



STRATEGIES *for a*

SUSTAINABLE

CHINATOWN

JUNE 2017



SUSTAINABLE  
CHINATOWN  
可持續發展的華埠



## ACKNOWLEDGEMENTS

Sustainable Chinatown is a collaborative, cross-sector initiative led by Chinatown Community Development Center (CCDC), the San Francisco Planning Department, the San Francisco Department of the Environment (SF Environment), and Enterprise Community Partners, Inc. The project was funded by grants from the Partners for Places Grant Program of the Funders' Network, the San Francisco Foundation, Enterprise Community Partners, and the San Francisco Planning Department.



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### Special thanks for the contributions by staff from:

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San Francisco Mayor's Office of Housing and Community Development  
San Francisco Department of Public Health  
San Francisco Recreation & Parks Department  
San Francisco County Transportation Agency  
San Francisco Municipal Transportation Agency  
San Francisco Department of Building Inspections  
EcoDistricts  
Global Green USA  
California Housing Partnership Corporation  
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A beautiful  
neighborhood with good  
fortune and peace

協居吉祥康增寧

Housing with  
luck, longevity and  
health

舉堂美景福添壽



**SUMMARY**

# Sustainable Chinatown: Preserving Chinatown's Common Heart

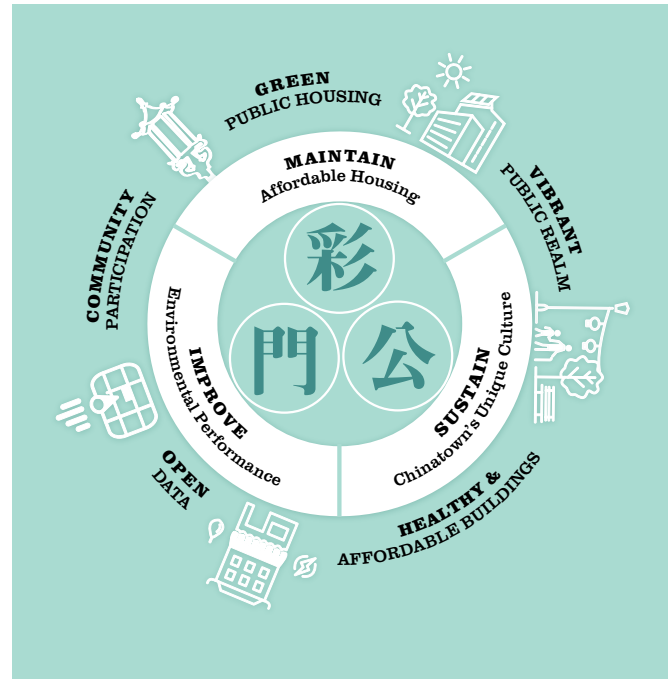
For centuries, poetry has been used in the Chinese culture as a form of expression and to memorialize significant moments and experiences. Chinese couplets are a traditional form of two complimentary poetic lines, often written on red paper or hanging scrolls and displayed in doorways for special occasions, such as the Lunar New Year. Terry Luk, a local Chinese poet and calligrapher, composed this couplet to describe the community vision of Sustainable Chinatown.

San Francisco’s Chinatown has a common heart; one that has grown strong through the dedication of long-time and new immigrant residents, loyal business owners, deeply-rooted social institutions, and a cultural impact that extends far beyond its physical boundaries. Its sidewalks and parks are packed with people; market stands overflow with produce, housewares, and knick-knacks; and Cantonese chatter fills the alleyways day and night. This close-knit community is one of the last affordable neighborhoods in an increasingly expensive city and is threatened by mounting environmental, displacement and gentrification challenges.

Sustainable Chinatown is an initiative to help preserve this cherished community by increasing its affordability, sustainability, and resilience. It is the product of a cross-sector partnership that emerged in 2014 between public agencies (San Francisco Department of the Environment and San Francisco Planning Department), philanthropy and intermediary supporters (The San Francisco Foundation and Enterprise Community Partners) and the Chinatown Community Development Center (CCDC)—a highly-respected and long-standing community development organization.

At its core, this work aims to redefine what sustainability means for a community like Chinatown, where so many residents and businesses are already “green by necessity,” consuming fewer resources, living in dense housing, and walking and/or taking public transit. For Sustainable Chinatown, “sustainability” is not only about environmental performance, but also about the long-term resilience of its culture in the face of larger looming threats such as gentrification and climate change.

Sustainable Chinatown consists of a set of strategies meant to address the neighborhood’s long-term sustainability at all of levels—social, economic, and environmental. The mission of Sustainable Chinatown includes:



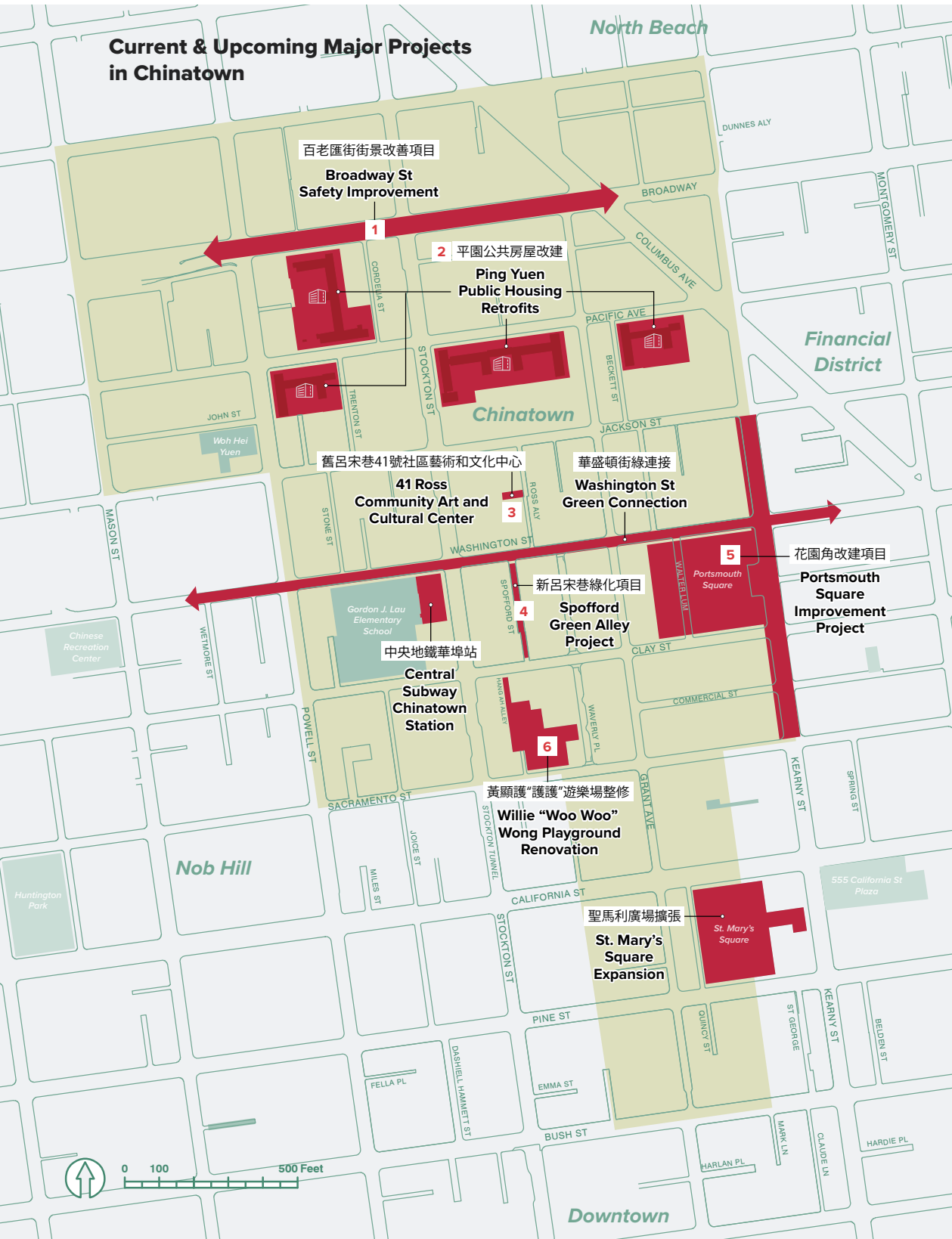
- **Maintain** affordability of housing and commercial properties
- **Sustain** the community’s unique culture and history
- **Improve** the neighborhood’s environmental performance

As interconnected goals, Sustainable Chinatown’s success is predicated on achieving all three. In other words, if Chinatown becomes the greenest neighborhood in the City but current residents and businesses are largely displaced due to market pressures or climate change, then the efforts of Sustainable Chinatown will have failed.

This report describes the work and vision of this cross-sector initiative, and includes the following components:

- **Part I – Strategies for a Sustainable Chinatown:** Six critical areas of work intended to complement the efforts of CCDC, other nonprofit organizations, and the City by maintaining affordability, sustaining Chinatown’s unique culture, and improving environmental health and sustainability.
- **Part II – Sustainable Chinatown Dashboard and Baseline Assessment:** An in-depth, innovative profile of environmental sustainability and demographic trends in Chinatown that can be monitored over time to track progress in meeting City and neighborhood goals.

### Current & Upcoming Major Projects in Chinatown



**Sustainable Chinatown initiative area**

**OTHER DISTRICT SCALE EFFORTS 整區努力**

- Efficient + affordable private buildings 可負擔私人樓宇
- Water + energy efficiency programs 水和電源節約計劃

- Building preservation + renovation 樓宇維護及修改
- Tenant education + building owner outreach 住客教育和業主外展

## Preserving Chinatown's Common Heart in the Face of Gentrification and Climate Change

With a history spanning over 150 years, Chinatown has long been an immigrant gateway, cultural mecca, and tourist destination. However, it is the people that define its common heart. The neighborhood has always been a place of community-building and resilience, providing a safe haven during transformative periods such as the anti-Chinese exclusionary policies of the late 19th and early 20th centuries, the post-1906 earthquake rebuilding efforts, and the protests for affordable housing and anti-discriminatory policies during the Civil Rights Era to the present. Then, as now, it was the community's social institutions—cultural organizations, family associations, nonprofits and other social services—that brought people together to defend their rights and to persevere during periods of growth and upheaval.

Chinatown remains a gateway community for vulnerable San Franciscans to this day. The 27 city blocks in the Sustainable Chinatown initiative area<sup>1</sup> are an economically vibrant community of over 14,000 residents and 900 small businesses. Chinatown is home to dozens of nonprofits and social service organizations supporting residents' diverse needs, including workforce development, youth development, housing counseling, senior care, and immigration services, among others. Chinatown is also rich with institutions such as the Chinese Hospital, churches and temples, and cultural strongholds such as the Chinese Culture Center and the Chinese Historical Society of America.

This vitality is in stark contrast with the neighborhood's harsh living conditions. Nearly one-third of Chinatown's households live in poverty, and the area's median income is one-fourth that of the citywide average. Most residents live and work in buildings that haven't seen significant upgrades since their construction immediately after the 1906 earthquake, resulting in rates of residential building health and safety violations that are more than double the city's average. Over



Photo courtesy of CCDC.

one-fifth of Chinatown residents live in overcrowded conditions (four times the city average), many of them in Single Room Occupancy (SRO) buildings, which make up over half of residential units in the neighborhood.

These trends are worsening as San Francisco's booming economy has introduced a new wave of real estate pressures. Until recently, Chinatown has been somewhat resistant to these market pressures, due to strong land use controls that protect SROs and limit the scale of allowable development. Even with these protections, Chinatown and its surrounding neighborhoods are not immune to gentrification pressures. The UC Berkeley Urban Displacement Project found that the area is at risk of gentrification, noting that Chinatown and the census tracts immediately surrounding the neighborhood have lost a significant number of Asian households (declining 18% from the 1990s to the present) and low-income residents as rents have increased. The core Chinatown area, which has a high percentage of rent-controlled and SRO units, has been relatively more stable than surrounding blocks—median rent in 2013 was \$575 per unit, compared to \$1,455 in the adjacent census tract.<sup>2</sup>

<sup>1</sup> There is no single accepted set of boundaries that define the Chinatown neighborhood. The initiative area for the Sustainable Chinatown was defined by CCDC, and encompasses the majority of the historic businesses, cultural organizations, SRO and apartment buildings, and other uses that are typically associated with Chinatown.

<sup>2</sup> Center for Community Innovation, University of California, Berkeley. Community Organizing Amidst Change in SF's Chinatown: Case Study on Gentrification and Displacement Pressures in Greater Chinatown of San Francisco, CA. June 2015. Available at: [http://iurd.berkeley.edu/uploads/Chinatown\\_Final.pdf](http://iurd.berkeley.edu/uploads/Chinatown_Final.pdf)





Photo by Flickr user centinel.

However, many fear it is only a matter of time before Chinatown succumbs to the same affordability pressures that have rocked other city neighborhoods. The SRO Families United Collaborative reports that skyrocketing housing costs have forced families to move into SRO housing across the city (increasing by 55 percent since 2001), where they must crowd into a single room. Meanwhile, citywide rents for SRO units have increased 25 percent over the last four years. While the majority of SROs continue to house low-income residents, some building owners are beginning to target higher-paying tenants. Anecdotally, a SRO owner in Chinatown recently made significant upgrades to his building, upgrading fixtures and adding in foldable toilets to target higher-income workers and students, offering rents of \$1,400 a month—two to four times more than SROs typically advertised to the Chinese community.

Commercial properties are not subject to rent protections and are also extremely vulnerable to displacement. Chinatown is starting to see a trend of long-standing restaurants closing, such as the Empress of China and Four Seas, and small businesses are beginning to fear their leases won't be renewed

in order to favor more upscale tenants. Without protective actions, these trends could worsen as the City completes large investments in infrastructure in and around Chinatown—including the Central Subway, streetscape projects, and renovations to signature parks and open spaces. These projects will bring much-needed improvements to neighborhood services, but will also make the area an increasingly desirable place to live and must be paired with appropriate neighborhood stabilization strategies to help protect existing residents against displacement.

Along with these immediate challenges is the looming threat of climate change, the biggest environmental threat of our time. Climate change will bring more droughts, extreme weather events, sea level rise and flooding, and environmental health risks to the City. The San Francisco Climate and Health Profile, created by the San Francisco Department of Public Health, rated Chinatown last out of 36 neighborhoods in its ranking of community resilience. Though climate change will affect us all, its impact may be felt most deeply in under-resourced communities like Chinatown, where it will amplify existing vulnerabilities such as poverty, linguistic isolation, housing insecurity, and low educational status. These impacts are compounded by the neighborhood's physical vulnerabilities, such as its poorly-maintained building stock, a scarcity of tree cover and permeable surfaces, and the City's lowest amount of parks and open space per capita.

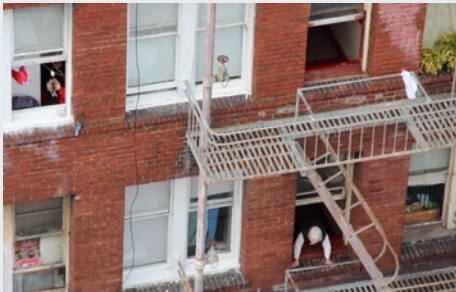
Chinatown is at a critical juncture. Against this background of aging buildings and infrastructure, a vulnerable low-income population, gentrification pressures and climate change, Chinatown has the opportunity to be a leader, showing how diverse stakeholders can unite around strategies that simultaneously make the neighborhood more resistant to environmental and social stressors, while improving health and quality of life for residents. The strategies identified here build on the neighborhood's strengths, and the unique public/nonprofit/philanthropic governance structure provides a model for communities in San Francisco and beyond.

## CHINATOWN AT-A-GLANCE: CHALLENGES & OPPORTUNITIES



### IMMIGRANT GATEWAY

The neighborhood has one of the lowest median incomes in the City and is home to a large population of seniors, immigrants, and non-English speakers. In this compact area, residents can access over 900 small businesses and dozens of nonprofits, social services, and cultural organizations, providing a vital lifeline and the social heart for this vulnerable population.



### GENTRIFICATION & OVERCROWDED, UNHEALTHY HOUSING

About half of Chinatown housing units are in Single Room Occupancy (SRO) hotels – a naturally affordable housing source, but one that is increasingly threatened by years of deferred building maintenance and gentrification. One-fifth of residents live in overcrowded conditions (4 times the City average) and rates of residential health and safety violations are double that of other neighborhoods. Meanwhile, rents have increased significantly in the areas immediately abutting Chinatown at the same time that low-income and Asian households declined, suggesting increased real estate pressures in Chinatown.



### GREEN BY NECESSITY

In general, Chinatown inhabitants live frugally to stay within their limited budgets, and have a smaller environmental footprint than residents elsewhere. Residents live in dense housing, purchase fewer items, consume less energy, emit less greenhouse gasses, and walk and/or take public transit instead of driving.



### CLIMATE CHANGE & OTHER ENVIRONMENTAL THREATS

Climate change will bring the threat of increased heat waves, flooding, and air pollution, disproportionately burdening Chinatown's most vulnerable populations – especially children and seniors. In addition, the neighborhood faces a variety of environmental challenges including inefficient buildings, high water use, and a lack of trees and open spaces. The San Francisco Department of Public Health rated Chinatown last out of 36 neighborhoods in its ranking of community resilience to climate change.



### NEW INFRASTRUCTURE OPPORTUNITIES

Planned investments, including the completion of the Central Subway, park renovations (including Portsmouth Square and Willie Woo Woo Wong Playground), streetscape and alleyway projects, and the rehabilitation of the Ping Yuen housing developments offer a once-in-a-generation opportunity to improve quality of life in Chinatown. These investments must achieve community priorities and be paired with appropriate neighborhood stabilization strategies.

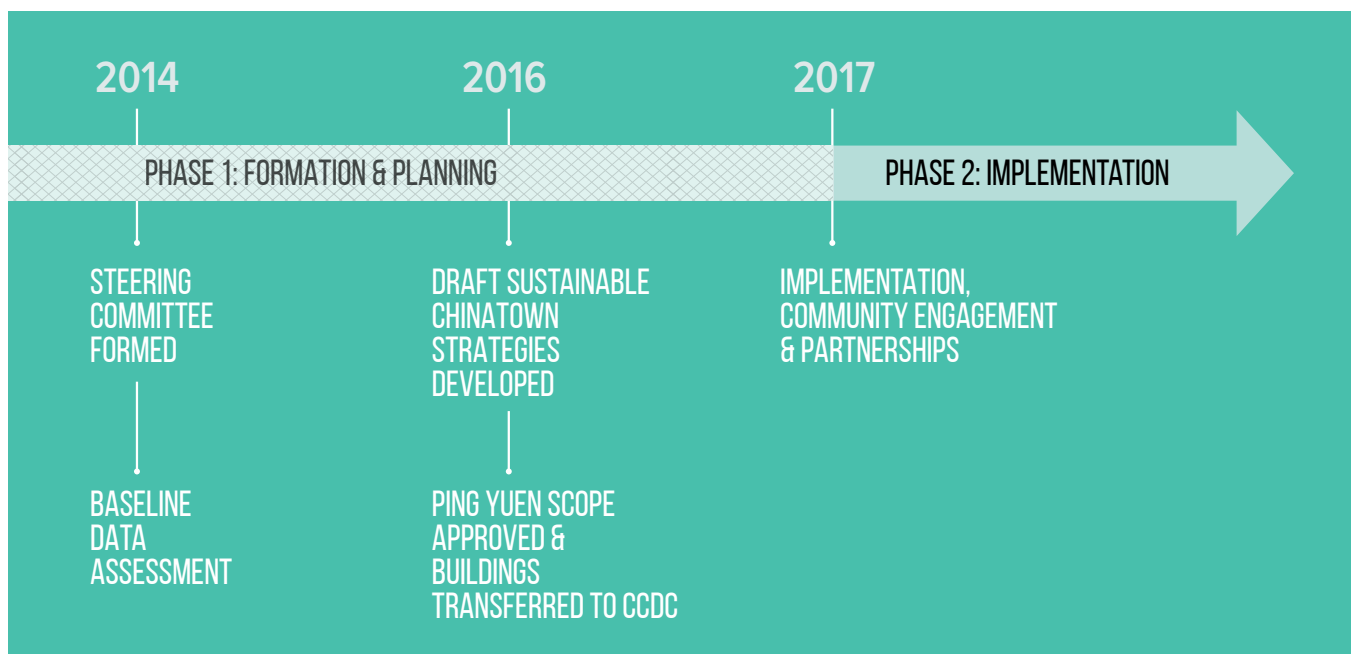
## Sustainable Chinatown Initiative Development & Steering Committee

Sustainable Chinatown is framed as a collective impact initiative, bringing together cross-sector stakeholders united by a shared interest in addressing both cultural preservation and environmental sustainability challenges in the neighborhood.

Prior to the project, the Planning Department began exploring the idea of developing “EcoDistricts” in San Francisco neighborhoods. This framework for addressing sustainability challenges at a district scale was developed by the Portland-based nonprofit of the same name. Early discussions in 2014 between CCDC, the Planning Department, and Enterprise Community Partners led the group to pursue funding for the creation of a “cultural EcoDistrict” in Chinatown. The San Francisco Department of the Environment (SFE) and the San Francisco Foundation joined as collaborators, and together the group applied for and won a two-year grant from the Partners in Place program of the Funders’ Network. The San Francisco Foundation and Enterprise Community Partners (Enterprise) provided matching funds and the Planning Department committed additional grant funding and in-kind support.

The first phase of this initiative focused on capacity-building and collaboration in the project’s Steering Committee, which meets monthly and is comprised of staff from CCDC, SFE, the Planning Department, and Enterprise Community Partners. The Steering Committee participated in the EcoDistricts Incubator program in Portland in spring of 2015 to learn from the organization’s methodology. The team also conducted a site visit to Little Tokyo Service Center in Los Angeles in order to learn from and share best practices with the Sustainable Little Tokyo Initiative, created in 2013.

Through the relationships forged during this process, the Steering Committee members remain committed to implementing the Sustainable Chinatown vision. We will continue to expand our outreach to engage new partners and seek additional support from philanthropic organizations and City departments to continue this work.



## PART I. STRATEGIES FOR ACTION: HOW WE WILL CREATE A SUSTAINABLE CHINATOWN

This vision is comprised of six strategies intended to complement the work of CCDC, other nonprofit organizations, and the City by maintaining affordability, sustaining Chinatown’s unique culture, and improving environmental health and sustainability. This list was informed by the baseline sustainability assessment and initial conversations at the Steering Committee and with key City and nonprofit partners. It represents a living document; the work of Sustainable Chinatown may evolve over time as further stakeholder input is sought, or as priorities and opportunities change.



Photo courtesy of CCDC.



### STRATEGY 1: MAKE PUBLIC HOUSING GREEN

Transform the Ping Yuen housing developments into a model for healthy and environmentally sustainable affordable housing.

#### Actions

**Solar Installations:** install solar photovoltaic array at Ping Yuen buildings.

#### Timeline

Medium-term (1-3 years)

#### Partners \*

CCDC  
MOHCD

**Baseline Green Scope:** complete rehabilitation of Ping Yuen buildings with baseline green scope (high-efficiency windows, insulation, LED lighting and EnergyStar appliances).

Medium-term (1-3 years)

CCDC  
MOHCD

\* CCDC = Chinatown Community Development Center, MOHCD = Mayor’s Office of Housing & Community Development

The Ping Yuen Public Housing Buildings (the “Pings”) are a community anchor and Chinatown’s largest residential development, housing nearly 1,000 residents in four buildings which total roughly 160,000 square feet. The transfer of these buildings from the San Francisco Housing Authority to CCDC as part of the City’s Rental Assistance Demonstration (RAD) Program offers a significant opportunity for energy and water efficiency upgrades. Sustainable Chinatown created a “green scope” for the Pings that explored the feasibility of implementing energy and water efficiency improvements, financing for solar photovoltaics (PV), and onsite greywater reuse. Ultimately, the final scope included funding for solar PV, in addition to the upgrades already included in

the project’s basic rehabilitation scope (such as new high-efficiency windows, EnergyStar appliances, water efficient fixtures, floor and roof insulation, and LED lights). Collectively these green retrofits will result in the reduction of 23 tons of GHG emissions annually, in addition to improving comfort and health for current residents. There is also the potential to build additional affordable units or provide other community amenities in the large rear yard spaces, a rare opportunity given the limited supply of developable sites in Chinatown. In the long term, CCDC may engage in feasibility and design studies to evaluate opportunities for infill development, which would also include analysis of potential sustainable design features.

2

**STRATEGY 2:  
ACQUIRE, PRESERVE, AND UPGRADE  
AFFORDABLE PRIVATE BUILDINGS**

Preserve affordability, livability, and environmental performance of private housing and commercial buildings.

<i>Actions</i>	<i>Timeline</i>	<i>Partners *</i>
<b>Focus Groups:</b> engage building owners to gauge interest in retrofits and energy efficiency upgrades.	Medium-term (1-3 years)	CCDC SFE
<b>Pilot Acquisition/Rehab Project:</b> Complete acquisition and rehabilitation pilot project (462 Green Street) with energy and water efficiency upgrades. Expand program to target other Chinatown buildings.	Medium-term (1-3 years) and Long-term (3+ years)	CCDC MOHCD SFE
<b>Energy &amp; Water Efficiency Programs:</b> connect Chinatown community to existing programs (City/state/federal, nonprofit, private) or create new programs that could help finance private building improvements. Build a financial model for 1-2 SRO buildings in Chinatown to demonstrate how a private owner could achieve upgrades while maintaining affordability.	Medium-term (1-3 years), Long-term (3+ years)	CCDC MOHCD SFE

\* CCDC = Chinatown Community Development Center, MOHCD = Mayor's Office of Housing & Community Development, SFE = San Francisco Department of the Environment

Chinatown's aging building stock, built largely in the aftermath of the 1906 earthquake, is decades behind current environmental standards for energy and water efficiency and occupant health. At the same time, it represents a tremendous resource for the neighborhood, providing affordable housing for some of the city's most vulnerable populations. Capitalizing on these assets, Sustainable Chinatown developed a typology of private buildings to understand existing building conditions. The team then analyzed typical water and energy efficiency upgrades to predict

potential resource and cost savings, modeled on CCDC's successful upgrade of several of its own affordable housing buildings. The Sustainable Chinatown team also held a focus group with private building owners to better understand the financial and operational constraints they face. Next steps include CCDC expanding its acquisition and rehabilitation programs to create permanent affordable housing units, as well as evaluating how to leverage the City's existing energy and water efficiency programs to better serve this neighborhood.

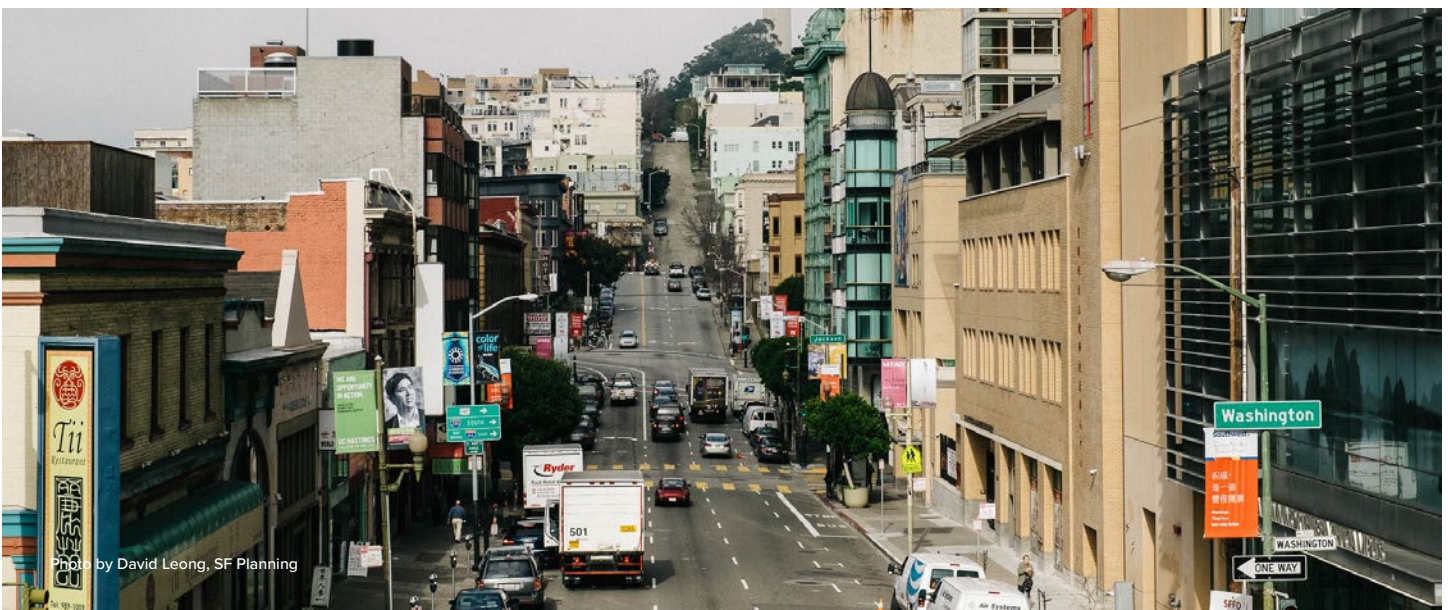


Photo by David Leong, SF Planning

3

**STRATEGY 3:  
IMPROVE PUBLIC REALM TO BETTER SERVE  
THE RESIDENTS AND THE ENVIRONMENT**

Influence City open space planning efforts with a sustainability and health lens & identify new open space and urban greening opportunities.

