due to high density environments with low access to medical resources and adequate sanitation facilities that has compelled the State of California and LA County to treat homelessness as an immediate and critical public health risk incentivizing immediate action to address housing needs.<sup>3</sup> Many elements proposed in the upcoming LA River Master Plan and the RHCAP advocate to address these vulnerabilities. In light of the recent pandemic, they are of increased importance to implement to create a more robust economic and social framework to support LA County’s most vulnerable residents.

<sup>1</sup> Cosgrove, Jaclyn. “Less than Half of L.A. County Residents Still Have Jobs amid Coronavirus Crisis.” LA Times, April 17, 2020. <https://www.latimes.com/california/story/2020-04-17/usc-coronavirus-survey>.  
<sup>2</sup> Poston, Benjamin, et al. “Younger Blacks and Latinos Are Dying of COVID-19 at Higher Rates in California.” LA Times, 25 Apr. 2020, <https://www.latimes.com/california/story/2020-04-25/coronavirus-takes-a-larger-toll-on-younger-african-americans-and-latinos-in-california>.  
<sup>3</sup> Kiefer, Francine, and Martin Kuz. “Housing Crisis or Health Crisis? On the Streets of California It’s Both.” Christian Science Monitor, 2 Apr. 2020, <https://www.csmonitor.com/USA/Society/2020/0402/Housing-crisis-or-health-crisis-On-the-streets-of-California-it-s-both>.

Source: California Housing Partnership, LA Times (2018), Los Angeles Homeless Services Authority – Greater Los Angeles Homeless Count Presentation (2019)



THE RISE IN PEOPLE EXPERIENCING HOMELESSNESS IS CORRELATED WITH A LACK OF AFFORDABLE HOUSING

# ECONOMIC AND SOCIAL

## DESIGN STRATEGIES TO ADDRESS ECONOMIC AND SOCIAL RESILIENCE

Prior to the COVID-19 pandemic, the Southeast cities typically had greater unemployment than that of LA County as a whole (4.4%). In the cities surrounding the project area, South Gate and Lynwood have higher unemployment, 4.7% and 5.1% respectively.<sup>1</sup> The Rio Hondo Confluence Area Project will serve to stimulate the local economy as it necessitates job creation through construction projects, operations and maintenance, security, commercial activity, and other site-specific roles. Although construction projects are temporary contracts, they will provide valuable work opportunities for local contractors as the County requires significant job procurement from local hire and targeted workers. These jobs help build local contractors’ capacity and provide valuable jobs to at-risk individuals that may otherwise be overlooked.

In the long term, the various projects will require a robust workforce of ongoing operations and maintenance, cleaning, security, facilities

management, and programming staff, such as those supporting sports fields, cafés, restrooms, and bike rental and repair stations. There are some roles that can be provided by outlying vendors, especially those related to food services, lawn and vegetation care, and cleaning. This provides numerous opportunities for local, for-profit businesses to take part in the business procurement related to the area parks and amenities.

Further, the projects will specifically incentivize the creation of green jobs that support a broader mission of sustainability, water supply, stormwater management, open space, ecology, and public health. These are specialized, well-compensated jobs that enhance the health of the broader region, provide immediate support for the projects, and diversify job growth in the local economy. In a 2019 Century Foundation report, researchers concluded that green jobs are more often classified as middle-class jobs than non-green jobs. Additionally, green

jobs within low-wage categories earn on average \$5-7 more an hour than other low-wage workers nationally.<sup>2</sup> In creating a supportive environment of green jobs, the RHCAP projects can help propel a climate of forward-looking, sustainable, and lucrative employment.

In addition to job creation, housing affordability is a key consideration for neighborhoods surrounding the Rio Hondo Confluence as projects are developed. Parallel efforts within neighboring communities and through the LA County CEO’s Office are ongoing to develop inclusionary zoning policies, tenant protections, and land acquisition funds for affordable housing, which will assist in mitigating effects of displacement as river areas improve and parks are added near the Rio Hondo Confluence. It is critical that the design strategies for the RHCAP continue to be coordinated with these ongoing efforts.

1 State of California, Employment Development Department. “Labor Force and Unemployment Rate for Cities and Census Designated Places: 2019 Annual Averages.” <https://www.labormarketinfo.edd.ca.gov/data/labor-force-and-unemployment-for-cities-and-census-areas.html>

2 Novello, Amanda and Greg Carlock. “Redefining Green Jobs for a Sustainable Economy.” The Century Foundation, 2 Dec 2019, <https://tcf.org/content/report/redefining-green-jobs-sustainable-economy/?agreed=1>.