<i>Actions</i>	<i>Timeline</i>	<i>Partners *</i>
<b>Groundplay:</b> develop and implement a temporary park, plaza, or alleyway improvement with Chinatown Committee for Better Parks and Recreation in Chinatown (CBPRC).	Medium-term (1-3 years)	Planning CCDC
<b>Portsmouth Square:</b> engage in park redesign effort with a focus on opportunities for urban greening and sustainability improvements (i.e. efficient irrigation systems, permeable surfaces, rain gardens).	Medium-term (1-3 years)	SFRPD Planning CCDC
<b>Urban Greening and Green Infrastructure:</b> identify green infrastructure opportunities, such as tree canopies and rain gardens at parks, streets, and alleys.	Long-term (3+ years)	SFPUC CCDC Planning

\* **CCDC** = Chinatown Community Development Center, **Planning** = San Francisco Planning Department, **SFPUC** = San Francisco Public Utilities Commission, **SFRPD** = San Francisco Recreation & Parks Department

Chinatown will see a number of planned public realm improvements over the next decade. Sustainable Chinatown is exploring how to work with City and community stakeholders on these projects to support the neighborhood’s environmental goals and improve the quality of life for residents through enhanced greening, storm water management, and improvement

and expansion of open space. Some opportunities include working directly with community-based organizations on alleyways greening, temporary urbanism projects (such as the Groundplay program), the renovation of Portsmouth Square, and various streetscape improvements.

4

**STRATEGY 4:  
EXPLORE DISTRICT WATER AND GREEN  
INFRASTRUCTURE**

Explore green infrastructure upgrades at the district scale in close collaboration with SFPUC.

<i>Actions</i>	<i>Timeline</i>	<i>Partners *</i>
<b>Water Balance/Infrastructure:</b> conduct an analysis of water intake/output at district scale. Identify incremental and large infrastructure interventions to offset water usage.	Medium-term (1-3 years)	SFPUC
<b>Green Infrastructure Coordination:</b> partner with City agencies to conduct financial analysis and incrementally build out sustainable infrastructure network.	Medium-term (1-3 years) and Long-term (3+ years)	SFPUC Public Works SFMTA

\* **Public Works** = San Francisco Public Works, **SFMTA** = San Francisco Municipal Transportation Agency, **SFPUC** = San Francisco Public Utilities Commission

Sustainable Chinatown has an emergent opportunity to partner closely with the San Francisco Public Utilities Commission (SFPUC) to evaluate the technical and financial feasibility of developing innovative district-scale water and green infrastructure. This process will

focus on strategies that meet Sustainable Chinatown’s simultaneous goals of increasing environmental performance while improving quality of life for existing residents, such as neighborhood greening strategies.

5

**STRATEGY 5:  
USE OPEN DATA TO DRIVE  
AND MONITOR SUCCESS**

Publicize baseline data analysis and monitor progress in meeting goals over time.

<i>Actions</i>	<i>Timeline</i>	<i>Partners *</i>
<b>Data Tracking:</b> track baseline assessment metrics over time and periodically report on progress.	Medium-term (1-3 years) and Long-term (3+ years)	Planning CCDC
<b>Website:</b> develop a StoryMap, dashboard or other way of making data more accessible to a wider audience.	Medium-term (1-3 years)	Planning CCDC
<b>Potential additional data analysis:</b> refine energy and water data analysis.	Medium-term (1-3 years)	Planning CCDC SFE

\* **CCDC** = Chinatown Community Development Center, **Planning** = San Francisco Planning Department, **SFE** = San Francisco Department of the Environment

Sustainable Chinatown is pioneering innovative approaches to measure neighborhood performance over time. The project has developed a robust and transparent methodology to identify metrics that can be monitored to measure the impact of Sustainable Chinatown. Data at a sub-neighborhood level has been

collected for the first time for key performance areas such as water and energy and provides a model for other San Francisco neighborhoods and beyond. A key next step is to publicize the findings and engage additional partners in this work.

6

**STRATEGY 6:  
ENGAGE COMMUNITY STAKEHOLDERS  
& DEEPEN PARTNERSHIPS**

Elevate work of Sustainable Chinatown among stakeholders and Chinatown community and develop partnerships to advance our work.

<i>Actions</i>	<i>Timeline</i>	<i>Partners *</i>
<b>Endorsements:</b> map key decision makers and influencers and seek their endorsement of the plan.	Medium-term (1-3 years) and Long-term (3+ years)	Steering Committee
<b>Community Outreach:</b> engage residents, businesses, and other key stakeholders to elevate the work of Sustainable Chinatown.	Medium-term (1-3 years) and Long-term (3+ years)	CCDC

\* **CCDC** = Chinatown Community Development Center, **Steering Committee** = CCDC, SFE, Planning, Enterprise Community Partners

The success of Sustainable Chinatown is reliant on uniting diverse stakeholders around common goals—everyone from residents and businesses to property owners, City agencies, to social and cultural institutions. Initial work has focused on building the foundation for this outreach by developing a governance structure and cross-sector Steering Committee comprised of

nonprofit, philanthropic, and government partners. Moving forward, we will broaden the Sustainable Chinatown family, strengthening our work through new partnerships. This work will build on the relationships and work of existing partners in Chinatown, including CCDC's work around creative placemaking, youth development, and community organizing.



Photo by David Leong, SF Planning

## PART II. SUSTAINABLE CHINATOWN DASHBOARD & FINDINGS FROM BASELINE ASSESSMENT

A major component of Sustainable Chinatown's first phase of work involved conducting a sustainability baseline assessment in order to better understand existing conditions, identify needs and opportunities, and establish indicators to monitor our progress. At the start of this process, the Steering Committee developed a broad list of potential indicators that are most closely aligned with Sustainable Chinatown's areas of work and community needs. The group ultimately refined the list to create the Sustainable Chinatown Dashboard Indicators below. Going forward, this list may evolve to respond to future priorities and areas of work, as well as new analytic methods.

These indicators provide a broad snapshot of how Chinatown is faring compared to other neighborhoods. Sustainable Chinatown may require additional performance metrics related to specific strategies. For example, a performance metric for our work on affordable housing acquisition and rehabilitation (Strategy 2) could include the number of units preserved and/or the energy and water savings resulting from building upgrades.

This work included developing a baseline sustainability assessment and obtaining data for each of these indicators, in many instances working closely with utility providers to negotiate access to data that had never been released at a neighborhood or smaller scale. This innovative analysis represents the first comprehensive neighborhood-level sustainability analysis completed for an existing San Francisco neighborhood. The processes and key findings from this process are detailed in Part II of this report ("Sustainable Chinatown Dashboard & Baseline Assessment").



## Sustainable Chinatown Dashboard Indicators (Draft)

<i>Performance Area</i>	<i>Indicators</i>	
<b>PEOPLE AND PLACE</b>	<b>Demographics</b>	Age of residents
		Race of residents
		% of population linguistically isolated
		% Foreign born
	<b>Economic Prosperity</b>	% of households living in poverty
		Household income
		Educational attainment of residents
		Unemployment rate
	<b>Health</b>	Preventable hospitalizations
	<b>Land Use and Affordable Housing</b>	Land Use (e.g. residential, commercial, industrial)
		Permanently affordable rental housing stock
		Non-permanent affordable rental housing stock
		Private building typology (analysis of building type, age, and conditions)
		% owner/renter
		Excessive rent burden
		Residential housing violations
Overcrowding		
<b>Safety</b>	Violent crimes	
<b>Transportation</b>	Mode share	
	Level of service and quality of major transit lines	
	Traffic injuries	
<b>ENERGY</b>	<b>Usage and Sources</b>	Energy use per capita
		Energy use intensity
		Electricity sources mix
	<b>Local Renewables</b>	Solar potential
		Renewable energy installations
	<b>Climate Change</b>	Greenhouse Gas (GHG) emissions from buildings and transportation
<b>WATER</b>	<b>Usage</b>	Residential potable water consumption per capita per day
		Gross Potable Water Use per capita per day
<b>WASTE</b>	<b>Diversion</b>	Total waste collected
		Diversion rate (% of waste composted, recycled, landfilled)
<b>URBAN ECOLOGY AND PUBLIC REALM</b>	<b>Access</b>	Neighborhood open space
		Tree canopy
		Impermeable ground surfaces
	<b>Quality and Use</b>	Frequency & types of uses (from potential public life study in the future)



Photo by Flickr user Aurimas Adomavicius

## Lessons Learned & the Future of Sustainable Chinatown

Sustainable Chinatown has accomplished several key milestones in its initial two-year phase of work:

- **Additional “green” features at the Ping Yuen housing developments.** Due to the successful advocacy of Sustainable Chinatown, the upgrade of the Ping Yuen housing developments will include a \$1.5 million solar photovoltaic installation, in addition to basic water and energy efficiency improvements.
- **Innovative sustainability data analysis at neighborhood level.** The work on the sustainability baseline assessment helped refine our understanding of the key needs and opportunities in the area, and provides a model for other neighborhoods around the City.
- **Stronger community/government/philanthropic relationships.** The process of developing these strategies has helped build stronger working relationships between the partnering organizations.

In many ways, Sustainable Chinatown’s work is just getting started. The team looks forward to engaging additional partners and stakeholders, to solicit their feedback on these strategies and to coordinate our work towards common goals. We look forward to years to come of a committed multi-sector partnership that is taking on some of the most challenging issues of our time, to ensure that Chinatown’s common heart will beat on.



**PART I**

# Strategies for Action: How we will create a Sustainable Chinatown

Against the background of aging buildings and infrastructure, a vulnerable low-income population, gentrification pressures and climate change, Sustainable Chinatown has identified six bodies of work to meet these challenges. These strategies will complement the work of CCDC, other nonprofit organizations and community partners, and the City by providing additional opportunities for maintaining housing affordability, sustaining Chinatown's unique culture, and improving environmental performance.

**Strategy 1: Make public housing green**

**Strategy 2: Upgrade and preserve private affordable housing**

**Strategy 3: Improve public realm to better serve residents and the environment**

**Strategy 4: Explore district water, energy, and green infrastructure**

**Strategy 5: Use open data to drive and monitor success**

**Strategy 6: Engage community stakeholders**

The following sections provide a description of each of these work areas, highlighting the work completed so far and our vision for deepening and broadening our impact in the years to come.



Photo by SE Planning

1



STRATEGY 1

## Make public housing green

Transform the Ping Yuen housing developments into a model of healthy and environmentally sustainable affordable housing.



### ACTION

**Solar Installations:** install solar photovoltaic array at Ping Yuen buildings.

### DURATION

Medium-term (1-3 years)

### PARTNERS

CCDC, MOHCD

### ACTION

#### Baseline Green Scope:

complete rehabilitation of Ping Yuen buildings with baseline green scope (high-efficiency windows, insulation, LED lighting and EnergyStar appliances).

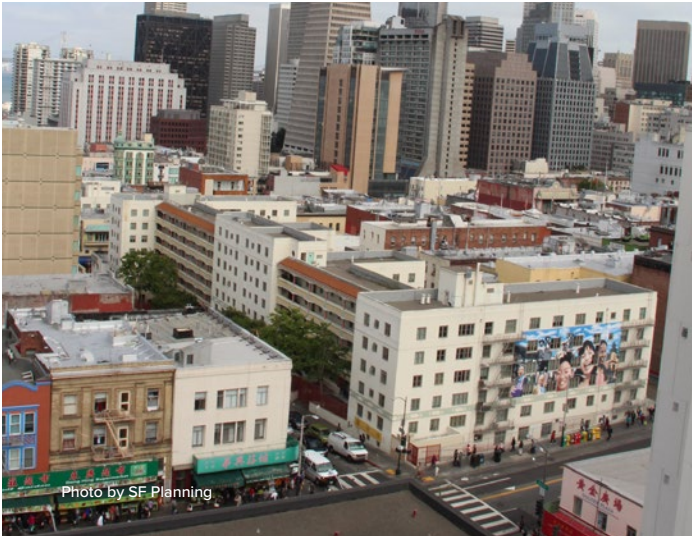
### DURATION

Medium-term (1-3 years)

### PARTNERS

CCDC, MOHCD





As an anchor in the community, the Ping Yuen Public Housing Buildings (the “Pings”) are Chinatown’s largest residential development, home to nearly 1,000 residents, over 400 units, and some of the largest buildings in Chinatown (totaling 160,000 square feet). With CCDC taking ownership of the Pings through San Francisco’s funded Rental Assistance Demonstration (RAD) program [funded by the U.S. Department of Housing & Urban Development (HUD)], Sustainable Chinatown recognized that the rehabilitation of the Pings offers a catalytic, once-in-a-lifetime opportunity to develop a “deep green” scope of improvements that achieve significant health and environmental benefits and serve as a model for other buildings in Chinatown and beyond.

San Francisco embarked on its local version of the HUD Rental Assistance Demonstration (RAD) program starting in 2014, the largest such program in the country. The City’s program will transfer management and ownership of over 3,500 public housing units in 29 properties (home to over 8,000 residents) to nonprofit partners committed to occupant wellbeing and the long-term affordability and sustainability of the properties. The top priority of the program is to improve management of public housing buildings and bring them to habitable condition after many years of deferred maintenance. CCDC was chosen as a community partner and developer for four RAD properties totaling 576 units. The majority of these units are at the Pings, including Ping Yuen North, a

12-story building with 200 senior and family units, and Ping Yuen, comprised of four 6- and 7-story buildings with 234 units.

Sustainable Chinatown’s efforts to incorporate the deep green scope was particularly ambitious, given that RAD is itself a monumental \$1.6 billion undertaking that involves a highly complex arrangement of stakeholders and financial institutions. The work was conducted under an accelerated timeline with the RAD project team, including CCDC project managers, California Housing Partnership Corporation (CHPC), design and engineering consultants, and the Mayor’s Office of Housing and Community Development (MOHCD), who was in turn continuously fine-tuning the program and budget in collaboration with HUD.

This section provides a case study of the key issues and accomplishments during this process. It outlines the green scope developed for the Ping retrofit, the financing options Sustainable Chinatown explored, and lessons learned.

## Developing the Green Scope

Sustainable Chinatown hired the engineering firm Integral Group at the start of the scoping process to evaluate the technical and financial feasibility of introducing high-impact, innovative energy and water retrofits at the Ping Yuen buildings. The firm organized a green charrette to brainstorm a host of potential sustainability interventions, attended by CCDC staff and the project design team (architect, MEP consulting engineer, contractor, and City staff).

The Ping Yuen buildings’ construction type, deferred maintenance, and historic preservation status presented challenges to developing a comprehensive retrofit program. In spite of these complications, the charrette yielded three potential interventions, expected to significantly improve environmental performance and occupant comfort:

- **Energy efficiency retrofits in the form of insulation paired with heat recovery ventilation:** The uninsulated concrete walls create wide daily temperature swings and creates excessive interior





Photo courtesy of Global Green

moisture levels, mold, and unpleasant living conditions. Exterior insulation would mitigate these problems, nearly eliminate the need for gas-fired boilers to provide space heating and potentially cut energy use by 50 percent. The addition of heat recovery ventilation could further improve indoor air quality and temperature control.

- On-site greywater recycling program:** The intent of a greywater recovery system is to collect wastewater from showers, bathroom sinks, and washing machines to re-use it for toilet flushing. For Ping Yuen North alone it was estimated that such a system would offset approximately 1.3 million gallons of potable water per year. With more frequent and severe droughts expected in California in the future, solutions like this are ripe for demonstration.
- Solar energy production:** Solar photovoltaics (PV) and solar thermal systems are widely deployed in multifamily affordable developments because of familiarity with the technology, availability of incentives and financing, and relative ease of coordination with construction timelines. Integral Group and CHPC each conducted technical feasibility studies, finding that a 166.4 kW solar PV at both Ping Yuen and Ping Yuen North would be a high-value investment, generating \$32,600 in average annual energy savings, net positive project cash flows of \$380,000 (after debt payments), and a total estimated net present value of \$250,000 over the 20-year useful life of the equipment.

## Final Scope and Lessons Learned

Sustainable Chinatown worked in parallel tracks to test the feasibility of implementing the green scope: while identifying the projects with the highest environmental impact and best potential cost savings over the long-term, we also investigated viable financing options (described in the sidebar below).

In the end, CCDC secured financing for the baseline green improvements (new high-efficiency windows, insulation, LED lighting, and Energy Star appliances), typical measures for all retrofits and generally required to qualify for favorable tax credit financing. Due to the successful advocacy efforts of Sustainable Chinatown in collaboration with CHPC, MOHCD also included funding for a solar PV system for Ping Yuen—the only RAD project to include a new solar installation—valued at \$1.5 million. In total, the energy efficiency upgrades and solar installation are predicted to result in a reduction of 23 metric tons of CO<sub>2</sub> per year.

Unfortunately, the more ambitious elements of the green scope of work proved too challenging to implement. The proposals for greywater recapture and exterior insulation measures were ultimately deemed cost-prohibitive and too difficult to coordinate within the project schedule. In addition, the Ping Yuen's historic preservation status also impacted the feasibility of exterior insulation, as extra funding would have been needed to mitigate the impact on the building facades.

Sustainable Chinatown set out to add deep green retrofits at the Ping Yuen buildings on top of an already very complex RAD process. While advanced green technologies are reaching significant market penetration for single-family homes and new construction, there are still many challenges to incorporating innovative approaches in affordable housing and major rehabilitation projects of older buildings. Some key lessons learned from this process include:

- **Find funding early on for design, feasibility studies, and other soft costs that are outside of the typical scope of affordable housing development.** After the green charrette, the Sustainable Chinatown team focused on greywater as the most impactful green intervention, but needed to fund an additional study to produce technical information on the system design, costs, and savings estimates. Eventually the team found the funding for the study, but ultimately concluded that greywater infrastructure was too complex to finance and integrate into the process.
- **Understand project costs and potential savings as early as possible to ensure successful project implementation.** After the initial engineering analysis, the team ultimately determined that greywater, while providing important resource savings and environmental benefits, proved too expensive due to the amount of additional demolition costs, necessary reconfiguring of piping and plumbing, space considerations, and other general constructability issues.
- **Existing financing mechanisms for green building are ill-suited to the affordable housing industry; new tools are needed.** When initiating this effort, Sustainable Chinatown realized that it would be necessary to secure third-party financing, and assumed that suitable products would be available. The team's research (described below) found that existing products are not well-structured for affordable housing processes, let alone in the context of the complex RAD program.



Photo courtesy of Global Green.

## Next Steps

The Ping Yuen buildings play a central role in the social and physical fabric of Chinatown. Their rehabilitation with green upgrades will have a positive impact on the health of hundreds of residents and improve environmental performance of the buildings for decades to come. The solar PV installation will serve as an example for the rest of Chinatown's buildings and for other RAD rehabilitations. Phased construction is currently scheduled to be complete in 2019.

There is also the potential to build additional affordable units or other amenities on the property in the large rear yard spaces, a rare opportunity given the limited supply of developable sites in Chinatown. In the long term, CCDC may engage in feasibility and design studies to evaluate opportunities for infill development to build additional housing, retail, or other community-serving spaces. Such analysis would also involve an assessment of potential sustainable design features.

## Financing For Green Affordable Housing: Challenges of Exploring Third-Party Options

As Sustainable Chinatown gained a deeper understanding of the Ping Yuen's budgetary constraints, additional funding sources were sought to make the deep green scope financially feasible. The team explored the following third-party financing options for the greywater and solar improvements:

- **Property Assessed Clean Energy (PACE):** PACE is a program offered by cities and counties that provides 100 percent upfront, low-cost capital for building owners to install clean energy upgrades with repayment through their property taxes for up to 25 years. We explored the potential of financing the improvements through GreenFinanceSF, San Francisco's PACE program, and working with Sustainable Real Estate Solutions (SRS), a technical consultant to SF Environment.
- **Energy Services Agreements (ESA):** ESAs are a performance-based, off-balance sheet financing solution that allows customers to implement resource efficiency projects with zero upfront capital expenditure. Under most ESA structures, the ESA provider pays for all project development and construction costs. Once a project is operational, the customer makes periodic service charge payments for the actual savings realized by the project. The advantage is that the customer (in this case CCDC) does not take project performance risk since they only pay for savings actually realized.
- **On-bill financing (OBF) and On-bill repayment (OBR):** OBF/OBR programs are implemented by utility companies to provide options for customers to pay for clean energy upgrades through their utility bills. In OBF programs, the sponsoring utility provides the capital for eligible clean energy upgrades and collects repayments on the customer bills; in OBR programs, the project capital comes from private third parties, using the same collection mechanism. Advantages of OBF/OBR programs include: ease of repayment, potential transferability with the property, and lower interest rates.

The Ping Yuen and Ping Yuen North projects are financed within the larger RAD Phase 2 portfolio which includes a loan and Low-Income Housing Tax Credits (LIHTC) from a large financial institution, as well as MOHCD gap financing. This complex structure made alternative financing mechanisms more challenging to implement. While there are successful examples of PACE-financed improvements on other HUD affordable housing projects, the required PACE lien priority over the mortgage created concerns for the RAD team. The ESA option was also found to be problematic, mainly due to timing of fund disbursement and the requirement for an ESA performance guarantee (provided if the installed system should fail).

Sustainable Chinatown also explored the OBR option with SFPUUC. While they expressed interest, the timing was simply infeasible for the development of a new program. Despite this, the team believes that on-bill programs, especially those using private capital, continue to be the best fit for affordable housing retrofits and should be explored for future projects. The State of California is currently developing a master-metered OBR program for this sector, which is scheduled to become available in late 2017.



Photo by Flickr user Mia Felicità Bartelli

2



## STRATEGY 2

## Upgrade and preserve affordable private buildings

Preserve affordability, livability, and environmental performance of private housing and commercial buildings.



## ACTION

**Pilot Acquisition/Rehab project:** Complete acquisition and rehabilitation pilot project (462 Green Street) with energy and water efficiency upgrades. Expand program to target other Chinatown buildings.

## DURATION

Medium-term (1-3 years) and Long-term (3+ years)

## PARTNERS

CCDC, MOHCD, SFE

## ACTION

### Energy & Water Efficiency Programs:

Connect Chinatown community to existing programs (City/state/federal, nonprofit, private) or create new programs that could help finance private building improvements. Build a financial model for 1-2 SRO buildings in Chinatown to demonstrate how a private owner could achieve upgrades while maintaining affordability.

## DURATION

Medium-term (1-3 years) and Long-term (3+ years)

## PARTNERS

CCDC, MOHCD, SFE



## ACTION

**Focus Groups:** Engage building owners to gauge interest in retrofits and energy efficiency upgrades.

## DURATION

Medium-term (1-3 years)

## PARTNERS

CCDC, SFE



Chinatown's aging building stock is comprised primarily of mixed-use apartment and single-room occupancy (SRO) buildings built in the aftermath of the 1906 earthquake. It represents a tremendous asset for the neighborhood, providing affordable housing and commercial spaces for some of the City's most vulnerable populations, including low-income seniors, families, and immigrants. However, living conditions in many buildings are harsh. Most buildings, over half of which are single room occupancy (SRO) hotels, have had minimal upgrades and are decades behind current standards for energy and water efficiency and occupant health. Overcrowding is four times higher than the City average (20 percent versus 5 percent) while health and safety violations are nearly double. In spite of tenant protections (including rent control and laws prohibiting SRO conversion/demolition), the poor condition of this building stock combined with growing real estate pressures increases the risk of buildings being sold and converted to more lucrative uses.

Common energy and water efficiency upgrades such as updating appliances, installing more efficient lighting and heating/cooling systems, improving building insulation, and replacing or repairing leaky windows can make units more comfortable for residents while improving health conditions associated with poorly maintained housing, such as asthma and other respiratory illness due to mold exposure. These improvements also align with the City's sustainability targets and programs aimed at reducing energy use in buildings, which account for nearly half (45 percent) of San Francisco's greenhouse gas emissions.

Sustainable Chinatown is committed to ensuring that Chinatown residents, who already have a small environmental footprint by most measures, are able to remain and thrive in the neighborhood. In collaboration with the City, CCDC is developing a program to selectively acquire and upgrade Chinatown buildings in order to extend their useful life, increase their



Photo by Tudor Stanley from [newamericanmedia.org](http://newamericanmedia.org)

energy and water efficiency, and improve occupant health and comfort. This strategy complements the organization's longstanding efforts to develop new affordable housing, and is modeled on their successful introduction of energy and water efficiency improvements in several buildings in their portfolio. The program may also conduct targeted outreach to private owners to gauge their interest in upgrading their buildings through existing City programs (see Appendix C for a list of existing green building programs).

### Building Typology and Focus Group

To support this strategy, Sustainable Chinatown developed a Building Typology analysis to gain a deeper understanding of the condition of the area's buildings and potential opportunities for energy and water conservation. This analysis allowed us to develop high-level estimates of the potential resource and

cost savings from these investments. This typology is described at the end of this section, and includes eight common residential and commercial building types (four residential, four commercial), reflecting trends in building age, size, construction type and materials. These typologies were then compared to data on energy and water consumption, as well as data from CCDC-owned and private buildings that have participated in City-sponsored energy and water conservation programs (described further in Part II and the Appendices). Some key findings from this work include:

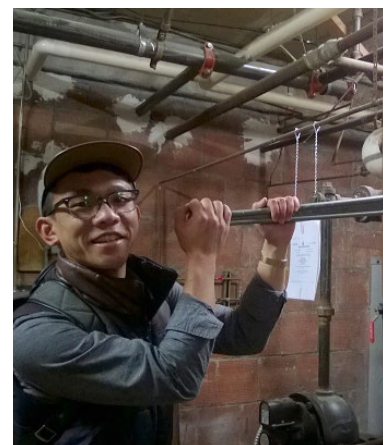
- Per person, Chinatown residents use less energy than the City average (roughly 40 percent less), which may be due to the high density of housing and residents owning fewer electronic devices. However, they also use roughly 20 percent more water per person than the City average, which might be

#### Energy Retrofit Case Study: The William Penn Hotel (160 Eddy Street)

CCDC's experience with acquiring and upgrading apartment buildings is a model for of cost-effective energy efficiency upgrades with tangible environmental and quality of life benefits. The William Penn Hotel is one of six CCDC buildings upgraded through the Bay Area Multifamily Building Enhancements (BAMBE) program, run by the Bay Area Regional Energy Network (BayREN). For an investment of \$140,000, CCDC experienced the following improvements:

- 29% overall energy savings
- 4,000 Therms of gas saved per year
- 49,000 kWh of electricity saved per year
- 30 metric tons CO2 emissions reduced per year
- Greater thermal comfort for residents
- Greater sense of safety attributable to improved lighting

More information on this case study is provided in Part II, Section 2 (Energy).



Photos courtesy of Bay Area Regional Energy Network.

explained by leaks, inefficient fixtures, and the need for additional outreach on water conservation.

- Participants in Citywide energy and water conservation programs saw a significant reduction in resource consumption and costs after installing relatively low-cost upgrades (considered to be those that pay for themselves within three years). For smaller residential buildings (the predominant building type in Chinatown), participants saved 22-23 percent in energy costs. Similarly, CCDC buildings that implemented water efficiency upgrades reduced their water costs by 18 percent.
- There is significant untapped potential for solar photovoltaic PV installations in the neighborhood. If slightly more than one-fifth of suitable rooftops were to install solar PV, the neighborhood could transition to 100 percent greenhouse-gas free electricity. Building energy efficiency upgrades, combined with continued improvements to the citywide power supply mix, could accelerate this shift even sooner.
- One initial hurdle to participation is that owners were fearful that participating in energy programs might expose them to other enforcement actions.
- Another challenge was articulating a value proposition to building owners to make these investments. Skepticism of potential savings in water and utility bills from program participation remains an issue.

Given the cost-effectiveness of City's energy and water efficiency programs and Chinatown's historically low participation rate, CCDC conducted a focus group with owners of four private buildings (two SRO buildings and two apartment buildings) to ask about their familiarity with these programs and gauge their interest in participating. These building owners were selected due to their existing relationships with CCDC. In addition, their properties represent some of the most common apartment and SRO building types in the area, which are the oldest and most likely to need upgrades. The feedback we received from these discussions is as follows:



Photo by SF Planning



- The evolving history and uses of these buildings present unique challenges for existing programs. For example, in some buildings, each individual unit may have its own water heater, making an upgrade very expensive and unlikely to be covered by rebates. These conditions may not be discoverable until a site visit.

Chinatown's complex building ownership structures make it difficult to conduct direct outreach. As discussed further in the Private Building Typology section below, most buildings are owned by a combination of family associations, trusts, or other complex assemblage of owners. Many are absentee landlords and may not have a vested interest in the Chinatown community or in maintaining the affordability of their building in the long term. Our priority will be to target owners who are local and identifiable, and thus are more likely to have an interest in Chinatown beyond their mere financial investment.

## Next Steps

Sustainable Chinatown will continue to support opportunities for nonprofit developers to acquire private buildings, rehabilitate them with sustainability upgrades, and evaluate how the City's energy and water efficiency programs can be tailored to meet the needs of Chinatown.

When the team launched this project in 2014, there did not appear to be an "upmarket" for SROs and similar Chinatown buildings. Initially, the team explored the idea of creating a program for private building owners to utilize the City's energy and water efficiency upgrade programs to improve the environmental sustainability and performance of their buildings. However, over the past two years there have been a number of SROs around the City being sold and/or illegally converted into short term rentals targeting higher income students and workers.

This creates a new tension: while we want to see owners invest in sustainability upgrades, these activities may increase real estate speculation and result in the loss of the affordable housing. While CCDC and other affordable housing owners continue to undertake energy and water retrofits, market rate owners are constrained by "split incentives," where costs borne by the owner that solely benefit tenants are hard to justify financially. Investments of this type are typically recovered through increased rents.

Sustainable Chinatown's top priority is preserving affordable housing. While CCDC still intends to conduct strategic outreach with building owners who may be aligned with this goal, the organization's main focus has shifted to acquiring and rehabilitating Chinatown buildings, thus ensuring that they remain permanently affordable. In August 2016, CCDC successfully closed its first acquisition through the City's Small Sites Program, purchasing 462 Green Street, a 6-unit apartment building in North Beach. In a neighborhood facing rising rents and displacement pressures, the acquisition and rehabilitation of 462 Green is an opportunity to preserve affordable housing for 25 residents, the majority of whom are monolingual Chinese immigrants who have lived in the building for over a decade. With this building, CCDC and Sustainable Chinatown can develop a successful financial model of a green rehabilitation on an existing building, which can be replicated elsewhere in the neighborhood. The proposed scope of rehabilitation for this building includes: new energy-efficient lighting and appliances, new windows, asbestos and lead abatement, and a possible conversion to electricity-powered heating systems.

## Chinatown Building Typology

Walk down nearly any block in the heart of Chinatown and you'll see a dynamic mix of uses—shops and restaurants, light manufacturing, housing, and social and cultural institutions—side by side or even nestled in the same buildings. However, a closer examination of the buildings and uses reveals larger patterns amidst this diversity, shaped by transformative boom-and-bust periods and other critical events over the neighborhood's 150-plus-year history.

In order to better understand the neighborhood's building stock, Sustainable Chinatown created a "private building typology" based on a range of building characteristics. We then matched this typology with building data from the City's energy retrofit programs to identify common opportunities and challenges for improving the livability and environmental performance of the housing stock. This section describes the development and key findings from our research. Appendix B matches the typology with data from buildings that have undergone energy retrofits to evaluate the potential cost and energy savings that a similar program serving Chinatown buildings might achieve.

The eight building typologies (four residential, four commercial) are mapped on the following pages. While the majority of Chinatown properties are represented by this building typology, some buildings may not fit neatly into the eight categories (marked "other" on the building typology maps). Some of those properties may have a more specialized use, such as municipal properties. The key trends and opportunities we observed include:

- **Age:** Building age is a general indicator of a building's condition, as older buildings not only deteriorate over time, but were in many cases built before modern building codes mandating efficiency and seismic safety. The era during which a building was built can provide clues as to the HVAC or plumbing systems typically present. The majority of buildings (over 75 percent) were built in the decade immediately after the 1906 earthquake, compared to one-third of buildings citywide. This older building stock likely means there is ample opportunity for retrofits and even basic maintenance.



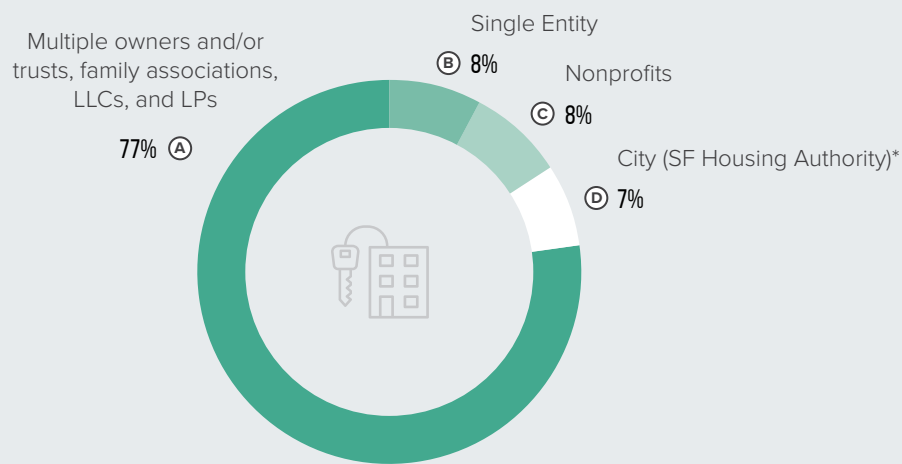
- **Building height and size:** The scale of a building may determine what types of building retrofits are necessary and/or financially feasible. Taller, larger buildings may require more sophisticated and costly measures. However, they may also be newer and in better shape overall, so they may need relatively fewer improvements. The vast majority of buildings are 2-4 story buildings built immediately after the earthquake, with just a couple dozen buildings exceeding this size.
- **Construction materials:** The materials used to construct a building affect many things: thermal performance and comfort, the amount of load it can bear, how easy or difficult it will be to retrofit for energy, water, or other improvements. Most Chinatown buildings are older masonry/concrete or wood frame construction. In general, these types of buildings are less insulated than sturdier, more modern construction, presenting a key opportunity for energy efficiency upgrades.
- **Land use:** What goes on inside a building for most of the day has major implications for energy and water use patterns and for how the building itself is constructed and laid out. For example, residential buildings may have simpler HVAC systems (featuring heating systems only) and use fewer fuel types, while commercial or institutional buildings will have more complex energy uses (including both heating and cooling systems), and larger equipment and energy loads. Chinatown is a mixed-use neighborhood,

with densely packed apartment and SRO buildings, many with retail uses on the ground floor, as well as many institutional and commercial buildings. The prevalence of retail spaces suggests a need for increased programming targeting small business owners (such as the City's existing Energy Watch Program). Another notable characteristic is the neighborhood's high number of SRO buildings. These buildings, some owned by nonprofit housing organizations and others by private entities, represent a unique challenge for developing building upgrade programs and conducting outreach to owners.

In order to support our efforts to conduct outreach with residential building owners, the team also researched building tenure and ownership structure of multifamily buildings. Chinatown is overwhelmingly a neighborhood of renters: 94 percent of residents rent, compared to 63 percent citywide. The ownership structure of many of these multifamily rental buildings is complex, reflecting multiple real estate transactions as buildings were passed down, sold, and split up between multiple owners over the years.

We determined that out of 408 multifamily apartment buildings and SROs in the plan area, only 46 (11 percent) are owned by a single individual or couple (representing 8 percent of multifamily residential units). These buildings may represent our best opportunity for participation in energy and water efficiency programs and long-term affordability strategies, such as building acquisition and rehabilitation. The remaining privately-owned buildings, representing 79 percent of residential units (excluding those owned by nonprofits), are owned by some combination of family associations, trusts, limited liability corporations (LLCs), and limited partnerships (LPs). In turn, each of these entities may be comprised of multiple discrete building owners who may or may not live in San Francisco. In addition to the logistical hurdle of reaching these building owners, it may also be difficult to collaborate with them if they do not feel any connection to the Chinatown community. More outreach and research is needed to better understand how the interests and priorities of building owners can align with the goals of Sustainable Chinatown.

### Ownership of Chinatown Multifamily Residential Units



\* Note: Units shown as under City ownership have officially been transferred to nonprofit ownership (CCDC) as of November 2016 under the City's Rental Assistance Demonstration project.



**Historic Chinatown photos** (clockwise, from top): Clay Street in 1901; Commercial architecture after the post-1906 earthquake reconstruction; Portsmouth Square in 1867; Ping Yuen housing development under construction. (Sources: San Francisco Public Library; Stan Piltz postcard (via Chinarhyming.com); San Francisco Public Library; Herbert Lee)



## Chinatown Boomtown: Key Development Periods

While the culture and people of Chinatown continue to evolve, its built environment has remained relatively unchanged over the last century. The vast majority of Chinatown's existing building stock was constructed in the aftermath of the 1906 San Francisco earthquake, with just three smaller building spurts since then. The key historical periods that have shaped the present-day look and feel of Chinatown today are:

- **1850s – 1906: Initial development and rapid growth of San Francisco during the Gold Rush area.**

Starting in the late 1860s, Chinese immigrants began settling the area near Portsmouth Square dubbed "Little Canton," fleeing an economic depression and lured abroad by the promise of work on the transcontinental railroad and related industries. Although they were critical to the City's economic growth, these immigrants were met with open hostility, with more than 30 anti-Chinese policies enacted during this era at the federal, state, and local levels.

- **1906-1920s: Reconstruction in the aftermath of the 1906 earthquake and fire.** After the earthquake leveled much of Chinatown, City business and civic leaders saw an opportunity to redevelop this prime area into more lucrative uses and advocated for the relocation of Chinatown to the City outskirts. In a deliberate attempt to brand the neighborhood and ensure residents could stay, Chinatown community leaders successfully organized and financed the reconstruction of the neighborhood, rebuilding structures to incorporate the faux-Chinese architectural style the area is known for today.

- **1950s and 1960s: Construction of the Ping Yuen Public Housing Projects and the Portsmouth Square redesign and parking garage.** Chinatown residents eagerly awaited the completion of the nearly 500 affordable housing units at the Ping Yuen Housing Projects, which helped fill a persistent need in this low-income immigrant community. However, persistent maintenance and safety issues spurred a tenant-led protest movement, culminating in two rent strikes during the 1970s. Also during this era,

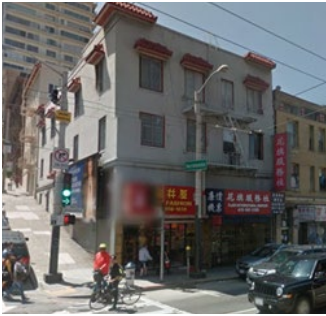
Portsmouth Square was dramatically redesigned in a modernist style, in part to accommodate a four-level underground parking garage.

- **1980s: Intensification of development and Chinatown Area Plan.** As real estate pressures in the adjacent Financial District heated up, a handful of Chinatown buildings were demolished and replaced with taller concrete and steel buildings that stood in stark contrast with the existing 2-4 story neighborhood fabric. Prolonged advocacy efforts by CCDC and others eventually led to the creation of the Chinatown Area Plan in 1983, which rezoned the area to emphasize preservation of existing buildings.

- **Late 1990s and early 2000s: Seismic retrofits of existing properties.** In response to City mandates following the Loma Prieta earthquake, property owners seismically retrofitted most of Chinatown's building stock, largely eschewing City programs and financing the improvements on their own. While addressing earthquake and life safety elements, these retrofits did not improve living conditions, buildings systems, or resource efficiency.

Today, significant new development is not expected in the area, due to a scarcity of developable sites and the existing land use controls, which prioritize building preservation and limit the scale and types of allowable development. However, given the old age and deferred maintenance of the majority of the building stock, it is imperative to figure out cost-effective ways of rehabilitating and maintaining the buildings to ensure they remain viable in the longer term.

## Building Typology: Residential



# R1

**HEIGHT**

**Low-rise**  
(up to 40-58 feet / 5 stories)

**MATERIALS**

Masonry / concrete

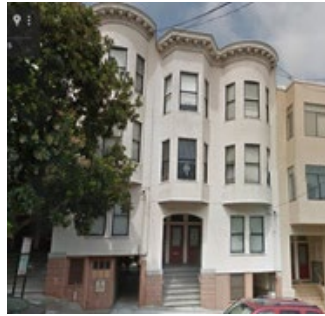
**AGE**

Pre 1920

**PREVALENCE**

241 buildings  
(55% of res bldgs)

3,740 units (59%)



# R2

**HEIGHT**

**Low-rise**  
(up to 40-58 feet / 5 stories)

**MATERIALS**

Wood / steel frame

**AGE**

Pre 1920

**PREVALENCE**

184 buildings  
(41% of res bldgs)

1,590 units (25%)



# R3

**HEIGHT**

**Mid-rise**  
(60-85 feet / 5-8 stories)

**MATERIALS**

Mixed  
(wood/steel; masonry/concrete)

**AGE**

After 1920

**PREVALENCE**

8 buildings  
(2% of res bldgs)

760 units (12%)



# R4

**HEIGHT**

**Mid-to-High rise**  
(Above 85 feet / 9+ stories)

**MATERIALS**

Structural steel (fireproofed)  
Reinforced concrete  
(fire resistant)

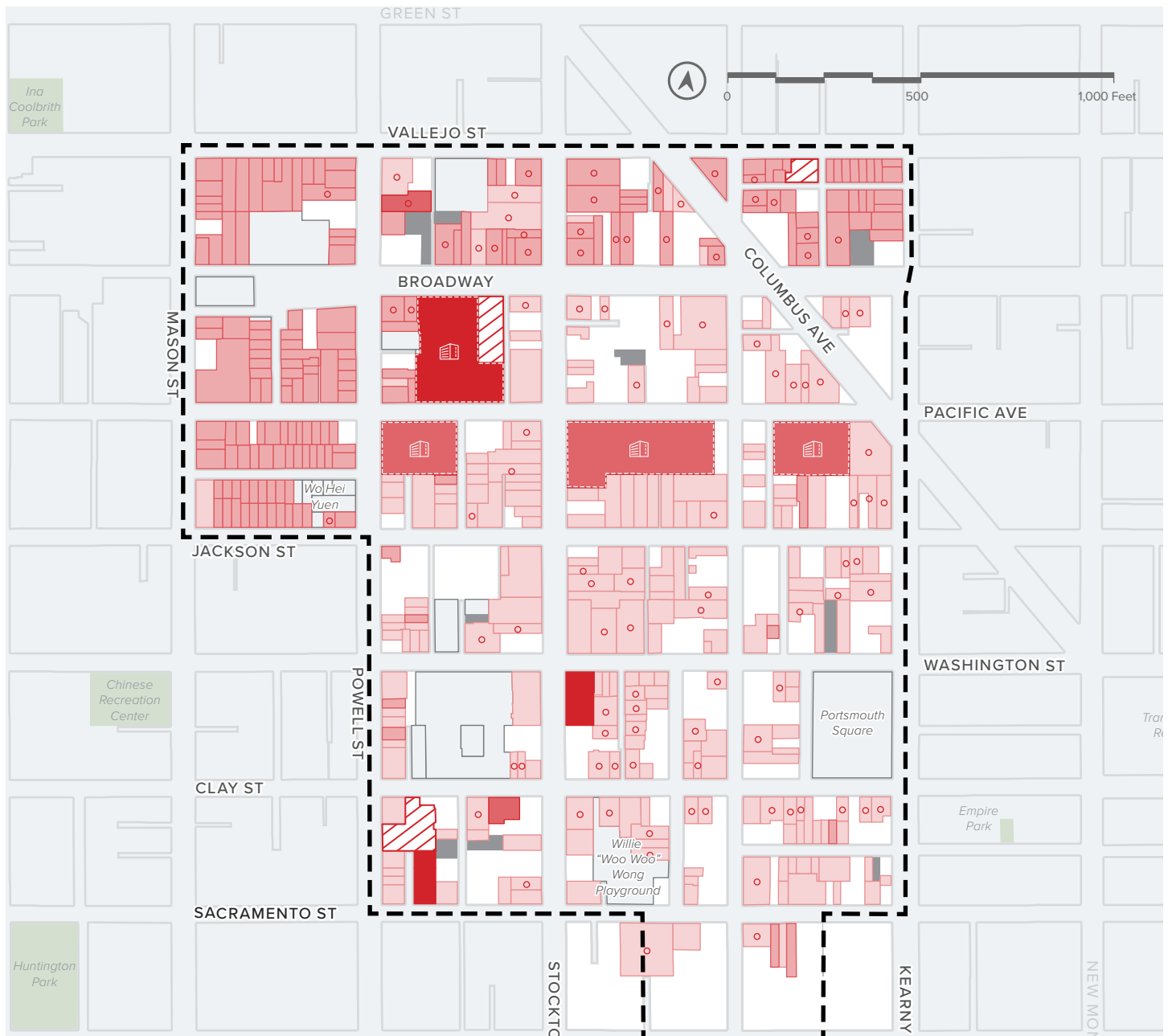
**AGE**

After 1920

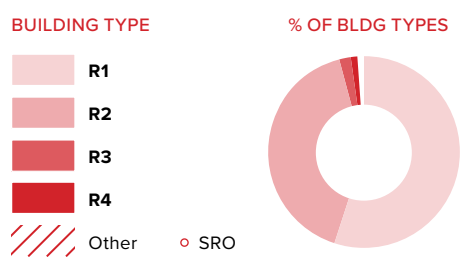
**PREVALENCE**

3 buildings  
(less than 1% of res buildings)

130 units (4%)



**Building Typology:  
Residential**



- Parks & Open Space
- Vacant / Parking
- Ping Yuen Housing
- Public

## Building Typology: Commercial



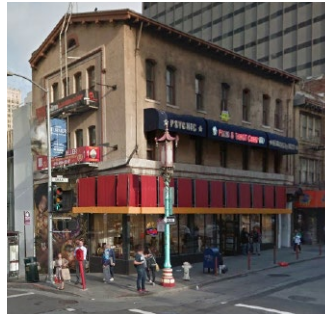
### C1

**HEIGHT**  
Low-rise  
(up to 40 feet / 4 stories)

**MATERIALS**  
Masonry / concrete

**AGE**  
Pre 1920

**PREVALENCE**  
144 buildings (76%)



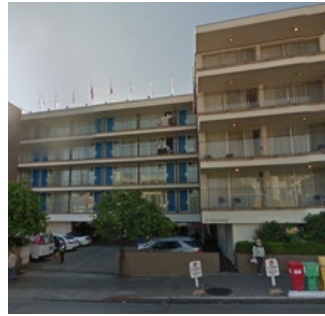
### C2

**HEIGHT**  
Low-rise  
(up to 40-58 feet / 5 stories)

**MATERIALS**  
Wood / steel frame

**AGE**  
Pre 1920

**PREVALENCE**  
31 buildings (16%)



### C3

**HEIGHT**  
Mid-rise  
(60-85 feet / 5-8 stories)

**MATERIALS**  
Masonry/concrete or  
Reinforced concrete

**AGE**  
After 1950

**PREVALENCE**  
9 buildings (5%)



### C4

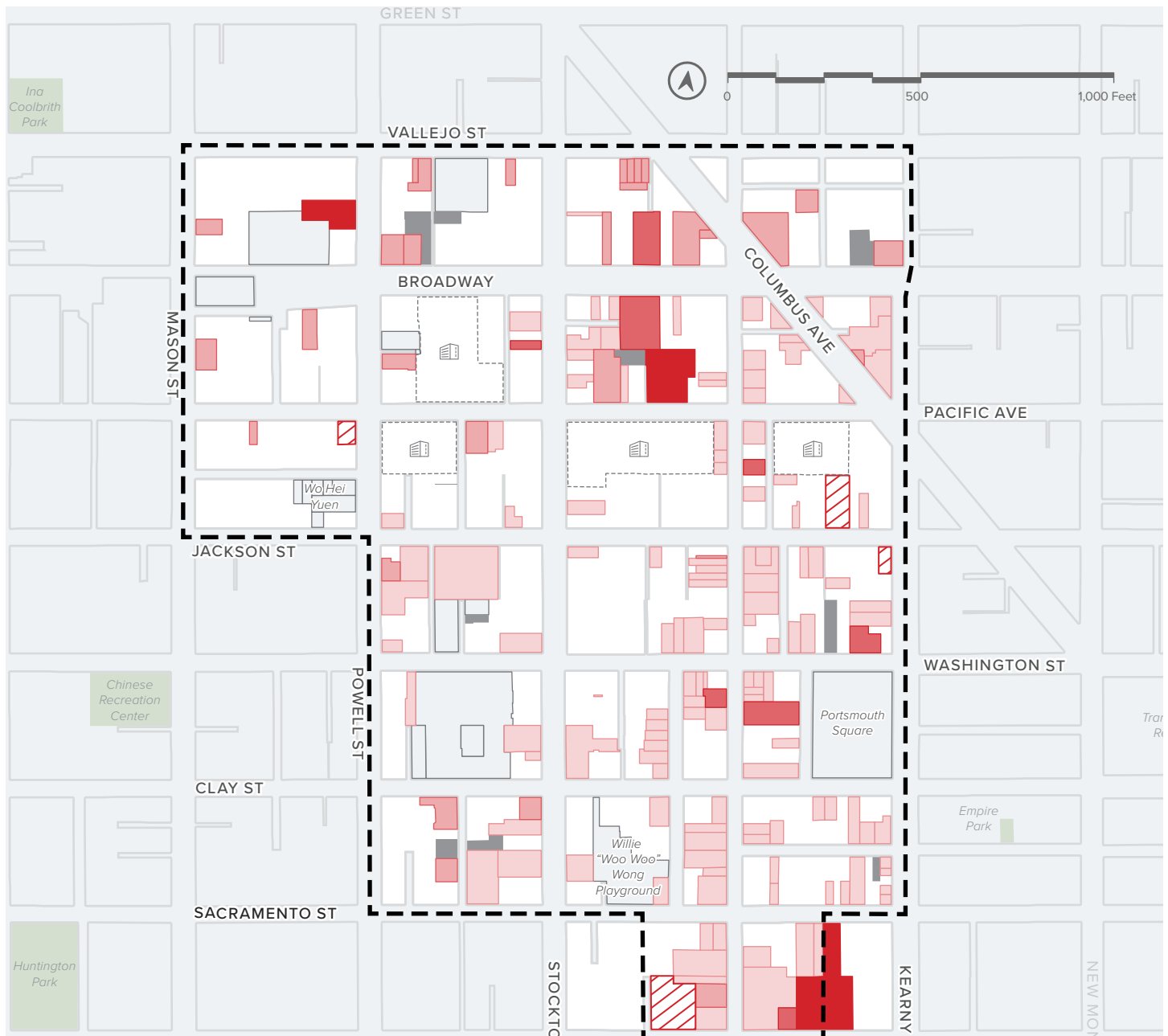
**HEIGHT**  
Mid- and High-rise  
(6-33 stories)

**MATERIALS**  
Structural steel (fireproofed)  
Reinforced concrete  
(fire resistant)

**AGE**  
After 1950

**PREVALENCE**  
6 buildings (3%)





**Building Typology:  
Commercial**

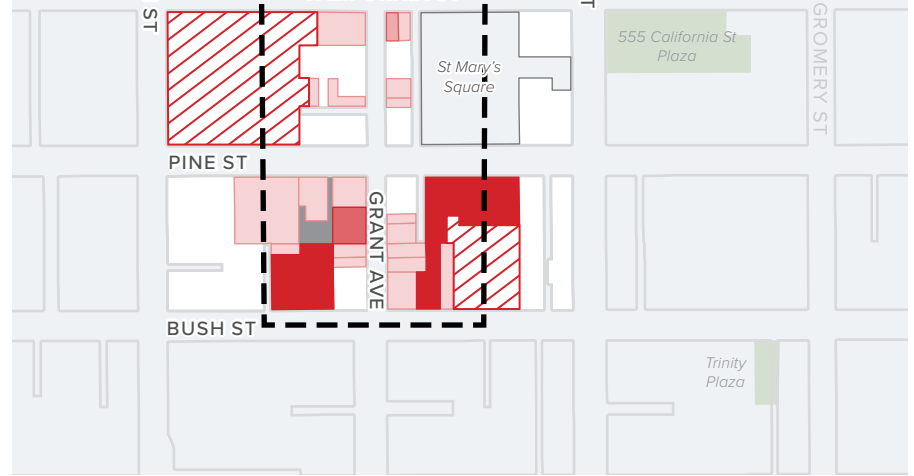
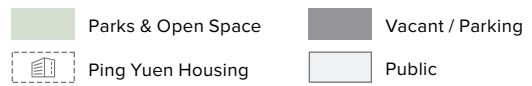
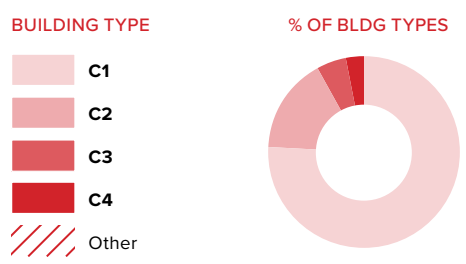




Photo courtesy of CCDC

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STRATEGY 3

# Improve public realm to better serve the residents and the environment

Influence City open space planning efforts with a sustainability and health lens & identify new open space and urban greening opportunities.

**ACTION**

**Portsmouth Square:** engage in park redesign effort with a focus on opportunities for urban greening and sustainability improvements (i.e. efficient irrigation systems, permeable surfaces, rain gardens).

**DURATION**

Medium-term (1-3 years)

**PARTNERS**

SFRPD, Planning, CCDC



**ACTION**

**Groundplay:** develop and implement a temporary park, plaza, or alleyway improvement with Chinatown Committee for Better Parks and Recreation in Chinatown (CBPRC).

**DURATION**

Medium-term (1-3 years)

**PARTNERS**

Planning, CCDC



**ACTION**

**Urban Greening and Green Infrastructure:** identify green infrastructure opportunities, such as tree canopies and rain gardens at parks, streets, and alleys.

**DURATION**

Long-term (3+ years)

**PARTNERS**

SFPUC, Planning, CCDC



Photo by Flickr user Steve Rhodes



With so many Chinatown residents living in overcrowded conditions, having access to safe and functional open spaces and recreational facilities nearby can vastly improve peoples' lives by providing places of respite and social gathering. Chinatown has the City's lowest amounts of parks and open spaces per capita, and the City should continue to pursue all available opportunities to add open spaces and recreational facilities in this area, including more creative strategies such as developing public improvements on underutilized space on streets, alleys, and sidewalks.

The quality and appropriateness of existing open spaces is just as critical, given the limited availability of space for new parks. Although many parks are heavily used – particularly Portsmouth Square, colloquially known as Chinatown's "living room" due to its role as a place of social gathering – they have outdated amenities and could be better designed to meet resident needs.

Several recently completed and planned public projects are scheduled to bring new or improved parks, open spaces and greener streets to Chinatown. These include:

- New Chinatown Central Subway station open space
- Willie Woo Woo Wong Playground renovation
- Portsmouth Square Improvement Project
- St. Mary's Square extension
- Broadway Streetscape Improvement Project
- Alleyway improvement projects, including Spofford Green Alleyway
- Washington Street Green Connection<sup>1</sup>

Sustainable Chinatown intends to leverage these opportunities to further our goals of improving equity and environmental sustainability. Our Steering Committee has conducted a preliminary assessment of short-term and long-term strategies that we will work towards, such as providing guidance on open space planning efforts underway and seeking creative opportunities to develop temporary open space

<sup>1</sup> The San Francisco Planning Department developed a conceptual streetscape design for Washington Street as part of the Green Connections Plan adopted in 2012, which plans to upgrade 115 miles of streets over the next 20 years to improve pedestrian and bicycle access to parks and the waterfront.

installations. Closer collaboration between community organizations and public agencies can ensure new public investment meets the needs of residents and addresses community priorities.

While not officially considered part of the City's open space network, the Ping Yuen Housing Projects are worth mentioning as large neighborhood sites that contain a significant amount of underutilized open space. Without ongoing maintenance, much of this space has fallen into poor condition and now requires significant rehabilitation. The transfer of these properties to CCDC for ownership and management presents the opportunity to reimagine how these are used and may be improved upon. Front and side courtyards as well as rear yard open spaces could be reimaged as greener and more active public spaces. In addition, the project will construct a community facility in the backyard of the central Ping Yuen building, which will provide much needed recreational and event space for community members.

## Next Steps

The Steering Committee has identified several areas of work to improve the neighborhood's open spaces to better serve residents and provide ecological benefits.

- Identify creative and strategic ways to add permeable surfaces and introduce vegetation and habitat into the crowded street environment. For instance, we will explore the possibility of a temporary public realm intervention (such as a Groundplay project) to create needed open space and provide opportunities to engage residents in the work of Sustainable Chinatown. We will work with relevant neighborhood groups and community organizations to identify possible sites.
- Maximize the potential of parks and open space projects currently underway or about to begin (Portsmouth Square, Central Subway Station Park) to further the goals of equity and environmental sustainability.
- Develop culturally- and linguistic-appropriate ecological literacy programs (such as environmental education programs or resource conservation campaigns) to engage the broader Chinatown community in conversations around sustainability, build community resilience and social capital, and provide opportunities for people to appreciate urban nature.
- The Ping Yuen open spaces represent a significant and underutilized open space resource within Chinatown. In the longer term, consideration should be given to the potential improvement of these spaces for both residents and the larger public.





**STRATEGY 4**

# Explore district water and green infrastructure

Explore green infrastructure upgrades at the district scale in close collaboration with SFPUC.



**ACTION**

**Water Balance/Infrastructure:** conduct an analysis of water intake/output at district scale. Identify incremental and large infrastructure interventions to offset water usage.

**DURATION**

Medium-term (1-3 years)

**PARTNERS**

SFPUC

**ACTION**

**Green Infrastructure Coordination:** coordinate with City agencies to conduct financial analysis and incrementally build out sustainable infrastructure network.

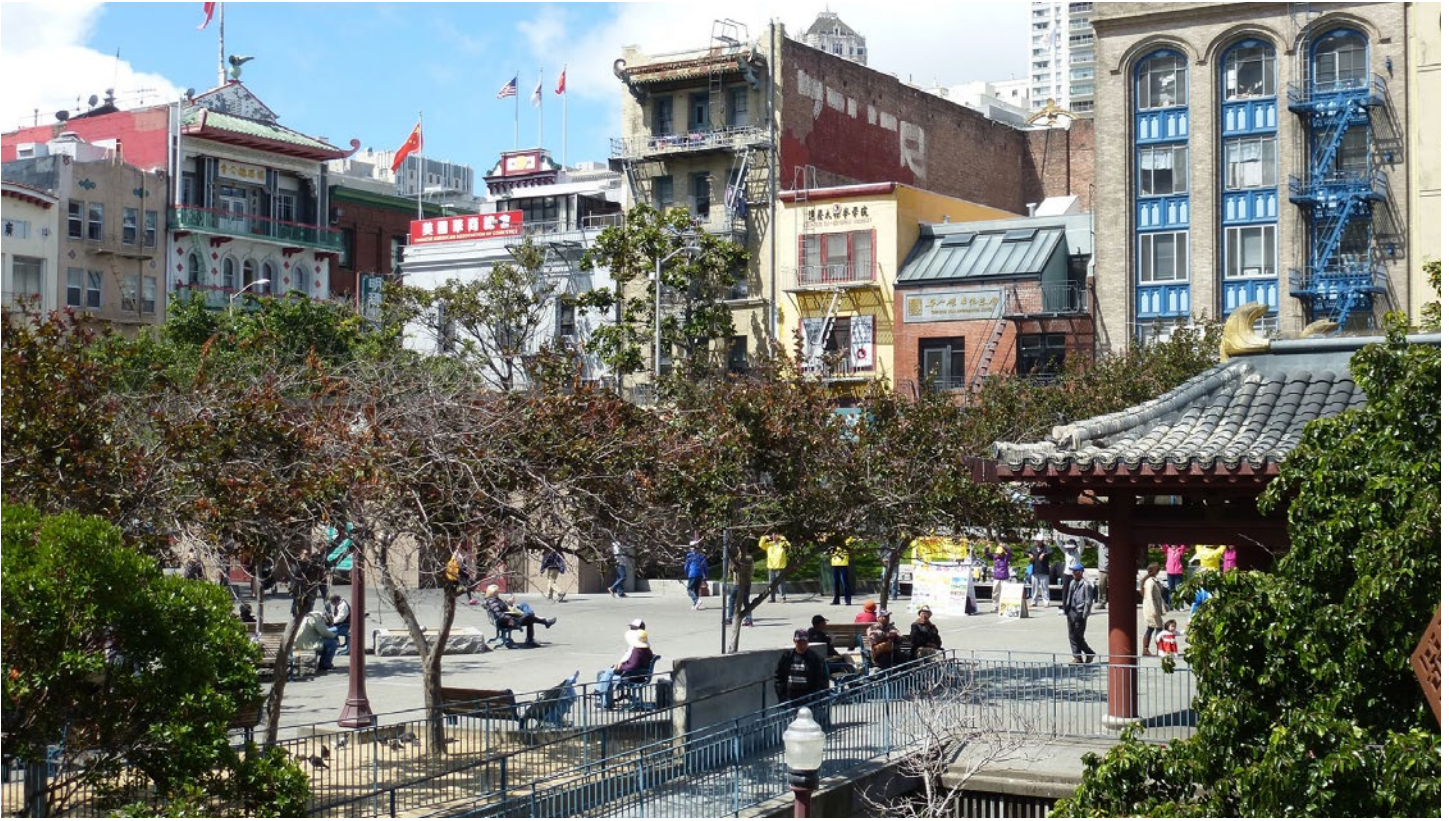
**DURATION**

Medium-term (1-3 years) and Long-term (3+ years)

**PARTNERS**

SFPUC, Public Works, SFMTA





Neighborhood-wide infrastructure, such as district water and energy systems and green/ grey infrastructure, are an increasingly popular component of EcoDistrict efforts and other sustainable neighborhood initiatives, particularly for projects that anticipate a large amount of new development. District-scale infrastructure can allow for economies of scale during construction, and ultimately result in more efficient use of energy and other resources.

District-scale infrastructure in existing, built-out communities can be more challenging to implement but remains an important opportunity for increasing urban sustainability. In the next phase of work, Sustainable Chinatown will collaborate with the SFPUC to evaluate the opportunities for neighborhood-scale initiatives in Chinatown. SFPUC's Enterprises (water, power, and sewer services) work across the City to promote energy efficiency, renewable power, and decentralized wastewater treatment and reuse. They will assist with evaluating the potential for innovative district-scale

wastewater treatment and reuse and the use of green infrastructure (such as permeable pavements and rain gardens) for stormwater management, and flood resiliency.

### **District-wide Energy, Water, and Green Infrastructure—Proposed Scope of Work**

Sustainable Chinatown envisions three potential tasks as part of this next phase of work. The exact scope of work is subject to change, but currently includes:

**Task 1: District Water Balance Analysis.** This task will identify and quantify all of the sources of water imported and exported from within the neighborhood boundaries, including but not limited to: rainwater available from rooftops and other impervious surfaces, potable water, stormwater runoff, groundwater, emergency firefighting supplies, black water and greywater, and flood volumes.



**Task 2: District-wide Water Conservation and Reuse**

**Plan.** Once the Water Balance Analysis is completed, the team will assess the potential for dramatically reducing the water consumption and wastewater exports in Chinatown. This effort will begin with assessing the planned conservation efforts underway within the neighborhood and look for opportunities to reduce the consumption of potable water within existing buildings. The plan may consist of a combination of conservation strategies, modifications to existing building codes and new guidelines, and proposals for water reuse and treatment. Due to the built out nature of the neighborhood, this plan will also have guidance on when and how to implement these strategies.

**Task 3: Green Infrastructure Analysis & Coordination.**

There are several ways that green infrastructure could be delivered to the District. The team will develop a baseline assessment of the existing conditions of the impervious surfaces and highlight opportunities for improvement. Open space projects, such as the upcoming redesign of Portsmouth Square, represent a key opportunity for leveraging City investments to introduce green infrastructure and other ecologically-beneficial infrastructure. Another outcome of this analysis may include the development of design guidelines for introducing green infrastructure in streets and alleyways, another major opportunity.

**Next Steps**

The City agencies remain committed to carrying this work forward, and the Steering Committee is working with SFPUC to continue to refine this scope of work to determine the best opportunities for local, district-scale projects that could maximize both ecological benefits as well as provide social benefits, such as greening, beautification, safety, and activation of public spaces.



Photo courtesy of SFPUC

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STRATEGY 5

# Use open data to drive and monitor success

Publicize baseline data analysis and monitor progress in meeting goals over time.



**ACTION**

**Website:** develop a StoryMap, dashboard or other way of making data more accessible to a wider audience.

**DURATION**

Medium-term (1-3 years)

**PARTNERS**

Planning, CCDC

**ACTION**

**Potential additional data analysis:** refine energy and water data analysis.

**DURATION**

Medium-term (1-3 years)

**PARTNERS**

Planning, CCDC, SFE



**ACTION**

**Data Tracking:** track baseline assessment metrics over time and periodically report on progress.

**DURATION**

Medium-term (1-3 years) and Long-term (3+ years)

**PARTNERS**

Planning, CCDC

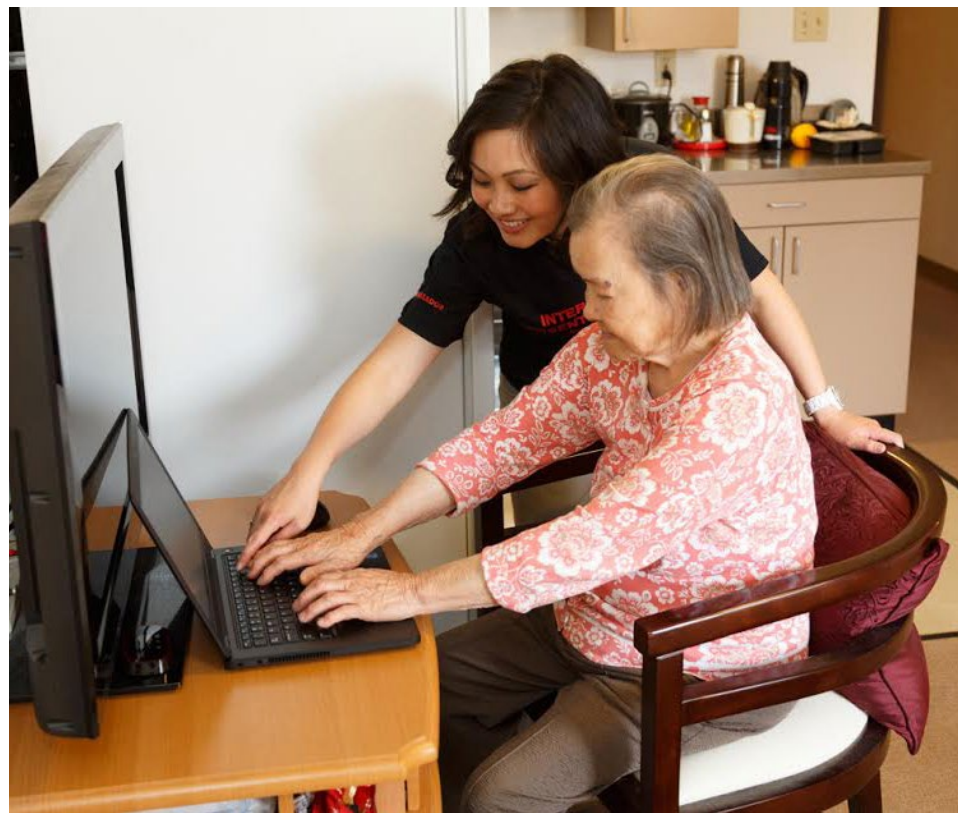




Photo courtesy of Global Green

Sustainable Chinatown is pioneering approaches to measure neighborhood conditions and change over time. The project has developed a Sustainable Chinatown Dashboard which identifies a range of social and environmental indicators that are relevant to community needs and that can be monitored to evaluate our impact (see Part II, Sustainable Chinatown Dashboard and Baseline Assessment, for more information). Sub-neighborhood data has been collected for the first time for performance areas such as water and energy, which can provide a model for other San Francisco neighborhoods and other cities.

A key next step is to build on the baseline data analysis to publicize the findings and engage additional partners in this work. There are a lot of ways to make the data more accessible and understandable to diverse audiences, by developing an online dashboard or other tools (such as an online map), or using participatory methods such as data storytelling. Providing neighborhoods with access to such data can empower stakeholders to take a more active

role in conversations about shaping their community. Conversely, their input can help ground truth this analysis, help develop priorities, provide stories and context that make the data meaningful, and identify additional research questions and data needs.

More broadly, a collective impact model uses data to drive decision making and to solve seemingly intractable social problems in a proactive, collaborative way. It creates a process whereby diverse stakeholders, anchored by a backbone organization, develop and work towards a shared vision of success using commonly agreed-upon indicators to keep everyone on track and accountable. The list of indicators developed in this first phase of work represents a living document. As Sustainable Chinatown expands its partnerships, the team will periodically revisit these indicators based on stakeholder input and evolving community needs, and work collaboratively to set aspirational yet achievable goals and targets.

## **Next Steps**

In the immediate term, Sustainable Chinatown seeks to publicize our findings in more accessible and culturally-relevant ways, such as data storytelling or other forms of community-based participatory research. The team is also in the process of developing an interactive dashboard or map that provides a transparent and accessible way for stakeholders to access the data findings.

Another task is to conduct additional analysis to set district-wide targets for some of our indicators and initiatives (for instance, water and energy reduction targets). In the longer term, our vision is that the indicators can help Sustainable Chinatown and key partners align and track our work more effectively.



Photo by Flickr user Ram Joshi

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STRATEGY 6

# Engage community stakeholders & deepen partnerships

Elevate Sustainable Chinatown among stakeholder and broader Chinatown community and build momentum to advance our work.

**ACTION**

**Endorsements:** map key decision makers and influencers and seek their endorsement of the plan.

**DURATION**

Medium-term (1-3 years) and Long-term (3+ years)

**PARTNERS**

Steering Committee



**ACTION**

**Community Outreach:** engage residents, businesses, and other key stakeholders to elevate the work of Sustainable Chinatown.

**DURATION**

Medium-term (1-3 years) and Long-term (3+ years)

**PARTNERS**

CCDC



The success of Sustainable Chinatown depends on uniting varied stakeholders around common goals – everyone from residents and businesses to property owners, city agencies, and social and cultural institutions. The team’s initial work has laid a foundation for this outreach by developing a governance structure and cross-sector Steering Committee that meets monthly, comprised of nonprofit, philanthropic, and government partners. Over the course of the last two years, this team has conducted a baseline assessment highlighting current needs and opportunities, developed the six action strategies outlined here—each accompanied with an implementation plan and list of partners—and made significant progress in greening Chinatown’s public housing stock.

Much of this early work has focused on creating a space for diverse agencies and community partners to overcome institutional silos and work on collaborative and innovative projects. These working relationships have been strengthened through team-building experiences, such as the 3-day EcoDistrict Incubator program in Portland, OR, where the Steering Committee worked with a facilitator to help refine our project goals and priorities. The team also conducted a site visit to the Sustainable Little Tokyo initiative, run by the Little Tokyo Service Center near downtown Los Angeles, CA. Their inspiring model uses a community development lens to improve environmental performance in a way that feels authentic and equitable. In particular, the team has been inspired by their outreach and communications strategies, which employ artists and creative placemaking strategies to elevate environmental sustainability issues. Sustainable Chinatown intends to utilize similar communications and outreach strategies in the next phase of work.

CCDC and the Chinese Culture Center recently launched a new program utilizing arts, culture and placemaking through 41 Ross, an exhibition space located in historic Ross Alley. 41 Ross provides a platform for CCDC to partner with community artists, journalists, and nonprofit organizations to highlight the uniqueness and importance of Chinatown as a housing, cultural, retail, services, and health resource for new immigrants and seniors aging in place. Sustainable Chinatown will build on these and other efforts.

## Next steps

In many ways, the work of Sustainable Chinatown is just beginning. Moving forward, we will build on existing relationships and broaden the Sustainable Chinatown family, generating new partnerships and opportunities for strengthening our work. The team will work with City and community partners to gain key endorsements and strategize opportunities for further collaboration, and will work to integrate with and leverage the deep community building work of Chinatown CDC and other community partners. Examples of organizations and ongoing community engagement that Sustainable Chinatown can collaborate with include, but are not limited to:

- SRO Families Collaborative
- CCDC Super Sunday monthly events
- Community Tenants Association
- Adopt an Alleyway (AAA) Youth Organizing

In the near term, CCDC’s Adopt-An-Alleyway (AAA) Youth Project will host a Chinatown Environmental Fair (“Eco-Fair”) in August 2017 to promote environmental conservation and green practices to the greater Chinatown community. The fair will provide a space for community partners, artists, environmental organizations and local agencies to participate and address the unique sustainability needs and challenges in neighborhoods like Chinatown. This event offers a unique opportunity for Sustainable Chinatown to engage community youth to be leaders and environmental stewards.

A major component of our community outreach work in the next two years will focus on aligning our work with projects that already have commitment and momentum from with City partners. For instance, a short term opportunity is for Planning Department staff to work directly with community stakeholders on a Groundplay project. Another major opportunity is the Portsmouth Square Improvement Project, which will be led by San Francisco Recreation and Parks Department and the San Francisco Planning Department. Sustainable Chinatown has the opportunity to leverage the district water and green infrastructure analysis conducted by SFPUC to recommend environmental sustainability features that could support the project.





Photo by David Leong, SF Planning



**PART II**

# **Sustainable Chinatown Dashboard and Baseline Assessment**

**SECTION A: PEOPLE AND PLACE**

**SECTION B: ENERGY**

**SECTION C: WATER**

**SECTION D: WASTE**

**SECTION E: URBAN ECOLOGY AND OPEN SPACE**

The Sustainable Chinatown Dashboard establishes key indicators that can be used to monitor the initiative's progress in the future. At the start of the process, the Steering Committee developed a broad list of potential indicators that are most closely aligned with Sustainable Chinatown's areas of work and the community's needs and priorities. We started by reviewing prior City frameworks (including the San Francisco Indicator Project from the San Francisco Department of Public Health, and the Sustainable Systems Framework from the San Francisco Planning Department), modifying them and adding indicators as necessary.

The team ultimately refined the list to create the Sustainable Chinatown Dashboard on the next page, consisting of 35 demographic, quality of life, built environment, and environmental sustainability indicators in five performance areas. As we track our progress, this list may evolve to respond to future priorities and areas of work. These indicators provide a broad snapshot of how Chinatown is faring compared to other neighborhoods. Sustainable Chinatown may require additional performance metrics related to our strategies and work. For example, a performance metric

for our work on affordable housing acquisition and rehabilitation (Strategy 2) could include the number of units preserved and/or the energy and water savings.

The group then developed a baseline assessment and set out on a process of data discovery to identify whether data could be accessed at a neighborhood or smaller scale. While a number of the indicators utilize census data or other common sources, many other useful datasets had never been publicly released and required extensive coordination with data providers to obtain data at a granular level while adhering to strict data privacy regulations. In spite of these challenges, Sustainable Chinatown has pioneered several methods of neighborhood-scale data analysis, particularly in the areas of water and energy, providing a model for other sustainability and community planning efforts throughout the City. These processes are described in more detail in Appendix A (Sustainable Chinatown Dashboard: Data and Methodology).

Part II presents the findings from this baseline assessment, highlighting the challenges and opportunities facing Sustainable Chinatown moving forward.

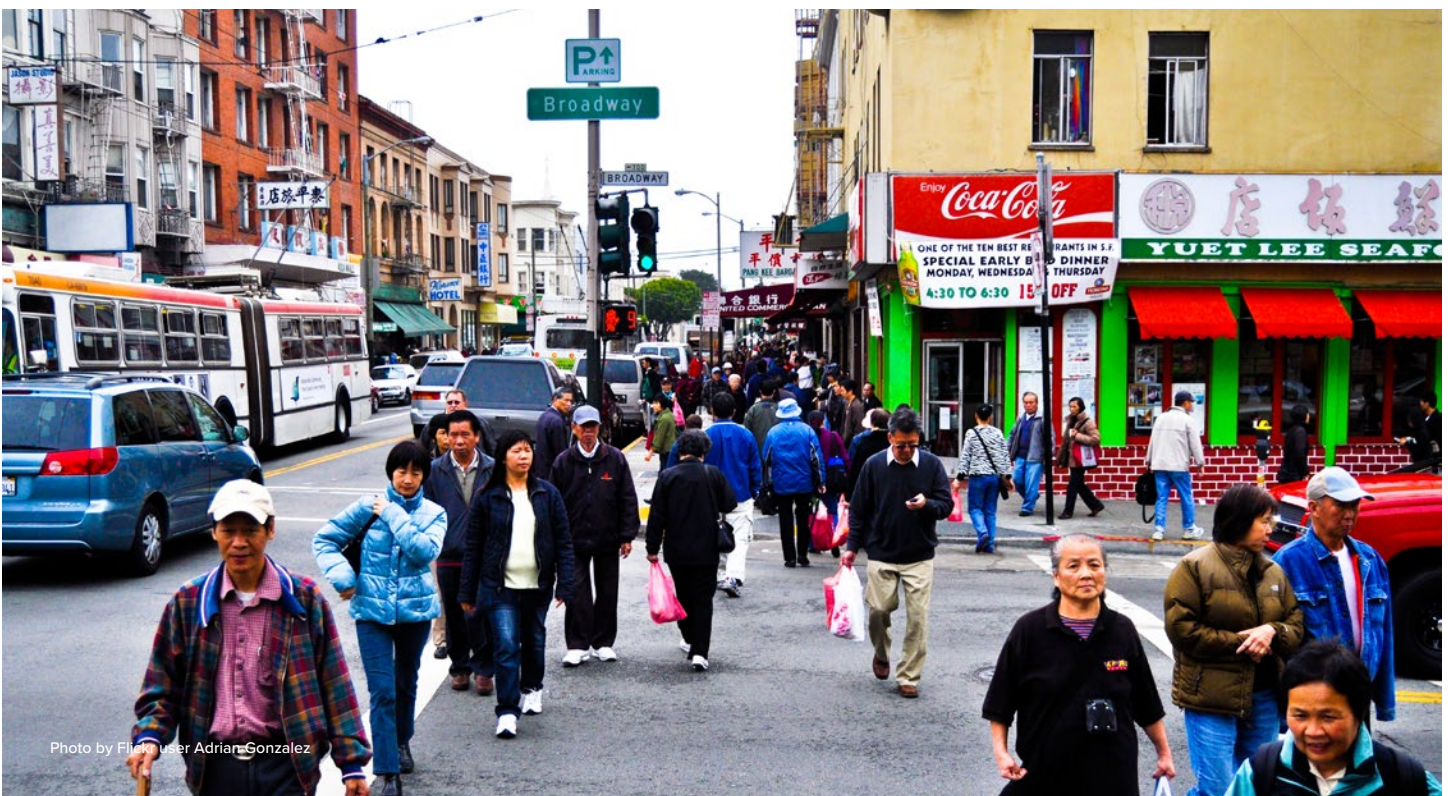


Photo by Flickr user Adrian Gonzalez

## Sustainable Chinatown Dashboard Indicators (Draft)

<i>Performance Area</i>	<i>Indicators</i>	
<b>PEOPLE AND PLACE</b>	<b>Demographics</b>	Age of residents
		Race of residents
		% of population linguistically isolated
		% Foreign born
	<b>Economic Prosperity</b>	% of households living in poverty
		Household income
		Educational attainment of residents
		Unemployment rate
	<b>Health</b>	Preventable hospitalizations
	<b>Land Use and Affordable Housing</b>	Land Use (e.g. residential, commercial, industrial)
		Permanently affordable rental housing stock
		Non-permanent affordable rental housing stock
		Private building typology (analysis of building type, age, & conditions)
		% owner/renter
		Excessive rent burden
		Residential housing violations
	Overcrowding	
<b>Safety</b>	Violent crimes	
<b>Transportation</b>	Mode share	
	Level of service and quality of major transit lines	
	Traffic injuries	
<b>ENERGY</b>	<b>Usage and Sources</b>	Energy use per capita
		Energy use intensity
		Electricity sources mix
	<b>Local Renewables</b>	Solar potential
		Renewable energy installations
	<b>Climate Change</b>	Greenhouse Gas (GHG) emissions from buildings & transportation
<b>WATER</b>	<b>Usage</b>	Residential potable water consumption per capita per day
		Gross Potable Water Use per capita per day
<b>WASTE</b>	<b>Diversion</b>	Total waste collected
		Diversion rate (% of waste composted, recycled, landfilled)
<b>URBAN ECOLOGY AND PUBLIC REALM</b>	<b>Access</b>	Neighborhood open space
		Tree canopy
		Impermeable ground surfaces
	<b>Quality and Use</b>	Frequency & types of uses (from potential public life study in the future)

## Key Findings from Sustainability Baseline Assessment

After the list of indicators was developed, the Steering Committee worked extensively with City agencies and utility providers in order to obtain data to create the full baseline assessment for Chinatown. A summary of key findings from this analysis is presented below.

### PEOPLE & PLACE



#### 1 Important Immigrant Gateway

San Francisco's Chinatown remains an important immigrant gateway, with over 900 small businesses and dozens of social services catering to the area's predominantly low-income, immigrant, linguistically-isolated population.

#### 2 Good transportation options, but a need for greater safety and reliability

Chinatown is highly walkable and transit-accessible, which is ideal for the many seniors and households without cars living in the area. However, pedestrian safety and transit reliability remain key issues. The eagerly awaited completion of the Central Subway may partially alleviate the latter.

#### 3 Gentrification Pressures

Chinatown is threatened by increasing gentrification and affordability challenges. From the 1980s to the present, there was a steady outmigration of low-income and Asian households in the neighborhoods immediately adjacent to the Sustainable Chinatown area at the same time that higher-income households moved in. Many fear that the core Chinatown neighborhood will succumb to similar trends.

#### 4 Dominance of Renters and Limited Affordable Housing

Chinatown is overwhelmingly a neighborhood of renters: 94 percent of residents rent, compared to 63 percent citywide. Though roughly half of the housing units are in single-room occupancy hotels (SROs) and are relatively low-cost, only 15 percent of units in Chinatown are considered permanently affordable.

### ENERGY



#### 1 Lower Energy Use

Chinatown residents and businesses consume less energy and have a smaller carbon footprint than the city of San Francisco as a whole, due in large part to the area's high population density (which requires less energy per person for building lighting and heating), as well as the preference for walking and riding transit over driving. Residents use 55 percent less energy than customers elsewhere in the city, while businesses use roughly one-third less per person compared to other commercial users. In total, Chinatown inhabitants emit about one-half the amount of greenhouse gases (GHG) of other San Francisco residents.

#### 2 Potential for Solar Power and 100% Greenhouse-Gas-Free Electricity

There is significant untapped potential for solar photovoltaics (PV) and solar hot water in the plan area. Chinatown could obtain 100 percent of its electricity from GHG-free sources if solar PV were installed on roughly one-fifth of the suitable rooftops. Investments to improve building energy efficiency as well as the decarbonization of the City's power mix could accelerate this shift even sooner, or even allow the area to achieve "carbon net positive" status (generating more energy than is consumed).

## Key Findings from Sustainability Baseline Assessment

### 3 Low Utilization of City Programs and High Savings Potential

The neighborhood has historically had a low rate of participation in City energy efficiency programs. There is the potential to see significant energy savings given the old age and deferred maintenance of Chinatown buildings. Data on similar multifamily buildings that participated in the City's energy efficiency programs experienced on average a 22-23 percent energy savings as a result of the program, translating to an average savings of \$170/unit/year.

### 4 Energy Data Accessibility

Energy providers and state regulators need to make more granular levels of energy data publicly available (such as at a block-level) to support neighborhood-based energy and carbon reduction programs and to track progress over time.

## WATER



### 1 High Water Use

Per capita water use in Chinatown is higher than the Citywide average (19 percent higher for residential uses), which may be a result of inefficient fixtures and/or plumbing leaks, increased use of water for cooking and laundry, and the need for more targeted and culturally-appropriate education on water conservation.

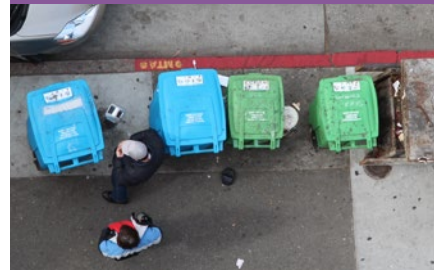
### 2 Changing Behaviors

Encouragingly, the data also reveals that water use is declining for both Chinatown and the City as a whole, even as the City's population is increasing, which is likely the result of water use restrictions and the City's concerted campaign to encourage residents and businesses to reduce water use.

### 3 Need for Water Reduction Programs

As demonstrated by the success of the water reduction programs in CCDC's portfolio of buildings, water efficiency programs to install low-flow fixtures combined with culturally-appropriate education and outreach could have a major impact on reducing water use. Across their portfolio of buildings, water use declined by 18 percent as a result of these programs. One property reduced use by 32 percent.

## WASTE



### 1 Limited Data

Due to current methods of data collection at Recology we were unable to acquire neighborhood-level data on waste generation and diversion rates. However, City agencies will continue to work with Recology to explore opportunities for improving data collection and reporting.

## Key Findings from Sustainability Baseline Assessment

### 2 Lower Diversion Rates and More Landfilled Waste

Data from the northeast portion of the City indicates lower waste diversion rates than the City as a whole – 51 percent of waste in the area is diverted from landfills, compared to 60-65 percent for residential areas Citywide.

### 3 Significant Waste Challenges

Lower diversion rates in Chinatown may be a result of the overall difficulty of servicing this complex neighborhood. Anecdotal accounts from Recology staff confirm that the area's high density, narrow streets, large number of multifamily properties, and linguistic barriers make waste collection difficult.

### 4 Culturally-Appropriate Reduction Strategies

Appropriate outreach on waste reduction strategies is a great need, and SFE and Recology are working with community partners in Chinatown to develop targeted outreach strategies and programming.

## URBAN ECOLOGY AND OPEN SPACE



### 1 Limited Greenery and Poor Ecosystem Functioning

Trees and greenery are much less visible in Chinatown than in other parts of the city. Chinatown's tree canopy is one of the smallest in the city (5 percent compared to approximately 14 percent citywide) and the amount of parks and open space falls far below citywide levels (11 square feet of park space per person compared to 299 sf per person citywide). Instead, Chinatown's environment is largely dominated by impervious surfaces (88 percent of the total area) such as roadways, pavement and buildings. The neighborhood provides very little ecological value—stormwater management, carbon storage, habitat creation and urban heat island mitigation.

### 2 Well-Used Open Space

Chinatown has very active and well used open spaces which play a vital community role, as many residents live in small Single Room Occupancy (SRO) rooms and rely on public spaces on streets and in parks for socializing and relaxing.

### 3 Planned Open Space Opportunities

Planned upgrades to Chinatown's parks (Portsmouth Square, Willie Woo Wong Playground and St. Mary's Square) offer a rare opportunity to improve the quality of existing open spaces. Sustainable Chinatown should explore how to leverage these projects and pursue other innovative strategies, such as the Groundplay program, to increase the amount of open spaces, improve permeability, and introduce trees and vegetation into the crowded street environment.





Photo by David Leong, SF Planning

## PART II

## SECTION A

# People and Place

Chinatown is widely regarded as one of San Francisco's most iconic and striking neighborhoods, with its distinctive architecture, bustling street life and thriving businesses, and dense network of social and cultural institutions that support the largely immigrant, non-English speaking population. Established during the Gold Rush era, present-day Chinatown is the product of a series of transformative events over the last 150-plus-years. Although the neighborhood's built environment and population continue to evolve, a common thread has been Chinatown's role as a gateway for recent immigrants, often in the face of social and political exclusion. This chapter describes the main demographic and neighborhood characteristics of Chinatown.

## KEY FINDINGS: PEOPLE & PLACE



### 1 Important Immigrant Gateway

San Francisco's Chinatown remains an important immigrant gateway, with over 900 small businesses and dozens of social services catering to the area's predominantly low-income, immigrant, linguistically-isolated population.



### 2 Good transportation options, but a need for greater safety and reliability

Chinatown is highly walkable and transit-accessible, which is ideal for the many seniors and households without cars living in the area. However, pedestrian safety and transit reliability remain key issues. The eagerly awaited completion of the Central Subway may partially alleviate the latter.



### 3 Gentrification Pressures

Chinatown is threatened by increasing gentrification and affordability challenges. From the 1980s to the present, there was a steady outmigration of low-income and Asian households in the neighborhoods immediately adjacent to the Sustainable Chinatown area at the same time that higher-income households moved in. Many fear that the core Chinatown neighborhood will succumb to similar trends.



### 4 Dominance of Renters and Limited Affordable Housing

Chinatown is overwhelmingly a neighborhood of renters: 94 percent of residents rent, compared to 63 percent citywide. Though roughly half of the housing units are in single-room occupancy hotels (SROs) and are relatively low-cost, only 15 percent of units in Chinatown are considered permanently affordable.

## Key Findings

Chinatown remains an important point of entry for immigrants and low-income families. According to the U.S. Census (2010-14), 80 percent of Chinatown's residents are Asian, and the neighborhood has higher proportions of seniors and non-English speaking households than the City as a whole (roughly one-third of Chinatown residents are over 60 years old, and 62 percent of residents are linguistically isolated— four times higher than the City). The neighborhood has the City's lowest level of educational attainment, and its household median income is roughly one-fourth of the City average—\$19,950 compared to \$78,710.

The overwhelming majority of Chinatown residents are renters (94 percent compared to 63 percent citywide). Over one-half (52 percent) of residential units are in aging single room occupancy (SRO) hotels, and one-fifth of Chinatown residents live in overcrowded conditions (compared to the city average of 5 percent). The area has roughly twice as many reported housing health and safety violations as the citywide average; this already alarming figure may represent significant underreporting due to Chinatown's high levels of linguistic isolation and renters with precarious housing statuses.

Despite these challenges, residents are remarkably resilient and generally enjoy better health than the City as a whole, with fewer preventable hospitalizations due to chronic health conditions. While this may be the result of a number of factors, many attribute it to the neighborhood's many assets. Strong cultural and social institutions, many inexpensive places to buy fresh produce and healthy foods, relatively low-cost housing, and nearby parks are just some of the protective factors that support residents' health and well-being. In addition, Chinatown is home to roughly 900 small businesses and over 30 social service organizations working to support residents' diverse needs in the area, such as workforce development, youth development, housing counseling, and senior care and immigration services.

With so many amenities nearby, walking and public transit are the predominant transportation modes, comprising 77 percent of mode share compared with 43 percent citywide. Some of the City's busiest bus lines travel through the area, offering frequent connections to Downtown and other neighborhoods. Given the neighborhood's role as a cultural and social



Photo by David Leong, SF Planning

hub for many generations of Chinese-Americans, these transit connections also serve as a critical lifeline to many residents in San Francisco and the region that regularly travel to Chinatown for work, shopping, and social and cultural events.

Despite the wide availability of transit options, the SFMTA Equity Strategy finds that bus reliability and overcrowding are in need of improvement, which may be partially alleviated by the completion of the Central Subway line—a new 1.7-mile extension of Muni’s T Line set to open in 2019 that will connect Chinatown directly to the South of Market (SoMa), Yerba Buena, Union Square, and the City’s southeastern neighborhoods. Transportation safety is also a concern: Chinatown has the City’s fourth highest rate of pedestrian injuries, and some of the neighborhood’s most important streets (including Stockton, Broadway, and Kearny Streets) are on the City’s High-Injury Network, with Kearny Street on the list of top 10 percent of streets for pedestrian injuries.<sup>1</sup>

This neighborhood’s status as a stronghold for the Chinese-American community is under threat due to the growing affordable housing crisis. A report by the Urban Displacement Project at UC Berkeley notes that while the Chinatown area has been relatively stable during this housing crisis, it may now be in the early stages of gentrification. The neighborhoods with large Asian populations immediately adjacent to Chinatown have already seen a marked increase in rents (more than doubling since the 1980s) and greater numbers of households with higher education and incomes, coupled with a steady decline in Asian and low-income households.<sup>2</sup> In Chinatown proper, where there are a greater number of rent-controlled units and SROs, rents have so far remained relatively more stable—median rent in 2013 was \$575 per unit, compared to \$1,455 in the adjacent census tract.

Despite strong tenant protections (including rent control and laws prohibiting conversion/demolition of SROs), the report notes that the Chinatown core is not immune to gentrification. Just 15 percent of



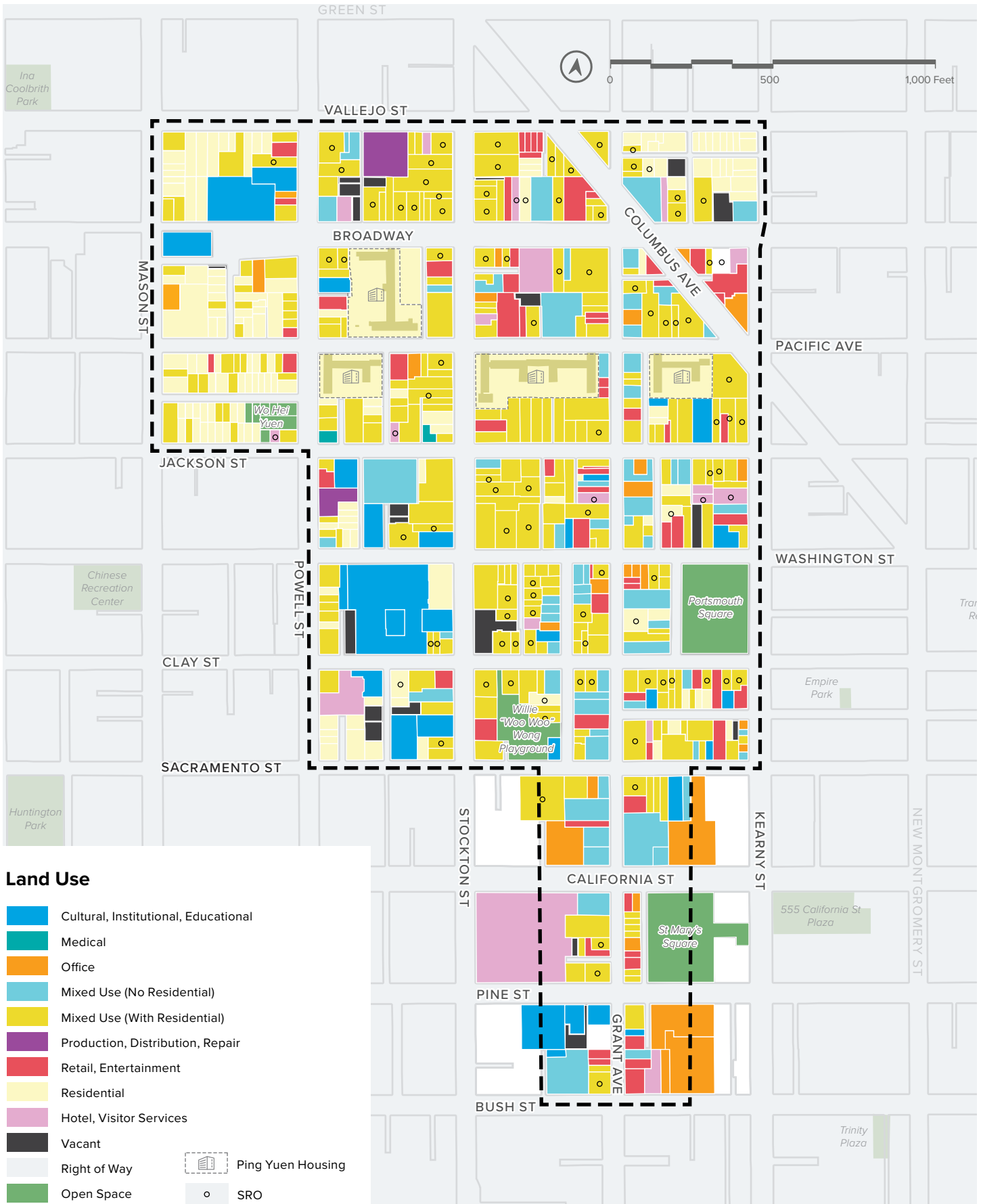
Photo by Theodore Rigby, San Francisco Chronicle

units are considered permanently affordable (e.g. deed-restricted Below Market Rate units), with the remainder at risk of conversion to higher-cost housing. The SRO Families Collaborative reports that across the City, SRO rents have increased 25 percent over the last four years, and skyrocketing housing costs have forced greater numbers of families to move into SRO housing (up by 55 percent since 2001), where families crowd into a single small room. While the majority of SRO units continue to house low-income residents, some building owners are selling or converting their properties to market rate rentals. Anecdotally, a SRO owner in Chinatown neighborhood recently made significant upgrades to their rooms, upgrading fixtures and adding in foldable toilets to target higher-income workers and students at a rent of \$1,400 a month—two to three times the price of SROs typically advertised to the Chinese community.

Additional findings from the demographic and built environment data analysis are presented in following maps and graphics on the following pages.

<sup>1</sup> Vision Zero SF. *Maps and Data: High-Injury Network*. Accessed at: <http://visionzerosf.org/maps-data/>

<sup>2</sup> Center for Community Innovation, University of California Berkeley. *Chinatown: Community Organizing Amidst Change in SF's Chinatown*. [http://www.urbandisplacement.org/sites/default/files/chinatown\\_final.pdf](http://www.urbandisplacement.org/sites/default/files/chinatown_final.pdf).



**Population**

**14,600** CHINATOWN

**829,070** CITYWIDE

Photo by Flickr user Jonathan Chen.

**Age of Residents**

**Median Age**

**50.4** CHINATOWN

**35.0** CITYWIDE

**% of Residents by Age**

	Chinatown	Citywide
A. Age 0-4	2%	5%
B. Age 5-17	10%	9%
C. Age 18-34	21%	30%
D. Age 35-59	32%	36%
E. Age 60 over	35%	20%

Source: 2009-2013 American Community Survey US Census

**Education Level**

**% Residents by with College Degree**

**20%** CHINATOWN

**53%** CITYWIDE

**% of Residents by Education Level**

	Chinatown	Citywide
A. High School or Less	70%	26%
B. Some College AA	10%	21%
C. College Degree	17%	32%
D. Graduate Professional	3%	21%

Source: 2009-2013 American Community Survey US Census

**Race of Residents**

**Percentage Asian**

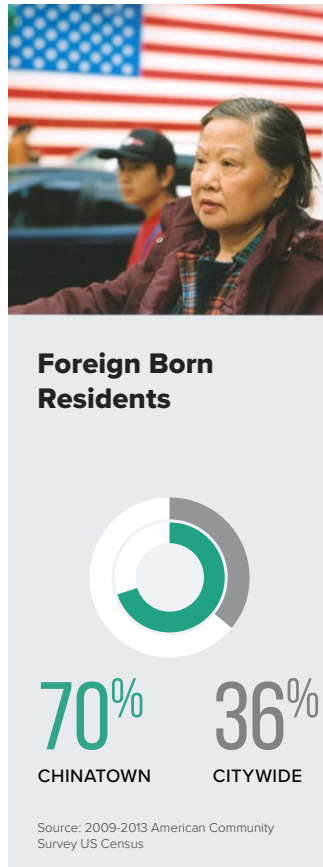
**80%** CHINATOWN

**34%** CITYWIDE

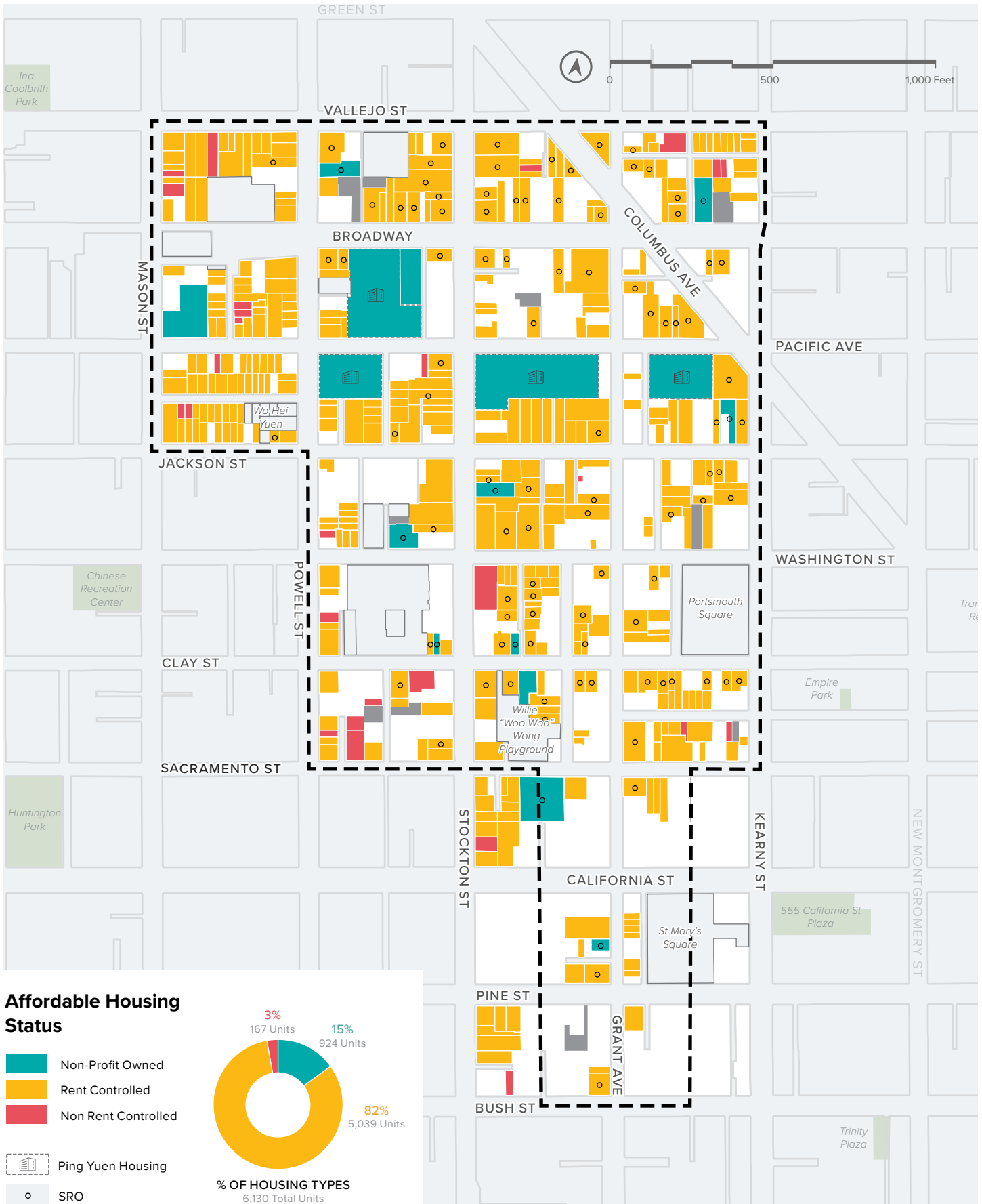
**% Residents by Race**

	Chinatown	Citywide
A. Asian	80%	34%
B. Black	2%	6%
W. White	15%	49%
N. Native American	0.3%	0.4%
P. Native Hawaiian Pacific Islander	0.0%	0.4%
O. Other MultiRacial	3%	10%
% Latino	3%	15%

Source: 2009-2013 American Community Survey US Census







### Excessive Rent Burden



Percentage of renter households whose gross rent exceeds **30%** of their household income.

**54%**

CHINATOWN



**44%**

CITYWIDE

Percentage of renter households whose gross rent exceeds **50%** of their household income.

**26%**

CHINATOWN



**22%**

CITYWIDE

Source: US Census via San Francisco Department of Public Health

### % Owner / Renter

#### Percent Renters

**94.0%**

CHINATOWN



**63.4%**

CITYWIDE

#### Percent Owners

**6.0%**

CHINATOWN



**36.6%**

CITYWIDE

Source: 2009-2013 American Community Survey US Census



Photo by David Leong, SF Planning.

### Violent Crime Rate 2010-2012

Number of offenses per 1,000 people.

Financial District / South Beach

South of Market

Bayview / Hunters Point

Mission

North Beach

Citywide

Chinatown

Pacific Heights

Noe Valley

**50.8**

CHINATOWN

**53.1**

CITYWIDE

Source: San Francisco Department of Public Health

## Residential Housing Violations



Total housing violations.  
2009-2011

256

Average annual violations per 1,000 people.  
2009-2011

9.1



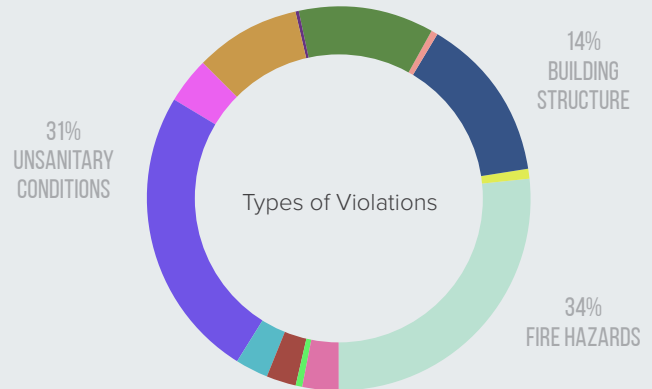
CHINATOWN

4.7

CITYWIDE

### Types of Violations

Animals and Pests	40	Garbage and Refuse	14
Biological Hazards	1	Indoor Climate	2
Building Conditions	50	Permitting Issue	11
Building Security	2	Plumbing, Gas, and Electric	12
Building Structure	61	Unsanitary Conditions	108
Chemical Hazard	3	Water Hazard	1
Fire Hazards and Prevention	117	Other	16



Source: San Francisco Department of Public Health: The San Francisco Indicator Project  
<http://www.sfindicatorproject.org/indicators/view/195>

## Overcrowding



Percentage of households with **more than 1 person per habitable room.**

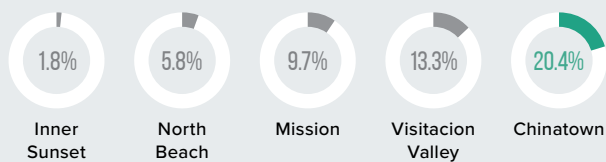
20.4%

CHINATOWN

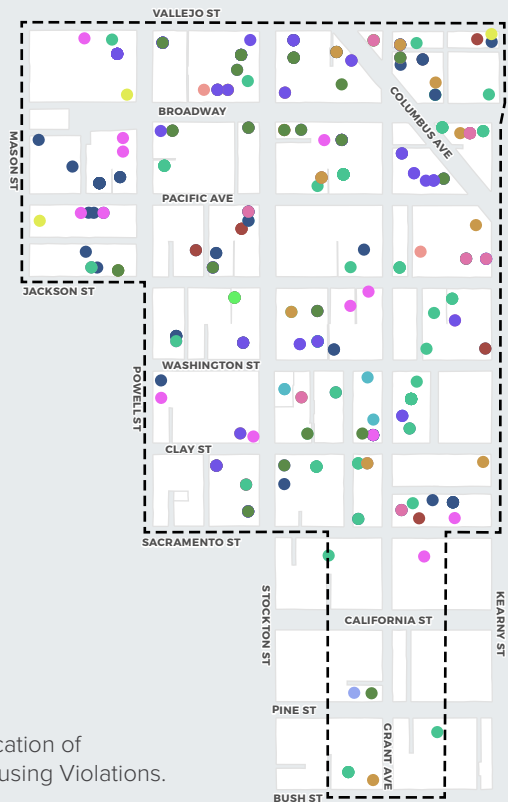


5.1%

CITYWIDE



Source: 2009-2013 American Community Survey US Census



Source: San Francisco Department of Public Health

### Vehicles Available



Percentage of housing units with **no vehicles** available



<b>5,864</b>	Occupied housing units with <b>no vehicles</b> available	<b>104,407</b>
<b>7,396</b>	Total occupied housing units	<b>345,344</b>

Source: 2009-2013 American Community Survey US Census

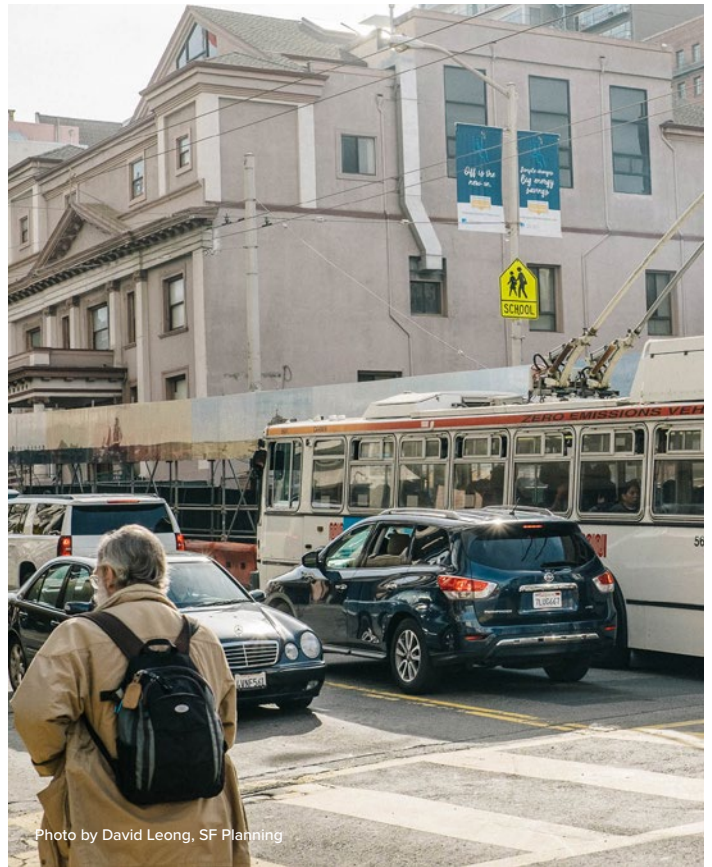
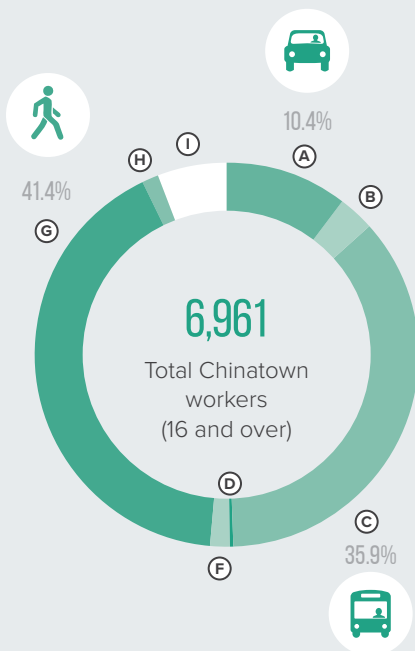
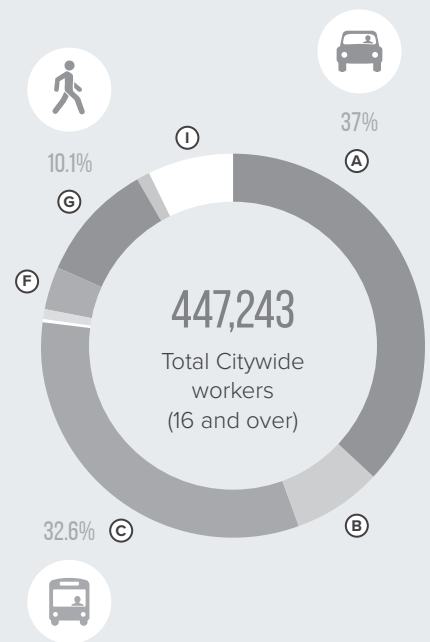


Photo by David Leong, SF Planning

### Mode Share



	CHINATOWN	CITYWIDE
A. Drove Alone	727	165,631
B. Carpools	217	33,588
C. Public Transit	2,500	145,863
D. Taxi	25	1,318
E. Motorcycle	0	3,860
F. Bicycle	115	15,631
G. Walk	2,884	45,083
H. Other	99	4,841
I. Work at Home	394	31,428



Source: 2009-2013 American Community Survey US Census



## Public Transit Equity Analysis

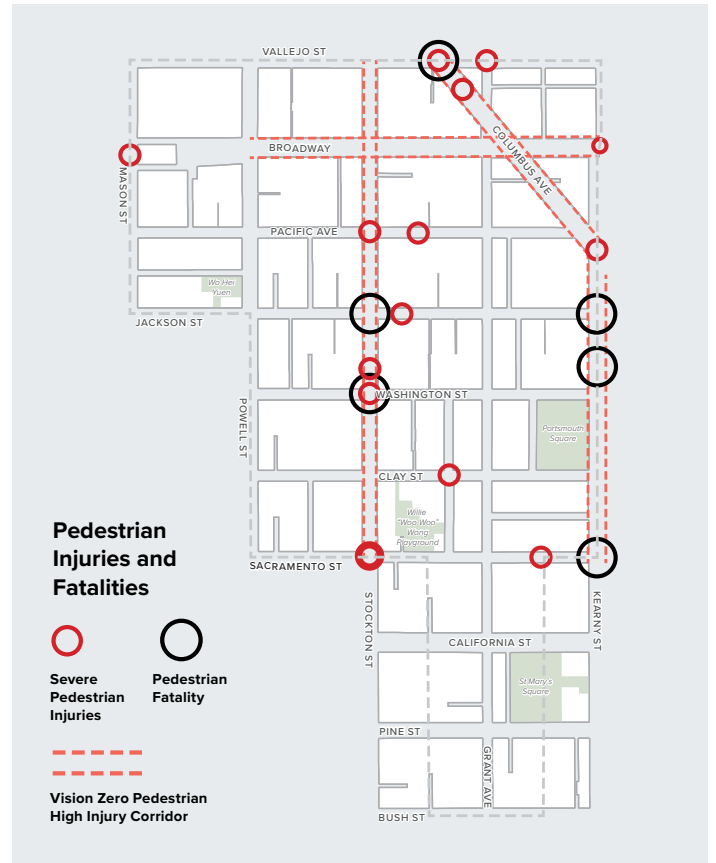
Route	Average Weekday Ridership	On-Time Performance	% of Trips with Service Gaps	Capacity Utilization during PM Peak
30 Stockton	32,400	56%	8%	52%
45 Union/Stockton	11,700	63%	2%	88%
8 Bayshore / 8AX Bayshore A Express / 8BX Bayshore B Express	38,600	62%	7%	73%
10 12 Townsend	5,500	59%	0%	93%
12 Folsom/Pacific	4,200	61%	0%	50%
1 California / 1AX California A Express / 1BX California B Express	26,000	65%	11%	85%

○ Local Route ● Rapid

Source: Muni Service Equity Strategy Policy  
<https://www.sfmta.com/sites/default/files/agendaitems/5-6-14%20Item%2013%20Equity%20Strategy%20presentation.pdf>



Photo by David Leong, SF Planning



Source: San Francisco Municipal Transportation Agency

## PART II

## SECTION B

# Energy

Climate change is one of the greatest challenges of our era, and every community needs to do its part to mitigate and prepare for its impacts. San Francisco is a national leader in this effort, reducing its carbon footprint by 14.5 percent from 1990-2010. However, we will need to take bold steps in order to meet our targets of 25 percent GHG reduction below 1990 levels by 2017 and 40 percent reduction by 2025.

San Francisco's primary sources of GHG emissions are buildings (45 percent) and transportation (50 percent), with the remainder coming from waste disposal to landfills (5 percent). The City's adopted Climate Action Plan outlines opportunities to further reduce emissions, and the San Francisco Department of the Environment encourages everyone to strive towards the goal of "0-50-100-Roots": zero waste to landfills; 50 percent of trips by transit, biking, or walking rather than driving alone; 100 percent of energy use from renewable sources; and maximum carbon sequestration through urban greening.

Though Chinatown's residents are typically seen as "green by necessity" (living in dense housing, walking or taking public transit far more often than driving, and generally using fewer resources than residents in other neighborhoods), there remain key opportunities to improve the neighborhood's environmental performance. In addition, many Chinatown residents live in buildings that are master-metered and may be unaware of their energy usage, and would benefit from culturally-competent outreach and education on how they could limit their energy consumption even further.

**KEY FINDINGS: ENERGY****1 Lower Energy Use**

Chinatown residents and businesses consume less energy and have a smaller carbon footprint than the city of San Francisco as a whole, due in large part to the area's high population density (which requires less energy per person for building lighting and heating), as well as the preference for walking and riding transit over driving. Residents use 55 percent less energy than customers elsewhere in the city, while businesses use roughly one-third less per person compared to other commercial users. In total, Chinatown inhabitants emit about one-half the amount of greenhouse gases (GHG) of other San Francisco residents.

**2 Potential for Solar Power and 100% GHG-Free Electricity**

There is significant untapped potential for solar photovoltaics (PV) and solar hot water in the plan area. Chinatown could obtain 100 percent of its electricity from GHG-free sources if solar PV were installed on roughly one-fifth of the suitable rooftops. Investments to improve building energy efficiency as well as the decarbonization of the City's power mix could accelerate this shift even sooner, or even allow the area to achieve "carbon net positive" status (generating more energy than is consumed).

**3 Low Utilization of City Programs and High Savings Potential**

The neighborhood has historically had a low rate of participation in City energy efficiency programs. There is the potential to see significant energy savings given the old age and deferred maintenance of Chinatown buildings. Data on similar multifamily buildings that participated in the City's energy efficiency programs experienced on average a 22-23 percent energy savings as a result of the program, translating to an average savings of \$170/unit/year.\*

**4 Potential for Solar Power and 100% GHG-Free Electricity**

Energy providers and state regulators need to make more granular levels of energy data publicly available (such as at a block-level) to support neighborhood-based energy and carbon reduction programs and to track progress over time.

\* Assuming the energy cost for an average multifamily unit in California is \$738/unit/year (source: Survey of 471 multifamily households in CA from 2009 EIA Residential Energy Consumption Survey (Public Use Microdata File): <http://www.eia.gov/consumption/residential/data/2009/>)



Photo by Flickr user Adrian Gonzalez.

In addition, the aging building stock (described more fully in the Private Building Typology in Strategy 2) has generally had fewer upgrades than similar buildings built around the same time. Energy efficiency retrofits could significantly reduce energy demand, through measures such as building envelope insulation, window repair or replacement, appliance and lighting upgrades, and operations and maintenance adjustments. A 2014 national study funded by the US Department of Housing and Urban Development found that cost-effective water and energy efficiency upgrades on over 200 affordable multi-family buildings resulted in an average savings of 18 percent in energy use, 26 percent in natural gas use, and 26 percent in water use.<sup>1</sup> Similarly, CCDC worked with the Bay Area Regional Energy Network (BayREN) program to achieve significant energy savings at six of its buildings, including the William Penn Hotel profiled on the following page.

In addition to environmental benefits and cost savings, energy retrofits can significantly improve residents' quality of life by improving thermal comfort and mitigating indoor air hazards such as mold and asbestos. These measures will become increasingly important as we adapt to the impacts of climate change, which will bring more frequent extreme weather events, droughts, flooding, and air pollution. Although climate change will affect us all, its impact may be felt most deeply in disadvantaged communities like Chinatown, where it will amplify existing vulnerabilities—such as poverty, linguistic isolation, housing insecurity, and low educational status. Improving the living conditions in the existing building stock will help ensure that residents are better equipped to handle these challenges.

<sup>1</sup> Stewards of Affordable Housing for the Future (SAHF) and Bright Power (2014). Energy and Water Savings in Multifamily Retrofits: Results from the U.S. Department of Housing and Urban Development's Green Retrofit Program and the Energy Savers Program in Illinois. Available at: [http://www.sahfnet.org/multifamilyretrofitreport\\_2\\_1287596736.pdf](http://www.sahfnet.org/multifamilyretrofitreport_2_1287596736.pdf)



## ENERGY RETROFIT CASE STUDY

### THE WILLIAM PENN HOTEL 160 EDDY STREET

CCDC's experience with acquiring and upgrading apartment buildings is a model for how building owners can implement cost-effective energy efficiency measures with tangible environmental and quality of life benefits. The William Penn Hotel is a 94-unit Single Room Occupancy (SRO) building that was owned by a SRO hotel developer when CCDC acquired it in 1992. It is one of six buildings in CCDC's portfolio upgraded through the Bay Area Multifamily Building Enhancements (BAMBE) program, run by the Bay Area Regional Energy Network (BayREN).<sup>1</sup> Energy efficiency was not a top priority when CCDC acquired the building, as it needed more urgent investments just to make the building habitable. Much of the building equipment had been used beyond its intended lifetime, and was challenging, inefficient, and costly to operate as a result. This is the case with many buildings in Chinatown; in fact, none of the six CCDC buildings selected to participate in the program had comprehensive building upgrades in 20 to 40 years.

The BayREN program provided CCDC with free energy analysis, assistance with project management, and nearly \$70,000 in rebates at the William Penn Hotel to help offset costs associated with installing energy efficiency upgrades. This allowed CCDC to invest in needed repairs, which included:

- Installation of thermostatic radiator valves (TRVs), enabling in-unit control of heating
- Increasing domestic hot water pipe insulation from 0-0.5 inches to 1 inch
- Replacement of broken steam system air vent replacement
- Upgrade of Attic insulation upgrades
- Replacement of central natural gas domestic hot water boiler
- Installing LED lighting throughout building



Photos courtesy of Bay Area Regional Energy Network.

The total renovation cost was \$140,000. As a result of these upgrades, CCDC experienced the following environmental, financial, and quality of life improvements:

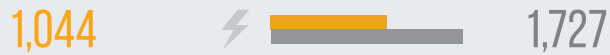
- 29% overall energy savings
- 4,000 Therms of gas saved per year
- 49,000 kWh of electricity saved per year
- 30 metric tons CO2 emissions reduced per year
- Greater thermal comfort for residents
- Greater sense of safety attributable to improved lighting

<sup>1</sup> BayREN program: <https://www.bayareaenergyupgrade.org/bay-area-multifamily-building-enhancements>

### Residential Energy Use

#### Energy Use Per Capita (Annual)

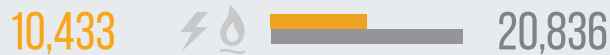
Electricity (MWh)



Gas (Therms)



TOTAL (kBtu)



#### Total Energy Use Intensity (kBtu/sq ft)

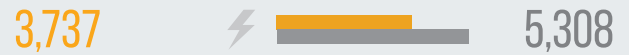


### Non-Residential Energy Use

#### Energy Use Per Capita\* (Annual)

\* Per capita calculations are based on the residential population.

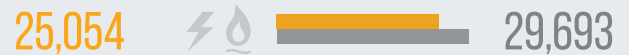
Electricity (MWh)



Gas (Therms)



TOTAL (kBtu)

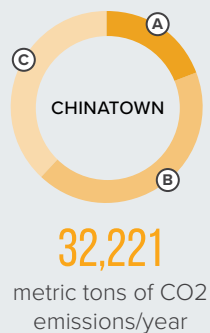


#### Total Energy Use Intensity (kBtu/sq ft)



### Carbon Emissions From Energy & Transportation\*

CO2 Emissions (metric tonnes of CO2/year)	A Residential		B Non-Residential		C Transportation		TOTAL	
	Total	Per person	Total	Per person	Total	Per person	Total	Per person
Chinatown	6,235	0.6	13,786	1.8	12,200	1.0	32,221	3.4
Citywide	912,642	1.1	1,549,738	1.9	2,118,863	2.6	4,581,243	5.5



\* CO2 emissions factors for Electricity and Gas are from the 2013 San Francisco Climate Action Strategy Update (2010 factors: 521.10 lbs CO2/MWh for electricity, 11.7 lbs CO2/therm for gas). The emissions factor for transportation is from correspondence with SFE's Climate Action Team (2012 factor: 1.05722 lbs CO2/vehicle mile traveled).

## Key Findings

### Neighborhood Energy Use & Greenhouse Gas Emissions

Overall, the energy analysis confirmed that Chinatown residents and businesses consume less energy and have a smaller carbon footprint than the City as a whole. Per capita, carbon emissions from residential buildings in Chinatown are approximately 42 percent lower than the city average (0.6 vs. 1.1 metric tons of CO<sub>2</sub> per person per year), which is even more striking given the condition of the building stock. Possible explanations for the lower energy use could include the area's high population density (which requires less lighting and heating energy per person), as well as the high proportion of low-income and senior residents who likely have less access to electronic appliances.

Energy use data from five CCDC-owned residential buildings in Chinatown generally confirmed that energy use in the area is lower than the City as a whole. However, the difference was less pronounced, with per capita energy use in CCDC's buildings 16 percent lower than the citywide average. One possible explanation is that residents of CCDC properties have more disposable income to buy electronic devices and other goods, since they have greater housing security and generally pay less rent than residents in private buildings. In addition, some CCDC buildings have retail, supportive services, or large multi-purpose rooms that often host community events, all of which contribute to higher energy use.

Chinatown's per capita nonresidential GHG emissions are much closer to the citywide average (per person, Chinatown businesses consumed 5 percent less than the citywide average). However, this finding may hold less meaning in a mixed use area like Chinatown. Given that the neighborhood has a high density of small businesses and is a regional shopping and cultural hub,

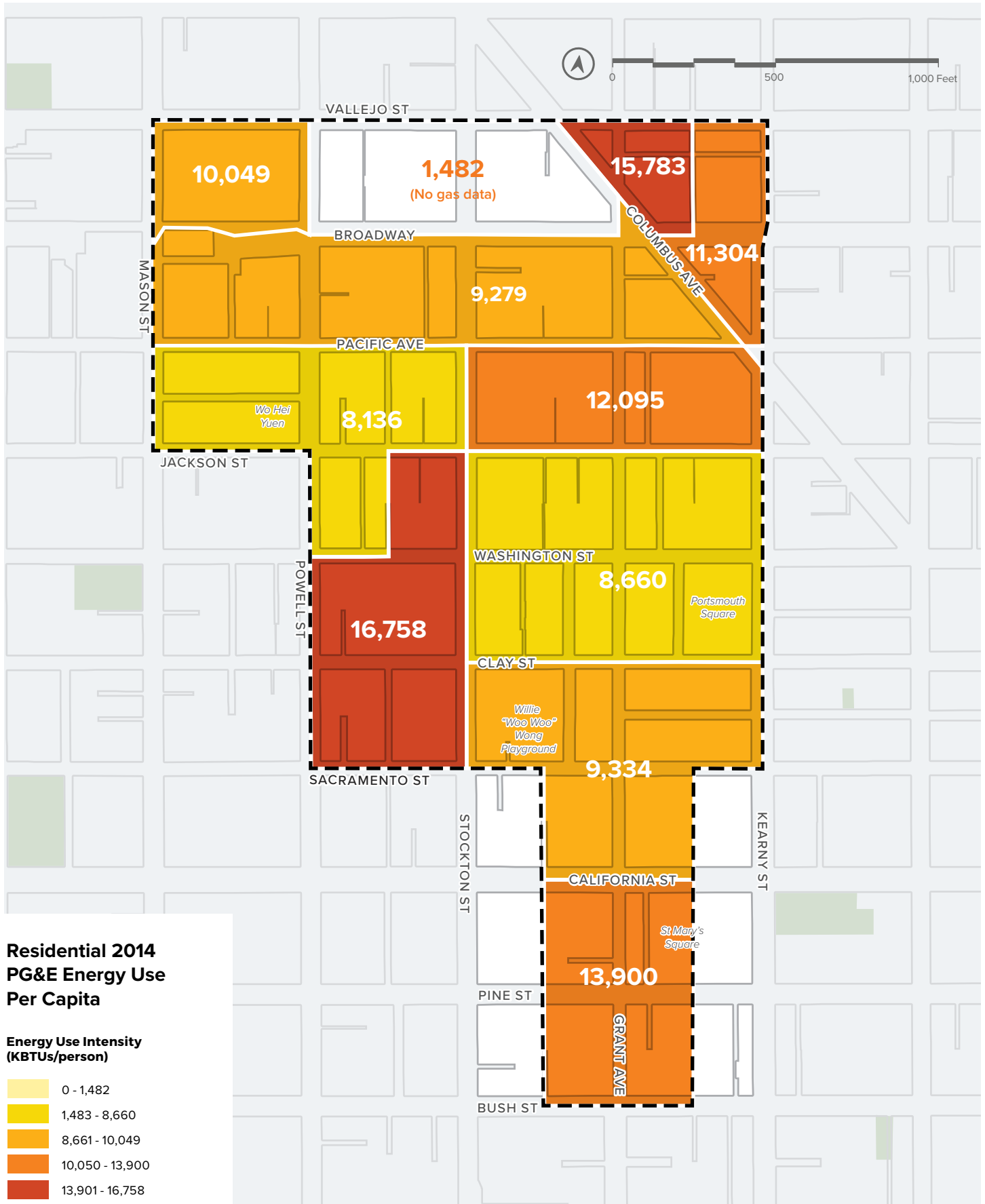
it makes sense to expect that commercial emissions per Chinatown resident would be higher here than in a predominately residential neighborhood. In future updates to this analysis, a more meaningful measure of nonresidential energy use would be emissions or usage per employee (instead of per resident).

Paradoxically, even though energy use is lower in Chinatown compared to the city, Energy Use Intensity, or EUI (a measure of how much energy is used per building square foot in a year), is actually much higher, at roughly three times the City average for residential buildings and two times the City average for nonresidential buildings, underscoring the area's extremely high density of residential and other uses. Chinatown residents and businesses simply get a lot of use out of small spaces.

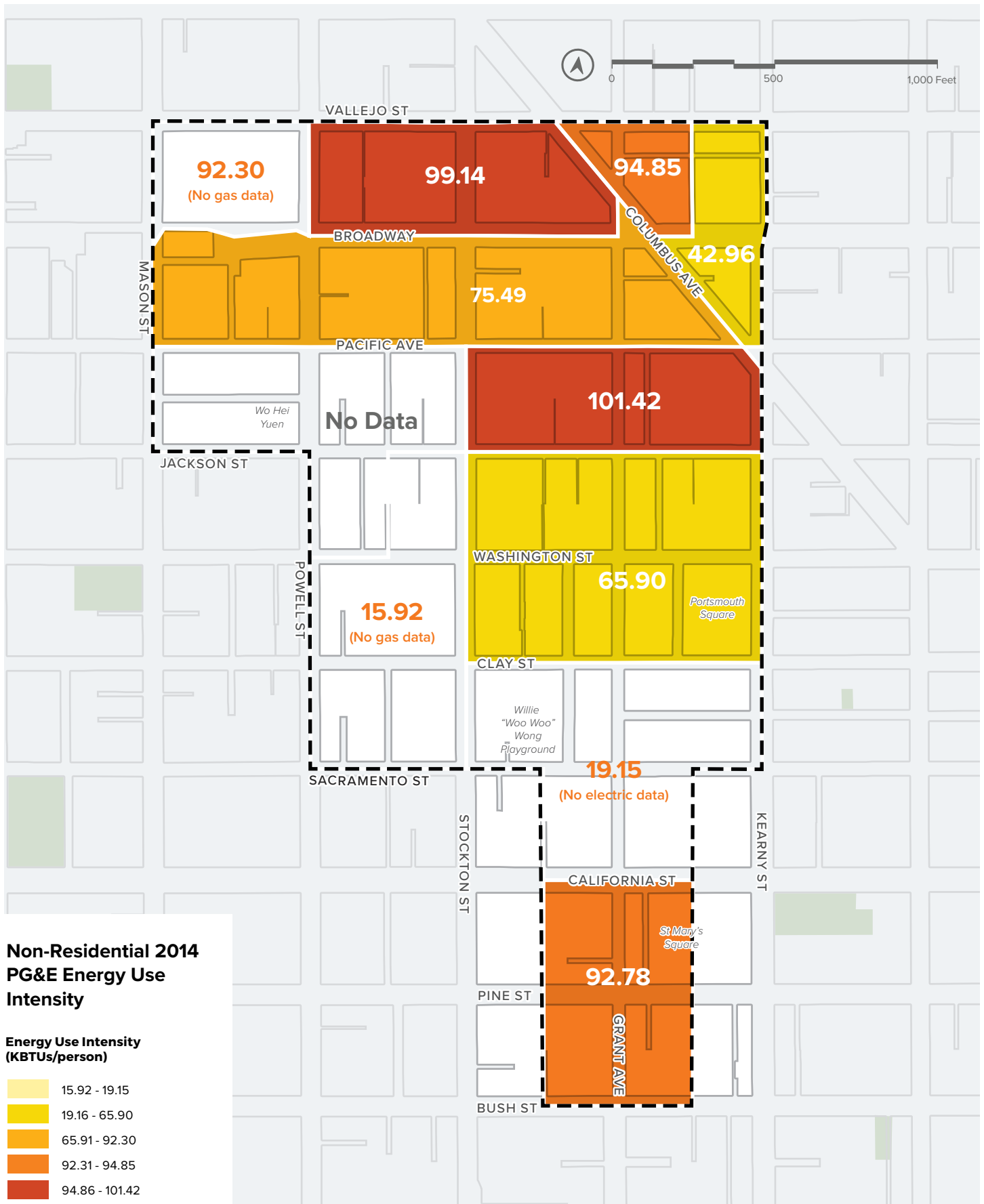
Carbon emissions from transportation are also much lower in Chinatown than other neighborhoods—about 60 percent less per person— a result of high transit ridership and the neighborhood's compact, walkable character. This analysis is based on estimates of the total amount and modes of transportation that occurs both within and through the plan area.<sup>2</sup> Given the number of heavy traffic arterials cutting through the plan area, the actual carbon emissions of just the residents and businesses living and working in the area is even lower.

The maps on the following page show variations in energy use by census block group, the smallest geographic unit for which data was made available through PG&E's Energy Data Request Program. Sustainable Chinatown collaborated with PG&E over a 15-month period to explore new methods of making energy usage data available at the most granular scale possible. See Appendix B for a description of the methodology, limitations, and lessons learned from this process.

<sup>2</sup> Source: San Francisco County Transportation Authority SF CHAMP model of 2012 Citywide transportation behavior, using the Transportation Analysis Zones (TAZs) that best represent the Sustainable Chinatown plan area.



Sources: Pacific Gas & Electric (PG&E), San Francisco Public Utilities Commission, San Francisco Department of Building Inspections, San Francisco Department of the Environment, San Francisco County Transportation Agency



Sources: Pacific Gas & Electric (PG&E), San Francisco Public Utilities Commission, San Francisco Department of Building Inspections, San Francisco Department of the Environment, San Francisco County Transportation Agency

## Neighborhood Energy Supply Mix & Renewables Potential

We developed a detailed profile of energy suppliers in the area, analyzing the energy mix and sources for each, in order to identify and increase opportunities for renewable production in Chinatown. This analysis found that there is significant potential to increase renewable energy production and reduce or eliminate dependence on fossil fuels for energy production, through solar photovoltaics (solar PV) and other technologies.

Nearly all of existing energy demand in Chinatown (86 percent of electricity and 100 percent of natural gas) is supplied by Pacific Gas & Electric (PG&E), the region's principal energy service provider. Across PG&E's energy system, about 35 percent of its energy mix is derived from renewable, GHG-free sources.<sup>3</sup> Another 4 percent of electricity is provided by the San Francisco Public Utilities Commission (SFPUC),

3 PG&E's 2014 Power Mix. [https://www.pge.com/includes/docs/pdfs/myhome/myaccount/explanationofbill/billinserts/11.15\\_PowerContent.pdf](https://www.pge.com/includes/docs/pdfs/myhome/myaccount/explanationofbill/billinserts/11.15_PowerContent.pdf)

which services all municipal buildings, including the Ping Yuen developments and other public housing projects. SFPUC sources 100 percent of its electricity from GHG-free sources, primarily through its Hetch Hetchy hydroelectric system. In addition, we made an assumption that some portion of electricity is supplied by Direct Access providers (though the data was not available at a neighborhood scale).<sup>4</sup> Finally, we identified an additional 67 kW of solar photovoltaics produced in the area, which amounts to less than 1 percent of total energy used.<sup>5</sup>

4 Citywide, 11% of energy use is additionally supplied through Direct Access (DA) programs that enable customers to purchase power directly from competitive Energy Service Providers. Data is not available to determine how many Chinatown customers receive energy through this source. Although it is reasonable to assume there may be fewer DA customers in Chinatown (due to linguistic barriers and smaller-scale development), our analysis uses a conservative approach by assuming that Chinatown uses DA customers at the same rate as the City. Source: San Francisco Mayor's Renewable Energy Taskforce. [http://sfenvironment.org/sites/default/files/fliers/files/sfe\\_re\\_renewableenergytaskforcerecommendationsreport.pdf](http://sfenvironment.org/sites/default/files/fliers/files/sfe_re_renewableenergytaskforcerecommendationsreport.pdf)

5 Existing solar photovoltaic (PV) installations were derived from data from the San Francisco GoSolar Program, Department of Building Inspections records, and an aerial survey of the plan area. As the aerial survey only provides an approximation of solar equipment in the area, some installations may actually be solar hot water systems rather than solar PV panels.



Photo by Flickr user J. Brewster

Citywide, the share of renewable energy consumed will increase in the coming years when the majority of San Francisco's PG&E customers transition to CleanPowerSF (managed by the SFPUC), which will have a 35 percent minimum renewable content (or a 100 percent renewable for customers who opt to for the SuperGreen plan), with plans to transition entirely to GHG-free fuel sources in the longer term. The program conservatively estimates that 80 percent of customers will opt into the program, though the initial rounds of enrollment have achieved rates as high as 98 percent in some neighborhoods.<sup>6</sup>

Given the energy mix of each of these service providers, we found that over one-half (57 percent) of electricity is currently supplied by GHG-free sources across the Sustainable Chinatown plan area. Once customers transition to CleanPowerSF, this value will increase to nearly three-fourths (73 percent), or 24 gigawatt hours (GWh) out of 32 GWh used across the area each year.

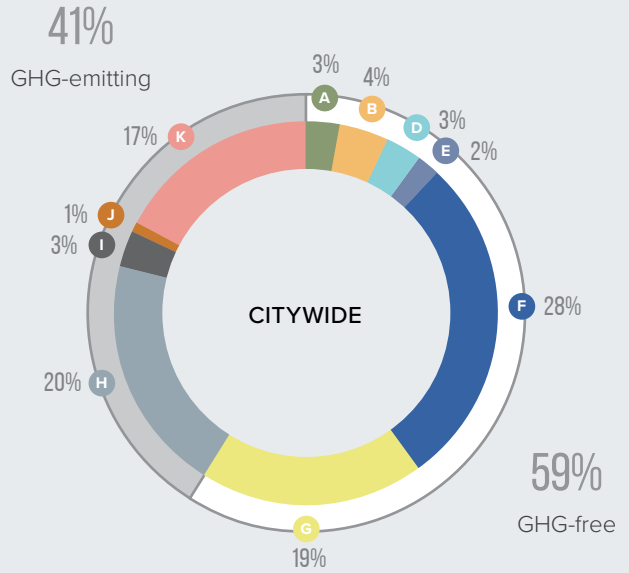
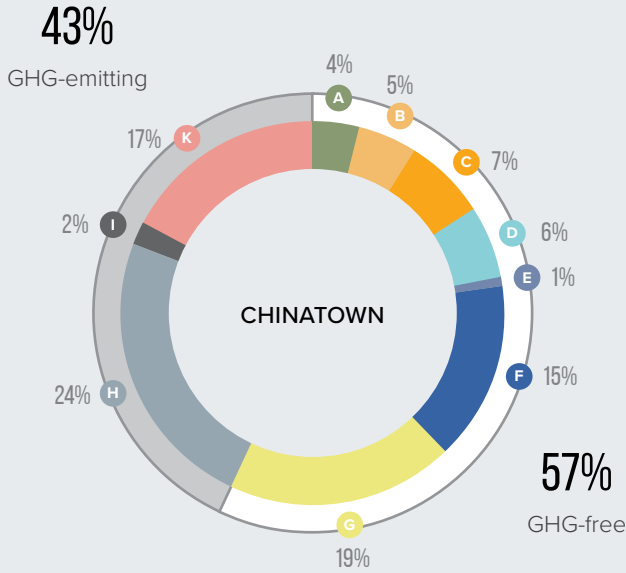
The neighborhood is an excellent target for investments in solar photovoltaic (PV) and solar hot water systems, given its relatively even scale of development (roughly three-fourths of buildings have four stories or less), southeast-facing slopes, and location in one of the sunnier areas of San Francisco. Using data from SFE's Solar Potential Map, we estimate that there is the potential for an additional 30 GWh of solar energy on existing rooftops in Chinatown.<sup>7</sup>

In other words, if roughly one-fifth of the suitable buildings in the plan area installed solar PV systems, the area could meet 100 percent of the area's electricity needs through GHG-free sources (assuming usage stays constant). Community solar installations or green job training could ensure that such projects have both social and environmental benefits. Given that the area is not expected to see significant new development or population growth, the neighborhood's energy use might even decrease if energy efficiency and renewable energy measures were implemented at scale. Thus, there is a viable path, albeit an ambitious one, for Chinatown's buildings to exceed "carbon neutral" to become "carbon net-positive"—producing and generating more renewable energy for electricity than what is consumed. The following section shares findings from the City's energy efficiency programs as a critical step towards implementing this vision.

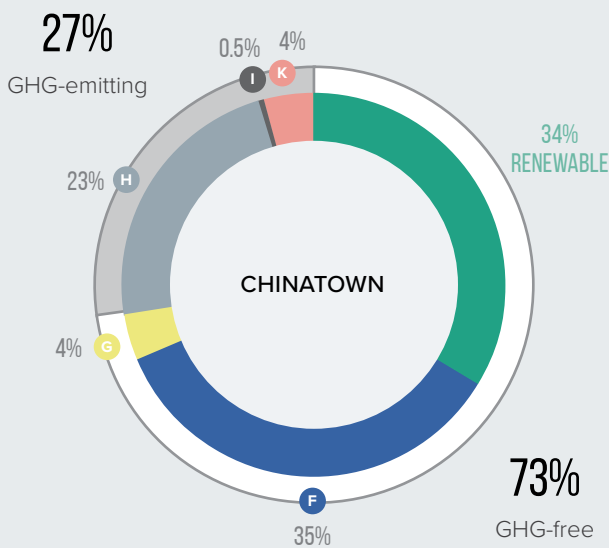
6 SFPUC CleanPowerSF. *Frequently Asked Questions*. <http://sfwater.org/index.aspx?page=998>

7 The Solar Potential Map (<http://sfenergymap.org/>) was estimated using Critigen/CH2M HILL's SAFE technology, which utilizes aerial imagery combined with 3d modeling to determine obstacles on roofs such as chimneys, exhaust fans, and air-conditioning. These structures are then subtracted from the total roof area to estimate the potential amount of area that can be used for a solar energy system. From this database, we estimated that 1,373,113 sq ft of usable roof area in the Chinatown area, which translates into 20,411 kW of potential solar arrays. We assumed that 1kW of solar arrays generates 1,472 kWh per year assuming standard 16% efficiency panels (source: PVWatts Calculator, <http://pvwatts.nrel.gov/>).

### Current Energy Mix



### Potential Energy Mix Under CleanPower SF



**+31%**  
Increase in GHG-free energy.

**34%**  
Renewable

#### GHG-free Energy

- A. Biomass & Waste
- B. Geothermal
- C. Solar
- D. Wind
- E. Small Hydroelectric
- F. Large Hydroelectric
- G. Nuclear

#### GHG-emitting Energy

- H. Natural Gas
- I. Coal
- J. Other Fossil
- K. Unspecified



### Existing Solar

Total Existing kW **66.7 KW**  
 Existing Installations **5**

EXISTING SOLAR INSTALLATION LOCATIONS ( see map )

- (A) Chinatown Public Health Center - 1490 Mason St
- (B) 829 Vallejo Street
- (C) The Salvation Army - 1450 Powell St
- (D) 567 Vallejo St
- (E) First Chinese Baptist Church - 15 Waverly Pl

SFPUC; SFDBI; Planning Department Orthophoto Survey


### Potential Solar



Total Potential kW **18,308 KW**

Usable Roof Area Chinatown **1,373,113 SQ. FT.**

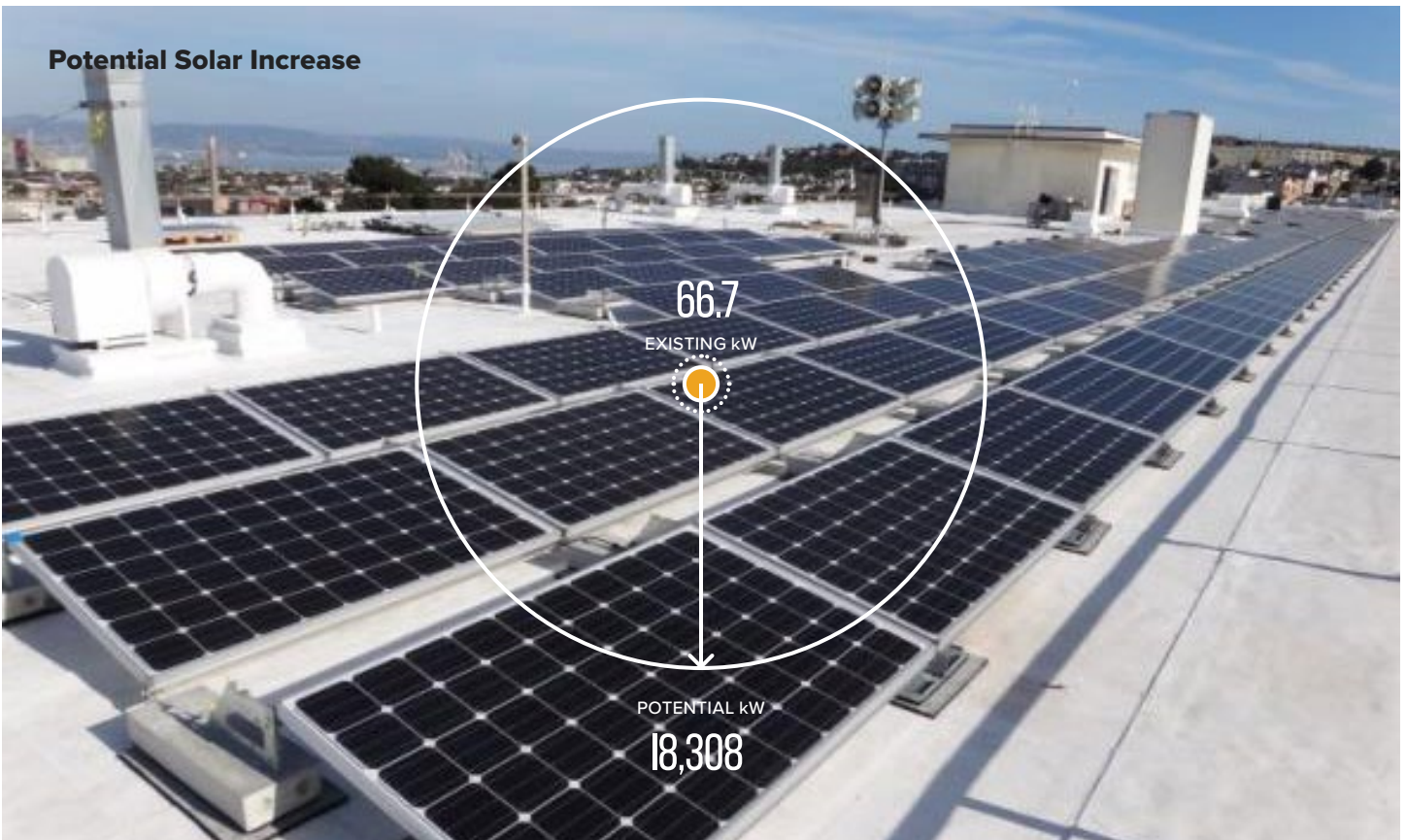
Cost Range

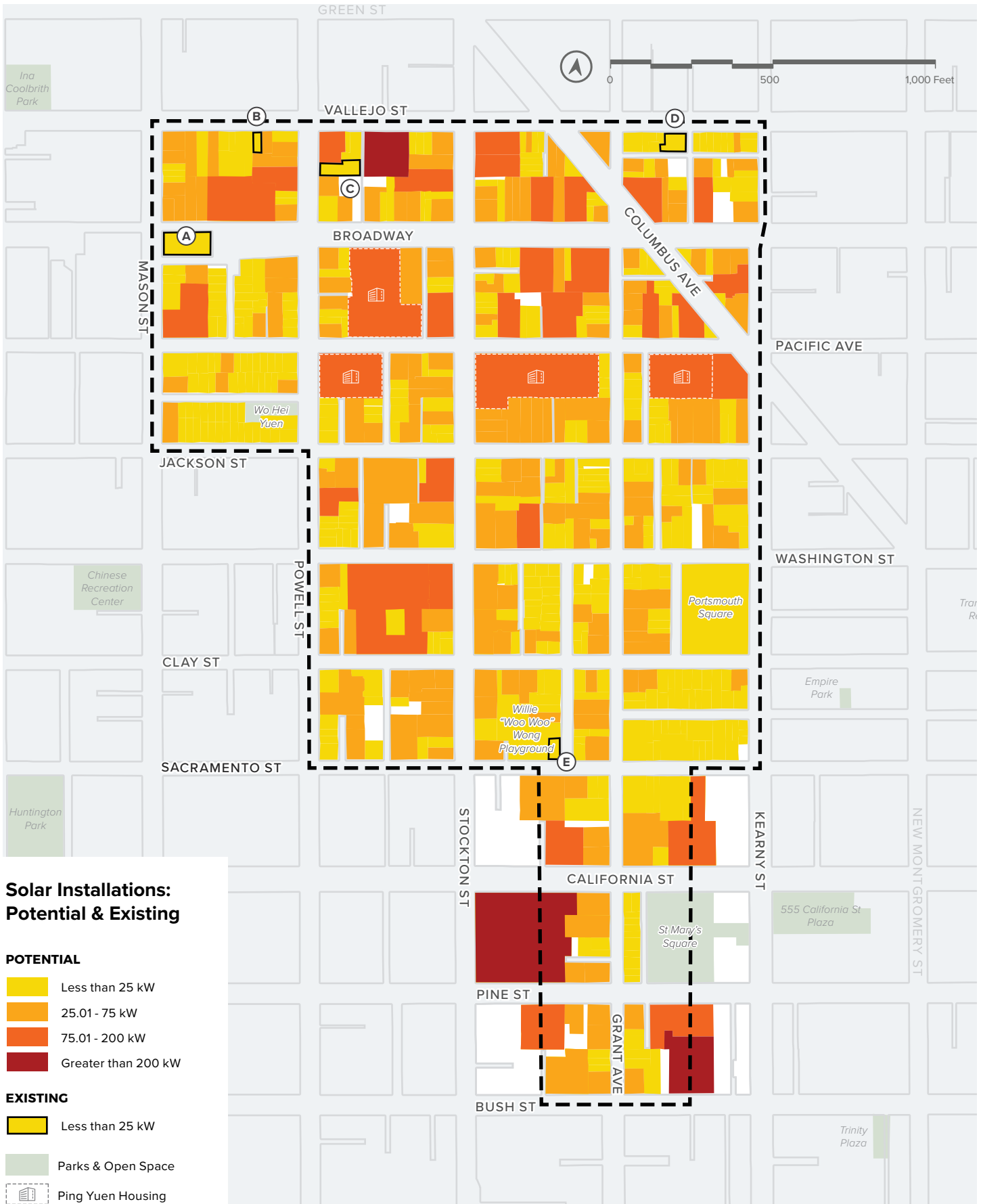
LOW COST  **\$59.5M**

HIGH COST  **\$109.8M**

Source: 2008 Solar Potential Dataset; Planning Department Orthophoto Survey

### Potential Solar Increase





## Identifying Energy Efficiency Potential in the Building Stock

In order to identify energy conservation opportunities in Chinatown buildings, we examined building-level energy efficiency audits provided by San Francisco Energy Watch (SFEW) performed through the BayREN program and the Existing Commercial Buildings Energy Performance Ordinance (ECBPO) on 23 residential and 253 nonresidential buildings. The full results of the analysis are detailed in Appendix B (Analysis of SFEW Data). This analysis provided high-level estimates of what energy conservation measures (ECMs) would be the most common, cost-effective and impactful for Chinatown. The typical menu of ECMs recommended and implemented in these programs is listed in the table below.

Generally, the data confirmed our expectations that there is significant potential for energy savings in smaller, older multifamily and commercial buildings that bear the greatest similarity to conditions in Chinatown. On average, the residential buildings saved 22-23 percent in energy costs, or roughly \$170/unit/year based on average costs for California multifamily buildings.<sup>8</sup> The most effective improvements were in the categories of domestic hot water, HVAC and refrigeration, and lighting.

For commercial buildings, data on energy use before and after the proposed energy efficiency improvements was unavailable; however, the program calculated predicted savings averaging from \$8,400 to \$10,800 per building, for properties most similar to Chinatown buildings.

This list represents some of the most common and cost-effective energy efficiency measures, and does not represent the full universe of investments that would benefit these buildings. Due to the particulars of existing programs, measures with a shorter payback period, financial incentives, or programs to offset installation costs were more likely to be recommended. The City should continue to explore strategies to expand the menu of ECMs available to buildings, particularly the more ambitious measures that could have major energy savings, but at a greater upfront cost.

## Typical Energy Conservation Measures from San Francisco Energy Efficiency Audits

### RESIDENTIAL\*

#### Domestic Hot Water

- On-demand recirculating pump control
- Pipe insulation
- Showerhead replacement
- High efficiency water booster pump motor

#### Building Envelope

- Attic Insulation

#### Lighting

- LED lighting

#### Space Heating

- High efficiency boiler replacement
- Pipe Insulation
- Thermostatic Radiator Valves (TRVs)

### NON-RESIDENTIAL

- HVAC Commissioning/Retrocommissioning
- HVAC and Refrigeration
- Solar installations (PV or hot water)
- Plugs load & processing adjustment
- Lighting
- Training in building systems
- Building envelope
- Motors
- Cleaning & repair
- Domestic hot water

\* Residential programs only recommended energy conservation measures that increase efficiency, while the nonresidential programs also included renewable energy generation (solar photovoltaic and hot water) as potential measures.

8 Assuming the energy cost for an average multifamily unit in California is \$738/unit/year (source: Survey of 471 multifamily households in CA from 2009 EIA Residential Energy Consumption Survey (Public Use Microdata File): <http://www.eia.gov/consumption/residential/data/2009/>)

# Opportunities and Next Steps

In summary, although Chinatown's energy use is considerably lower than other City neighborhoods, there remain significant opportunities for improvement:

- Historically, few buildings in the neighborhood have benefitted from City energy efficiency programs. Given their old age and low rate of maintenance, there is significant potential for energy savings. Smaller multifamily buildings that participated in City programs experienced an average 22-23 percent energy savings (which translates to an average savings of \$170/unit/year).
- The area has a very low rate of renewable energy installations (less than 1 percent of total energy use), and there is potential for large increases in capacity, particularly through solar photovoltaic and hot water systems.

As described in Part I, Strategy 2, CCDC has conducted a focus group with several owners of residential buildings in the area to better understand barriers to participation in City energy efficiency programs. Next steps include targeted audits to better understand building upgrade opportunities specific to Chinatown, and evaluating the opportunities for adapting City programs to this area.



Photo by David Leong, SF Planning.

## PART II

## SECTION C

# Water

In the midst of California's unprecedented five-year drought, every community in the state was asked to reduce its water use. In May 2015, the California State Water Resources Control Board introduced its first-ever mandatory water restrictions, requiring a 25 percent cutback in potable water use statewide. Although these emergency restrictions were lifted in early 2017, these types of drastic measures will become more common as droughts increase due to climate change. Living in California will require us to dramatically rethink the way that we capture, use, conserve, recycle, and dispose of water.

San Francisco's water use is among the lowest in California: residential users consumed 41 gallons per capita per day (R-GPCD) in fiscal year 2015-2016, compared to the statewide average of 82 R-GPCD over this same period.<sup>1</sup> A variety of factors contribute to the City's low water use—our dense neighborhoods, small or non-existent yards, culture of environmental awareness, and supportive policies and educational campaigns that encourage water recycling and conservation. However, there is the potential to unlock even more significant water savings. For instance, by some estimates over half of the water used in our homes is for landscape irrigation and toilet flushing. Graywater and rainwater can be safely recycled for these activities, greatly reducing demands on our drinking water supply. In addition, the SFPUC estimates that 40 percent of water fixtures are leaky or inefficient. A residential building could achieve an average 15 percent water savings through new toilets, aerators, showerheads, and leak detection and repair.

<sup>1</sup> California Environmental Protection Agency: State Water Resources Control Board. *Water Conservation Portal – Conservation Reporting*. Available at: [http://www.waterboards.ca.gov/water\\_issues/programs/conservation\\_portal/conservation\\_reporting.shtml](http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/conservation_reporting.shtml)

## KEY FINDINGS: WATER



Photo by Flickr user Steven Depolo

### 1 High Water Use

Per capita water use in Chinatown is higher than the Citywide average (19 percent higher for residential uses), which may be a result of inefficient fixtures and/or plumbing leaks, increased use of water for cooking and laundry, and the need for more targeted and culturally-appropriate education on water conservation.



Photo courtesy of SFPUC

### 2 Changing Behaviors

Encouragingly, the data also reveals that water use is declining for both Chinatown and the City as a whole, even as the City's population is increasing, which is likely the result of water use restrictions and the City's concerted campaign to encourage residents and businesses to reduce water use.



Photo courtesy of SFPUC

### 3 Need for Water Reduction Programs

As demonstrated by the success of the water reduction programs in CCDC's portfolio of buildings, water efficiency programs to install low-flow fixtures combined with culturally-appropriate education and outreach could have a major impact on reducing water use. Across their portfolio of buildings, water use declined by 18 percent as a result of these programs. One property reduced use by 32 percent.



Photo courtesy of SFPUC

Stormwater treatment and retention is another critical issue facing the City, precipitated by aging sewer infrastructure as well as increased extreme weather events predicted under climate change. Anecdotally, urban flooding is also an issue in Chinatown due to the lack of permeable surfaces and the sub-basements common to buildings in the area. Rain gardens, permeable paving, and other green infrastructure can help beautify the neighborhood, mitigate impacts on the sewer system, and make Chinatown more resilient to flooding and urban heat island impacts.

Outreach and implementation is challenging in communities like Chinatown where residents and building owners have fewer resources and may be less aware of City- and state-level policy trends. The majority of residents in Chinatown live in multi-unit buildings that are master-metered (similar to energy metering), providing little incentive to residents to conserve water. However, previous successful campaigns to educate residents on water conservation and other sustainability issues provide a positive example of how to generate greater awareness in the community.

## Key Findings

Per capita water use is somewhat higher in Chinatown compared to the citywide average. In fiscal year 2015, residential per capita use was 19 percent higher in Chinatown (56 gallons per day vs. 47 gallons per day citywide). Gross per capita water use, which includes both residential and nonresidential uses, was 4 percent higher in this same period (86 gallons per day in Chinatown vs. 83 gallons per day citywide). This contrasts with the energy consumption data, which shows that Chinatown residents and businesses consume less energy than the City average.

There are a number of potential explanations for why Chinatown residents and businesses consume more water. Many buildings may have unrepaired leaks or outdated fixtures and appliances, and residents may be more likely to consume more water for laundry and cooking in their buildings. In addition, our analysis method required that we use a single population figure (from the 2010 Decennial Census) for the six-year timeframe. The Chinatown population has likely grown during this period as greater numbers of families move into the neighborhood, so this approach may overestimate the amount of water consumed in later years.

There is also greater potential for misclassification bias in older, mixed-use areas such as Chinatown, where water service accounts may not accurately classify buildings as residential or commercial. (This issue is discussed further in the data and methodology write-up in Appendix A.) This misclassification may explain why some of the blocks on the water maps show water usage rates that seem far too high or too low to be believable. This same error likely applies to citywide estimates of water usage, which is why it is important to consider both residential use as well as gross (which includes residential and nonresidential) water usage when trying to get a clearer understanding of a neighborhood's water use. By either metric, Chinatown still has higher per capita water usage.



## Chinatown Residential Per Capita Water Use

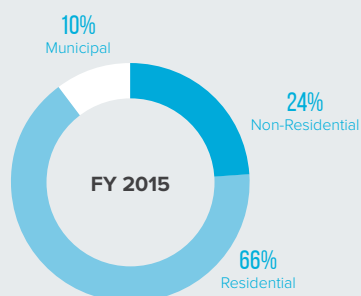


Fiscal Year	2009	2010	2011	2012	2013	2014	2015
<b>Chinatown Water Use (million gallons)</b>							
Residential	277	274	271	275	269	256	249
<b>Gallons per person per day*</b>							
■ Chinatown	63	62	62	62	61	58	56
■ Citywide	51	51	50	48	47	47	47

## Chinatown Gross Per Capita Water Use

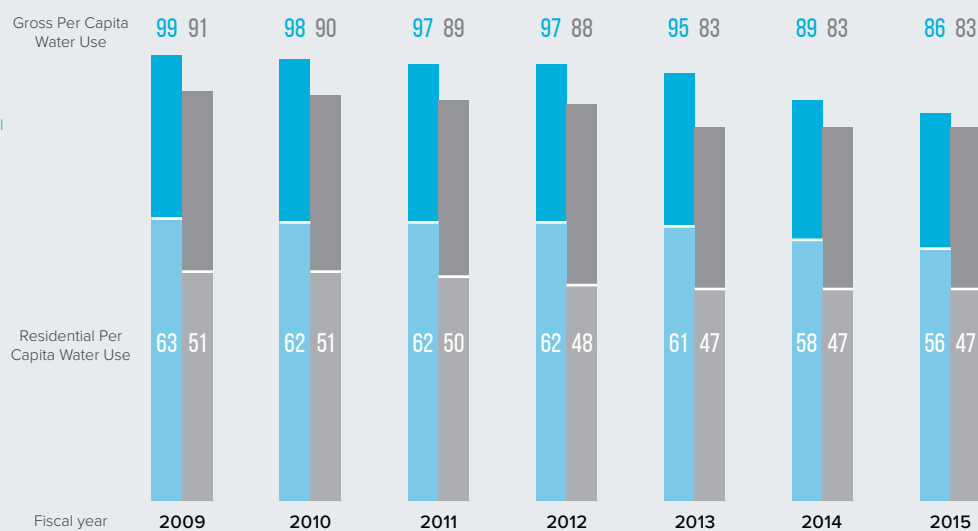


Fiscal Year	2009	2010	2011	2012	2013	2014	2015
<b>Chinatown Water Use (million gallons)</b>							
Non-Residential	117	115	112	106	102	95	91
Residential	277	273	271	275	269	256	249
Municipal	43	43	43	48	48	41	38
TOTAL: Gross water use (million gal.)	437	432	426	429	419	391	377
<b>Gross Per Capita Water Use (Gallons per person per day)*</b>							
■ Chinatown	99	98	97	97	95	89	86
■ Citywide	91	90	89	88	83	83	83

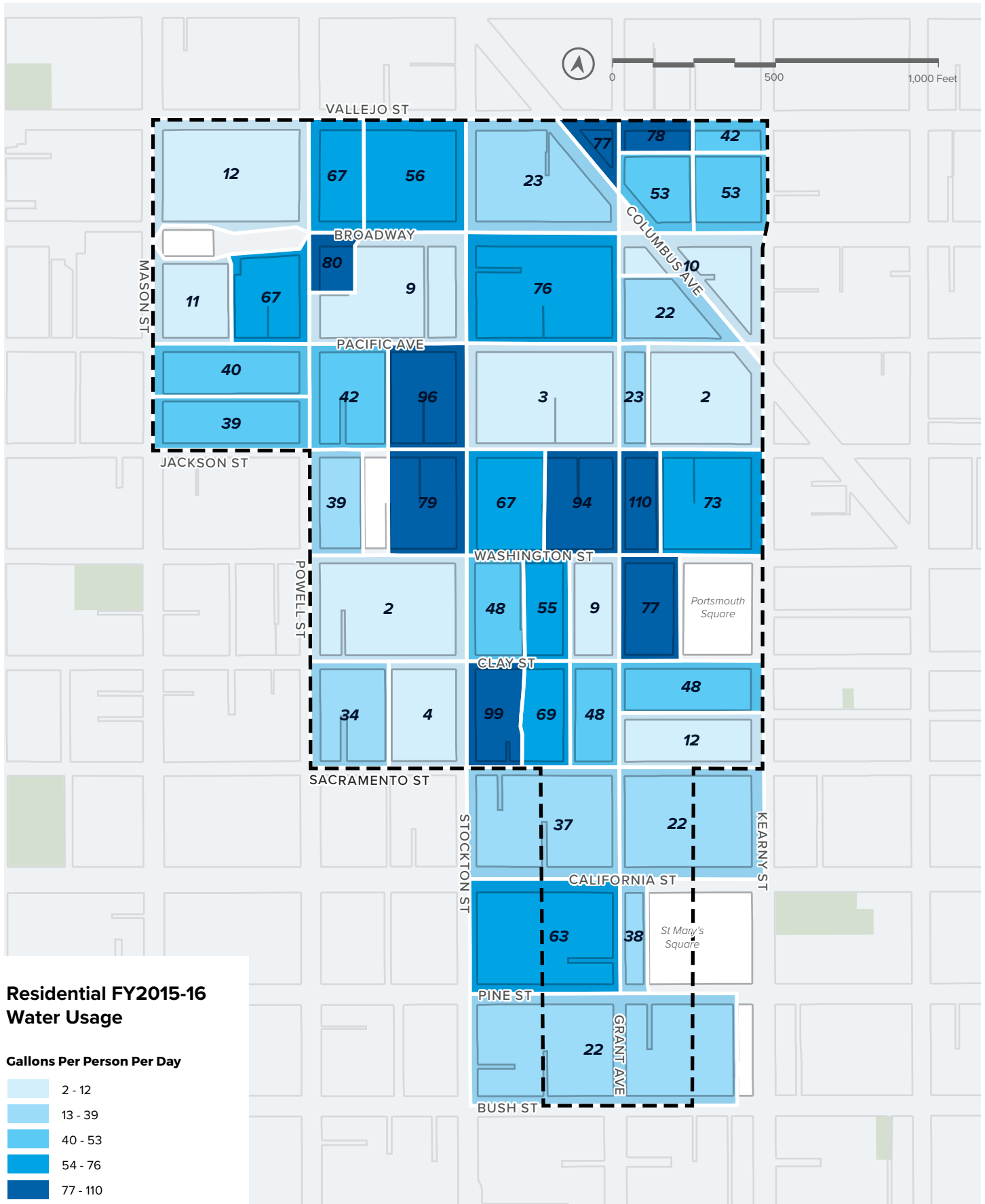


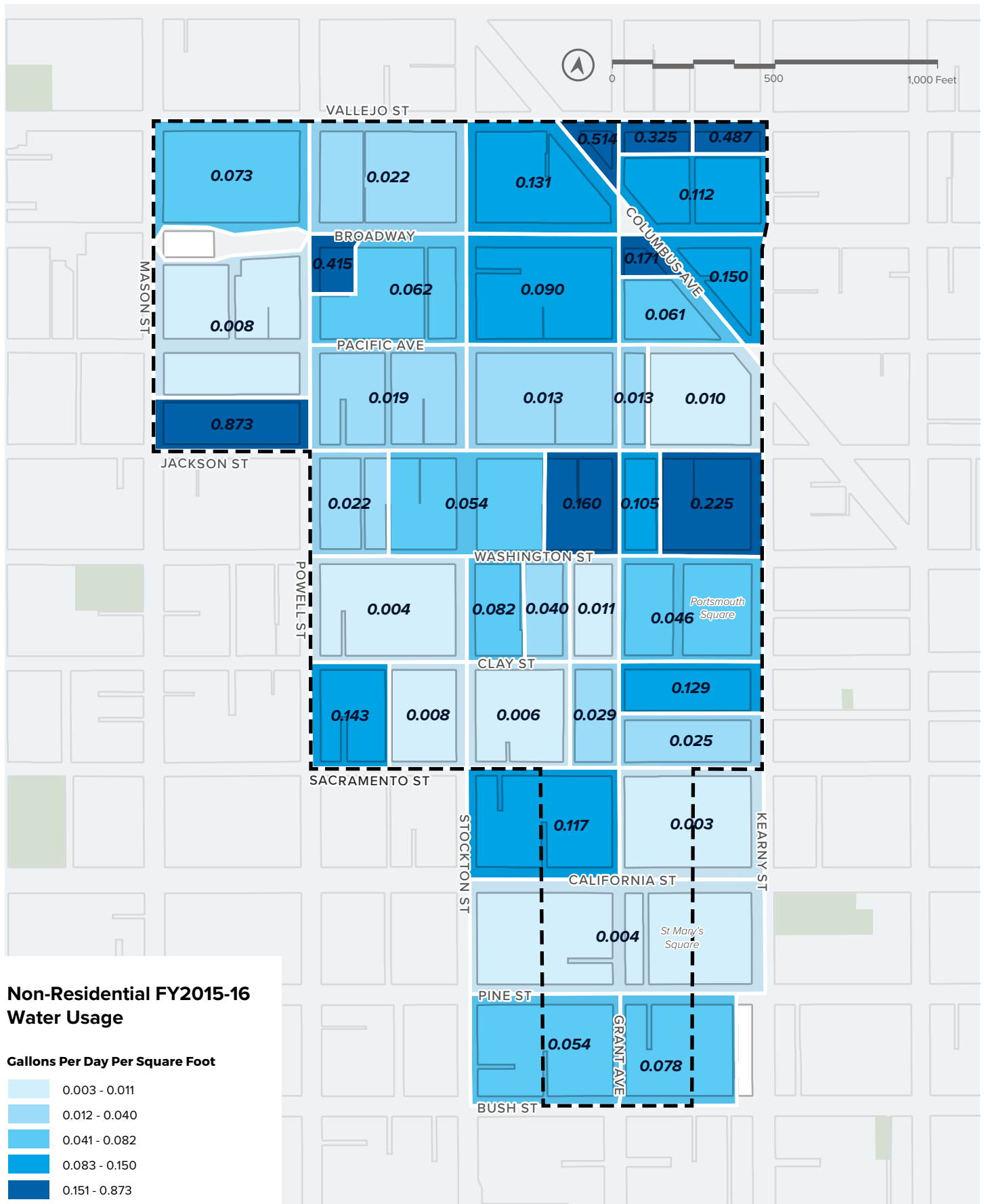
# 377M

Total gallons of water used in Chinatown in 2015



\* All per capita values for Chinatown are calculated assuming population levels from 2010 Decennial Census (the latest census for which complete population data was available for the census blockgroup and block geographies).





## Findings from CCDC Properties

We also evaluated water consumption data from CCDC's portfolio of properties, many of which have participated in a SFPUC program started in 2011 that provides financial incentives to nonprofit affordable housing developers to upgrade their buildings with water-efficient fixtures. This data confirmed that Chinatown water consumption is higher than the City average, but showed striking improvements after the water conservation measures were installed, resulting in an 11 percent drop in water use in their six Chinatown properties and an 18 percent reduction across their entire portfolio. A few buildings have also had educational campaigns and water saving competitions, resulting in even greater water use reductions. One such building, St. Claire Apartments, saw its water use drop by 32 percent from 2011-2015.

### Water Use in CCDC Portfolio (Buildings in Chinatown only), 2010-2015<sup>2</sup>

Year	2011	2012	2013	2014	2015
<b>Residential water use (gallons/person/day)</b>	71	71	68	64	63
% change since 2011	n/a	1%	-4%	-9%	-11%

### Water Use Reduction in CCDC Portfolio as a Result of Water Efficiency Programs (All buildings), 2010-2015

Property	Water Use: % change from 2011 to 2015
St. Claire Apartments	-32%
Notre Dame Apartments	-29%
9th Avenue Terrace	-28%
Tenderloin Family Housing	-27%
Bayside Elderly Housing	-26%
Tower Hotel	-25%
Larkin Pine Senior Housing	-25%
The Consorcia	-23%
William Penn Hotel	-17%
1370 CA Street Apartments	-16%
Namiki Apartments	-14%
665 Clay Street	-14%
International Hotel Senior Housing	-11%
Broadway Family Apartments	-10%
Clayton Hotel	-9%
1150 Grant Avenue	-7%
Swiss American Hotel	-7%
<b>TOTAL</b>	<b>-18%</b>

<sup>2</sup> Data is from 18 properties that underwent incremental water efficiency upgrades starting in 2011 onwards through the San Francisco Public Utilities Commission's program for nonprofit-owned multifamily properties.



Photo by Flickr user Vincent Desjardins.



Photo by Flickr user David Alonso Rincon.

## SFPUC Water Conservation Programs

The water use savings at CCDC properties mirrors improvements in reducing water use Citywide. Even as the city population grew from 2005-2015, total water use declined slightly, reflecting a significant drop in per capita water use. Some of this drop is attributable to the efforts of the SFPUC Water Conservation Program, which oversees a number of efforts to help residents and businesses minimize water usage and waste, through customized WaterWise Evaluations, water efficiency rebates and incentives, and education and outreach.

From its establishment in 2004 through 2015, the program has resulted in estimated water savings of 9.6 million gallons per day (mgd), through both conservation programs (2.7 mgd) and stricter adherence to plumbing codes (6.9 mgd). This represents a roughly 13 percent savings across the city, exceeding both City and state targets.<sup>3</sup>

The table below presents the menu of water conservation measures offered through the Water Conservation Program. Though installation costs and water savings vary, some of the most effective measures are free or low-cost. Simply installing aerators on faucets can reduce total water usage by roughly 4 percent, while low-flow showerheads can reduce water from showering by 40 percent. As the City's population continues to grow and our water resources become less secure due to climate change, we will need to continue building on these successful efforts and create innovative strategies to reduce water use even further.

## SFPUC Water Conservation Program Measures<sup>4</sup>

<i>Land Use</i>	<i>Measures</i>
<b>Single-family Residential</b>	<ul style="list-style-type: none"> <li>• Mandatory Audits for Rate Discount Recipients</li> <li>• WaterWise Evaluations</li> <li>• High-Efficiency Toilet Direct Install and Rebates</li> <li>• High-Efficiency Clothes Washers Rebates</li> <li>• Laundry-to-Landscape Kits</li> <li>• Graywater Permit Rebates</li> <li>• Showerhead Distribution &amp; Direct Install</li> <li>• Rain Barrels &amp; Cisterns Incentives</li> <li>• Continuous Usage Alerts</li> <li>• Site Water Usage Reports through My Account</li> <li>• Education, Training, and Informational Materials</li> </ul>
<b>Multi-family Residential</b>	<ul style="list-style-type: none"> <li>• WaterWise Evaluations</li> <li>• High-Efficiency Toilet Direct Install and Rebates</li> <li>• High-Efficiency Clothes Washers Rebates</li> <li>• Showerhead Distribution &amp; Direct Install</li> <li>• Rain Barrels &amp; Cisterns Incentives</li> <li>• Site Water Usage Reports through My Account</li> <li>• Education, Training, and Informational Materials</li> </ul>
<b>Non-Residential</b>	<ul style="list-style-type: none"> <li>• WaterWise Evaluations</li> <li>• Direct Install Audits</li> <li>• Surveys (Hospitals, Hotels, Schools) and Commercial/Industrial/Institutional Audits</li> <li>• Landscape Surveys</li> <li>• High-Efficiency Toilet/Urinal Direct Install and Rebates</li> <li>• Coin-Op High-Efficiency Clothes Washers Rebates</li> <li>• Landscape Grants</li> <li>• Rain Barrels &amp; Cisterns</li> <li>• Equipment Retrofit Rebates</li> <li>• Site Water Usage Reports through My Account</li> <li>• Education, Training, and Informational Materials</li> </ul>

<sup>3</sup> Source: page 18 of San Francisco Public Utilities Commission's *2015 Retail Water Conservation Plan*. Available at: <http://sfwater.org/modules/showdocument.aspx?documentid=8760>

<sup>4</sup> Source: page 18 of San Francisco Public Utilities Commission's *2015 Retail Water Conservation Plan*. Available at: <http://sfwater.org/modules/showdocument.aspx?documentid=8760>



## Opportunities and Next Steps

Encouragingly, the data ultimately reveals that water use is declining for both Chinatown and the City as a whole even as the City's population is increasing, which is likely the product of the City's concerted campaign to encourage citizens to reduce water use during the recent historic drought. As illustrated by the success of the water reduction programs in CCDC's portfolio of buildings, water efficiency programs to install low-flow fixtures combined with culturally-appropriate education and outreach could have a major impact on reducing water use even further. As a next step, water use audits would be required to gain a fuller understanding of how water is used in Chinatown and to identify opportunities for conservation across the neighborhood. The upcoming work with the SFPUC (described in Part I, Strategy 3) will provide an opportunity to do this focused analysis and develop meaningful water reduction strategies.

## PART II

## SECTION E

# Waste

San Francisco has a long history of solid waste management, recycling since its days as a primary Gold Rush destination and the formation of the Scavengers Protective Union in 1879. Over a century later, the City achieved a diversion rate of 80 percent of solid waste diverted from landfills in 2010, and it is striving to achieve a goal of zero waste to landfills by 2020.

Meeting the City's ambitious Zero Waste target has involved many individual actions over decades, both by the City government and by individual residents and businesses. These collaborative actions have worked to divert materials from the waste stream after they are used (known as "downstream"). Today, increasing attention is also being placed "upstream" to reduce the amount of wasteful consumption that occurs at and before the point of purchase through education and programs directed at the residential, government, business, and industrial sectors.



**KEY FINDINGS: WASTE**

1

**Limited Data**

Due to current methods of data collection at Recology we were unable to acquire neighborhood-level data on waste generation and diversion rates. However, City agencies will continue to work with Recology to explore opportunities for improving data collection and reporting.

2



Still from the 2014 film Racing to Zero. <http://trash24.org/>

**Lower Diversion Rates and More Landfilled Waste**

Data from the northeast portion of the City indicates lower waste diversion rates than the City as a whole – 51 percent of waste in the area is diverted from landfills, compared to 60-65 percent for residential areas Citywide.

3



Photo by Flickr user lyhon Chiu

**Significant Waste Challenges**

Lower diversion rates in Chinatown may be a result of the overall difficulty of servicing this complex neighborhood. Anecdotal accounts from Recology staff confirm that the area's high density, narrow streets, large number of multifamily properties, and linguistic barriers make waste collection difficult.

4



Still from the 2014 film Racing to Zero. <http://trash24.org/>

**Culturally-Appropriate Reduction Strategies**

Appropriate outreach on waste reduction strategies is a great need, and SFE and Recology are working with community partners in Chinatown to develop targeted outreach strategies and programming.



Photo courtesy of SF Environment.

San Francisco, working in close partnership with Recology (the City's sole waste management provider), was one of the first municipalities in the country to create a residential three-stream waste collection program (compostables, recyclables, and trash), unveiling a pilot program in 1999, and expanding the green cart composting service citywide to all 150,000 single-family households in 2004. At that time about 2,000 apartment buildings also voluntarily included the green cart in their building's service.

Since that time, SFE's Residential Zero Waste team has worked on a number of strategies to expand composting and recycling rates in apartments, for instance through rate incentives and kitchen compost pail giveaways. By 2009, the number of buildings participating in the program had doubled to over 4,000 buildings – a vast improvement, but still less than half of the City's approximately 8,700 apartment buildings. To ensure that all residents would have access to

composting services, the City passed the Mandatory Composting and Recycling Ordinance in 2009, which required all apartment buildings to provide recycling and composting service, post appropriate signage, and educate all tenants at least once a year.

As a result of this mandate and the tools developed in prior years, SFE and Recology have now brought composting services to virtually all remaining multifamily buildings. Now that service is in place, the focus has shifted to participation – getting everyone to use the service consistently and correctly. SFE's Zero Waste team conducts outreach to property management companies and individual buildings, conducting waste assessments to look for opportunities to reduce garbage and increase recycling and composting.



Photo by Flickr user Jim Killock

## Key Findings

Although the City has achieved an 80 percent waste diversion rate overall, this figure is heavily influenced by large commercial and industrial operators (who have considerable control over their waste and resource stream) and by the construction and demolition trades, where enormous amounts of materials are recovered in the course of projects. For the area served by Recology Golden Gate (which includes Chinatown, the Financial District, SoMa, and other neighborhoods along the northeast waterfront), the 2012 waste diversion rate was approximately 51 percent, which is slightly below the Citywide average diversion rate of 60-65 percent for residential neighborhoods. However, there is likely considerable variation across this area, and Chinatown is expected to be among the lower performing neighborhoods, based on anecdotal accounts and the challenges described here.

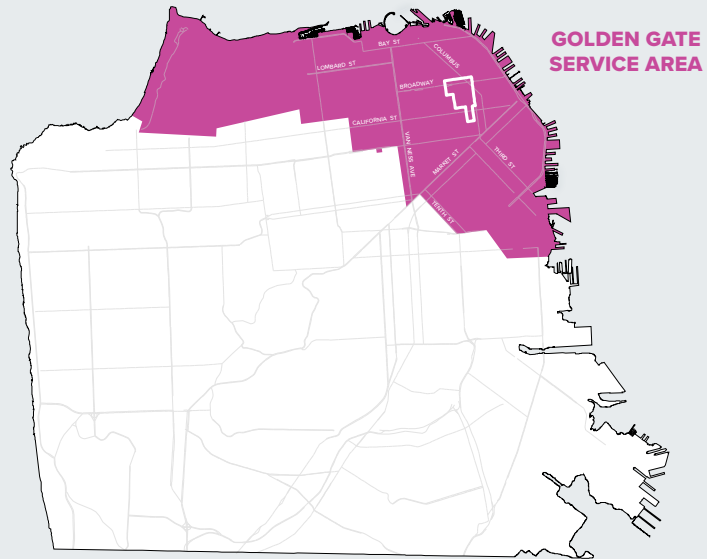
The physical characteristics of Chinatown make it extremely challenging for residents, business and Recology to meet Citywide zero waste goals. The area is difficult to service due to its density of residents and businesses, its small and intricate street grid, and the intensity of activities at all hours. Keeping up with service demands is a test for Recology and the City departments who serve Chinatown. There are numerous residential buildings without room for waste bins, requiring Recology's waste collectors to ascend 2-3 flights of stairs or descend into basements to collect trash in burlap sacks instead of garbage carts. Many restaurants and produce stores also lack space for green bins, so food scraps are packaged into reused cardboard boxes and stacked on the sidewalk, where they are pitched directly into the backs of Recology organics collection trucks.

**Northeast San Francisco Waste Generation & Diversion, 2012**  
 (Recology Golden Gate Service Area)



**212,003**

tons of waste generated in service area (2012)



**32,221**  
tons of Landfill Waste



**100%**  
to landfill

**57,143**  
tons of Organics



**100%**  
composted

**55,674**  
tons of Recyclables



**85%** recycled  
**15%** landfill

**3,847**  
tons of Other Waste

**100%**  
diverted

**51%**

tons of waste were diverted from landfill

	Received (tons)	Diverted (tons)	Disposed (tons)	% Diverted
To Landfill	95,339	0	95,339	0%
Organics	57,143	56,960	183	100%
Recyclables	55,674	47,181	8,493	85%
Other	3,847	3,835	12	100%
<b>TOTALS</b>	<b>212,003</b>	<b>107,976</b>	<b>104,027</b>	<b>51%</b>

Source: Recology

# Opportunities and Next Steps

While many Chinatown business, residents and community leaders have expressed a growing interest in protecting the environment, participation in the City's recycling, composting and waste reduction programs has historically been much lower compared to other San Francisco neighborhoods.

Recognizing the need for culturally-relevant outreach and education programs, SFE and Recology recently partnered with community groups in Chinatown to convene a series of working meetings. Together, they are creating a Community Council of local stakeholders to gain a deeper understanding of barriers and challenges, create and/or adjust existing programs, and increase overall engagement around the issue of zero waste in Chinatown.

The extensive renovation of the Ping Yuen apartments present a key opportunity to improve waste management at the buildings, and the City is in the process of developing service adjustments and outreach and incentive programs to help reduce waste. The City will pursue additional partnerships with community organizations and residents to create new campaigns and targets focused on multifamily buildings, businesses, and restaurants.

PART II

SECTION E

# Urban Ecology and Open Space

Today, Chinatown is one of the most densely populated neighborhoods in the nation, second only to Manhattan, New York. Where sand dunes and coastal vegetation were once predominant, buildings, busy streets, crowded sidewalks, and small but well-used parks and open spaces create a vibrant urban neighborhood. Although the area's historic ecology has largely vanished, there are ample opportunities to create a greener and more livable Chinatown. Improvements that infuse buildings, streets, parks, and open spaces with more trees and greenery could provide a range of social and ecological benefits, such as improved mental and physical health, beautification, wildlife habitat, stormwater management, carbon sequestration, and protection against urban heat island impacts.

## KEY FINDINGS: URBAN ECOLOGY AND OPEN SPACE



### Limited Greenery and Poor Ecosystem Functioning

Trees and greenery are much less visible in Chinatown than in other parts of the city. Chinatown's tree canopy is one of the smallest in the city (5 percent compared to approximately 14 percent citywide) and the amount of parks and open space falls far below citywide levels (11 square feet of park space per person compared to 299 sf per person citywide). Instead, Chinatown's environment is largely dominated by impervious surfaces (88 percent of the total area) such as roadways, pavement and buildings. The neighborhood provides very little ecological value—stormwater management, carbon storage, habitat creation and urban heat island mitigation.



### Well-Used Open Space

Chinatown has very active and well used open spaces which play a vital community role, as many residents live in small Single Room Occupancy (SRO) rooms and rely on public spaces on streets and in parks for socializing and relaxing.



### Planned Open Space Opportunities

Planned upgrades to Chinatown's parks (Portsmouth Square, Willie Woo Woo Wong Playground and St. Mary's Square) offer a rare opportunity to improve the quality of existing open spaces. Sustainable Chinatown should explore how to leverage these projects and pursue other innovative strategies, such as the Groundplay program, to increase the amount of open spaces, improve permeability, and introduce trees and vegetation into the crowded street environment.



Photo from Wikimedia Commons, Public Domain.

Portsmouth Square near harbor in 1851 — San Francisco during the Gold Rush.



Photo by David Leong, SF Planning

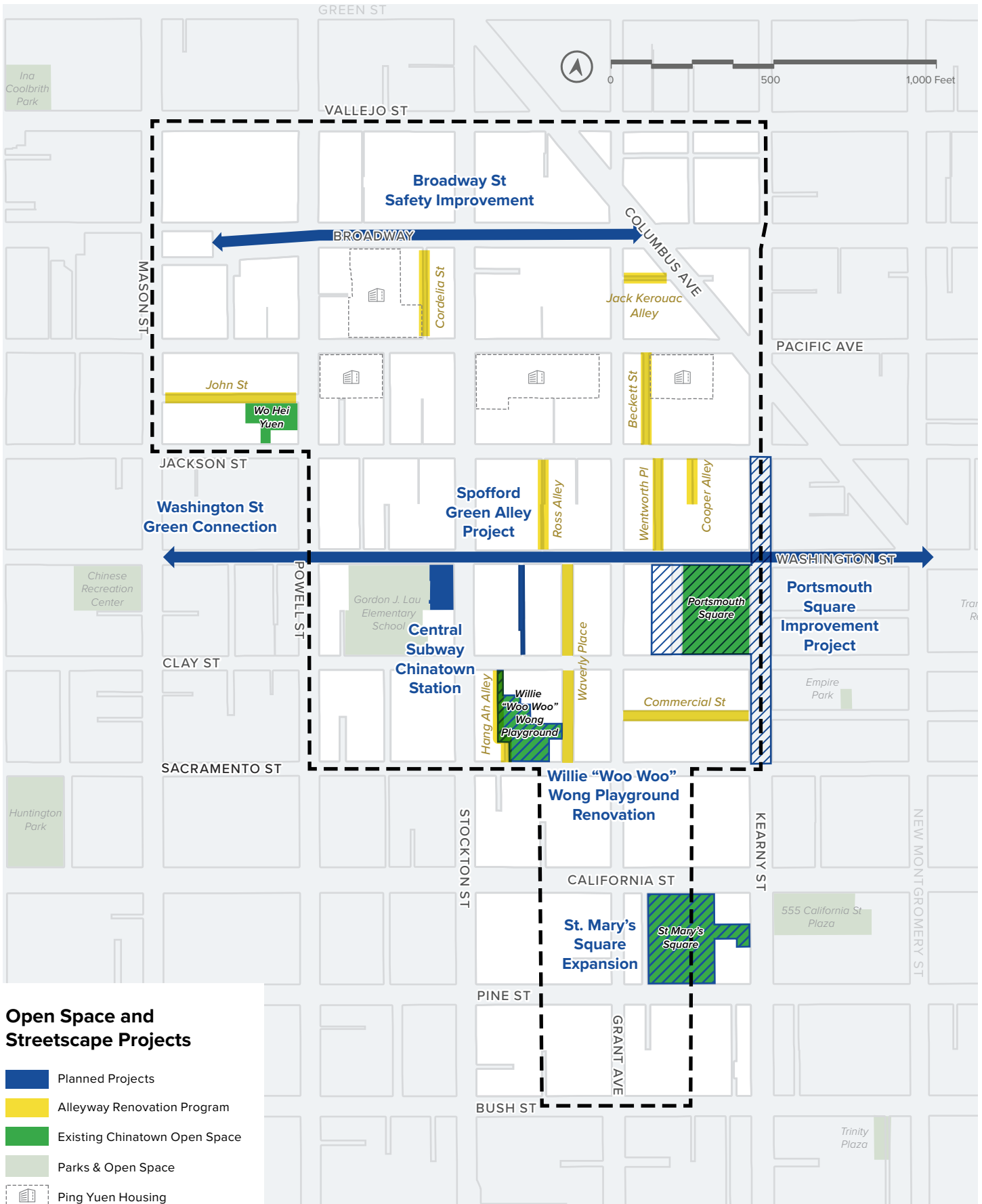
The recreational and therapeutic benefits of parks and nature in urban areas have been well documented. Recognition is now growing of the role cities can play in enhancing the ecological function of urbanized areas. Chinatown has the City's lowest rates of parks and open spaces per capita, and the City should continue to pursue all available opportunities to add open spaces in this area, including more creative strategies such as developing public improvements on underutilized space on streets, alleys, and sidewalks.

However, the quality and appropriateness of existing open spaces is just as critical, given the limited availability of space for new parks in the area. Although many parks are heavily used — particularly Portsmouth Square, colloquially known as Chinatown's "living room" due to its role as a place of social gathering — many parks have outdated amenities, and upcoming planned upgrades and improvements can ensure that they better serve the diverse needs of diverse neighborhood residents.



Photo by SF Planning





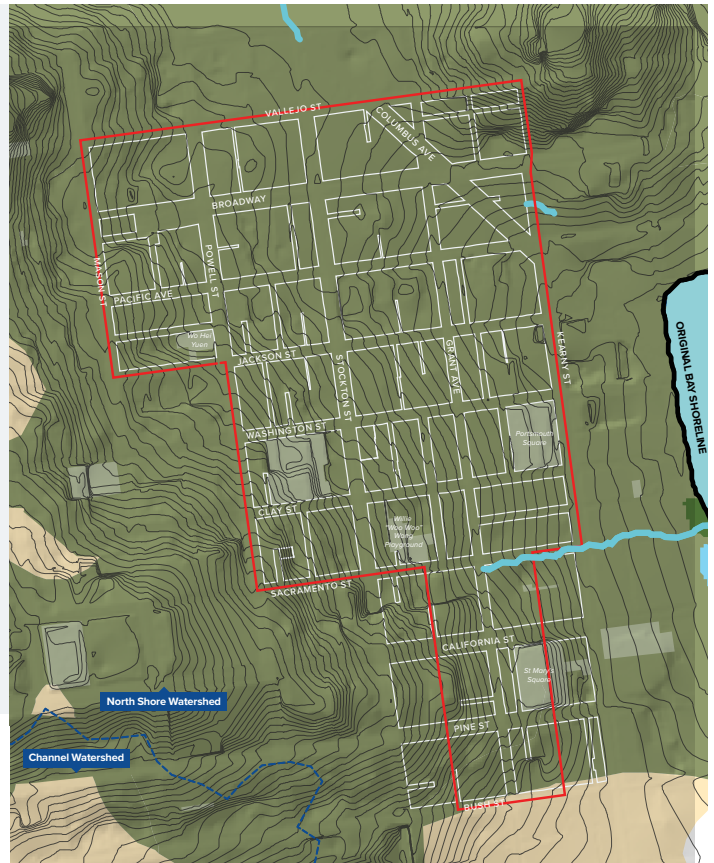
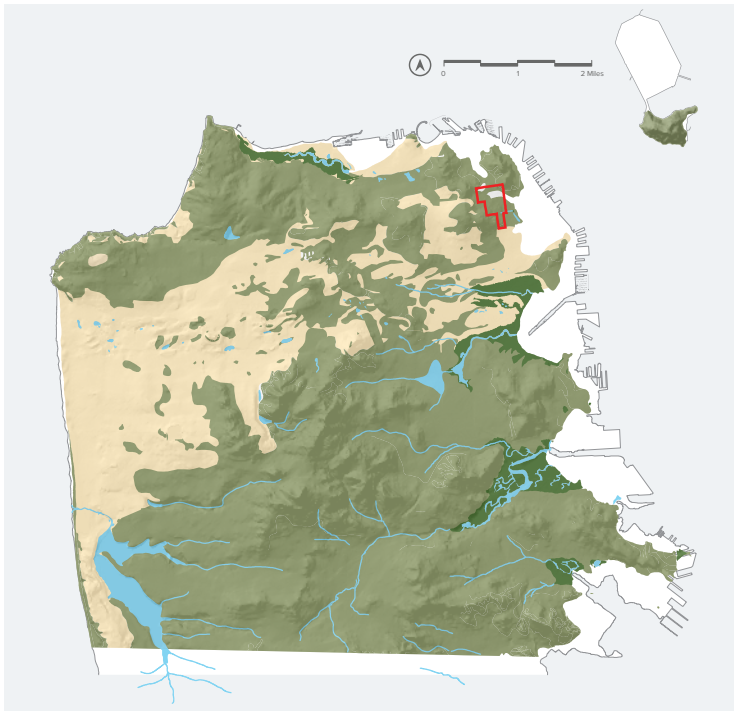
### Key Findings

Prior to arrival of Europeans in the 18th century and its eventual urbanization, San Francisco was covered by a rich landscape of sand dunes, grasslands, wetlands, riparian and coastal scrub vegetation. This diverse ecology supported abundant wildlife and small Native American (Ohlone) tribal communities. The neighborhood’s steep streets and hills were likely once windswept sand dunes covered in coastal scrub abutting San Francisco Bay. Portsmouth Square, Chinatown’s largest park, was established as a small plaza on the banks of an inlet opening to the Bay known as Yerba Buena Cove and quickly became the civic and commercial heart of the budding city. The cove, a popular spot for docking ships, was eventually filled to facilitate the rapid growth of downtown San Francisco, creating more distance between Chinatown and the new shoreline.

Today, the neighborhood’s environment is largely dominated by impervious surfaces – roadways, pavement and buildings. Over 87 percent of Chinatown is impervious, making it the second-most concrete and asphalt dominated neighborhood in San Francisco behind South of Market. As a result, trees and greenery are much less visible here than in other parts of the city. Chinatown’s tree canopy is one of the smallest in the city (5 percent compared to 12 percent in neighboring North Beach and approximately 14 percent citywide). The San Francisco Department of Public Health has identified this lack of greenery as a contributing factor in its ranking of the neighborhood as especially vulnerable to climate change, due to elevated health risks during extreme heat events.<sup>1</sup>

While Chinatown has very active and well used open spaces, the amount of parks and open space

1 San Francisco Heat Vulnerability Index (San Francisco Department of Public Health, 2012).



#### Historic San Francisco Surface Features \*

Estimate based on geology and shoreline.

- Sand and Dunes
- Grasses
- Wetlands
- Historic Lowland Rivers and Creeks
- Watersheds
- Present Day Shoreline



in Chinatown falls far below citywide levels. The neighborhood has only 11 square feet of park space per person compared to 299 sf per person citywide. Chinatown’s parks and open spaces provide a vital role, since many residents live in small Single Room Occupancy (SRO) rooms and rely on public spaces on streets and in parks for socializing and relaxing. Beyond public health and social equity concerns, these spaces also support a wide range and scale of cultural activities, varying from tai chi exercises to annual Lunar New Year festivals. Like the rest of the neighborhood, even the parks in Chinatown tend to be dominated by paved or impervious surfaces rather than greenery and trees. San Francisco’s largest and greenest open spaces—such as Golden Gate Park, the Presidio, and McLaren Park—are located relatively far away (a 30+ minute transit ride).

Photo by SF Planning

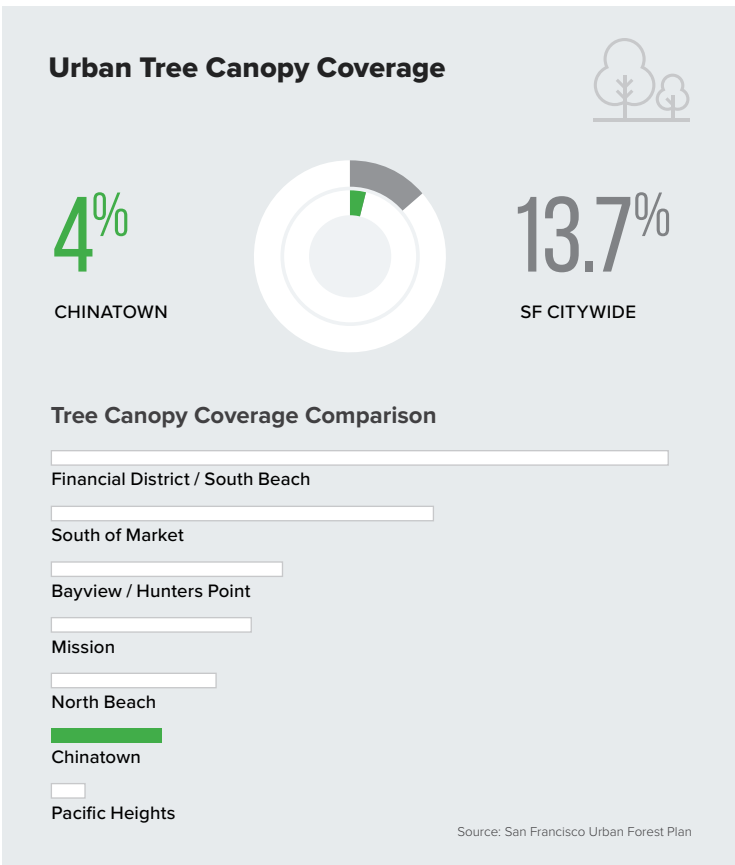


Photo by David Leong, SF Planning

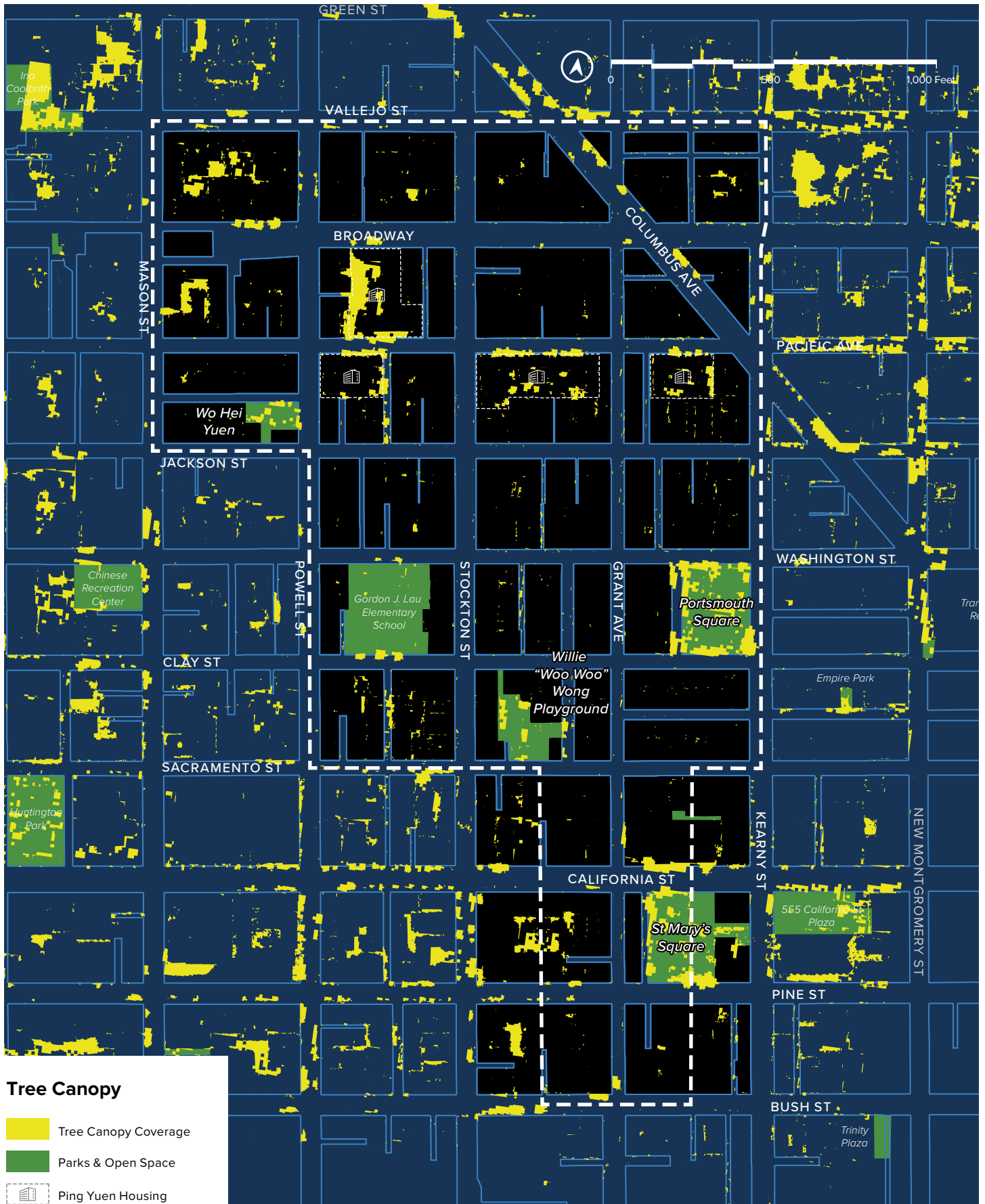




Photo by SF Planning

## Opportunities and Next Steps

Sustainable Chinatown should continue to explore ways to provide or improve the neighborhood's public realm and open spaces for residents while identifying creative and strategic ways to increase permeability and introduce vegetation strategically into the crowded street environment.

Several public projects either recently completed or currently underway will bring new or improved parks, open spaces and streetscapes to Chinatown. These include an open space on top of the new Chinatown Central Subway station, the extension of St. Mary's Square, park renovation projects at Willie Woo Woo Wong Playground and Portsmouth Square, and streetscape improvement projects on Broadway and on several of Chinatown's alleys. As part of San Francisco Planning's Green Connections project, preliminary concept designs for a safer, greener Washington Street were produced, laying the groundwork for a streetscape that improves activation while providing opportunities to support urban nature.

In the nearer term, the Planning Department and the Chinatown community are exploring temporary public realm improvements, including Groundplay temporary open space and activation projects, and reimagined communal open spaces at the Ping Yuen housing projects.

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STRATEGIES FOR A SUSTAINABLE URBAN TOWN

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盆景 香花  
花園 禮品



# Appendix

**APPENDIX A.** SUSTAINABLE CHINATOWN DASHBOARD: DATA & METHODOLOGY

**APPENDIX B.** ANALYSIS OF SAN FRANCISCO ENERGY WATCH PROGRAM DATA

**APPENDIX C.** SAN FRANCISCO ENERGY, WATER, AND ZERO WASTE PROGRAMS

## APPENDIX A

# Sustainable Chinatown Dashboard: Data & Methodology

The Sustainable Chinatown baseline assessment pioneered several new methods of data analysis to quantify environmental sustainability at a neighborhood scale. This appendix provides additional information on some of these data sources and methods, organized by chapter.

## ENERGY

Sustainable Chinatown developed a neighborhood-scale analysis of energy consumption aimed at the following goals.

- Create a profile of baseline energy usage in the Chinatown area from buildings and transportation
- Estimate the potential for meeting some of this energy demand through energy efficiency and renewable energy retrofits to existing buildings
- Estimate greenhouse gases (GHGs) generated under these scenarios and develop preliminary carbon reduction targets

The Steering Committee collaborated with public and private agencies such as Pacific Gas & Electric (PG&E), San Francisco Public Utilities Commission (SFPUC), the Department of Building Inspection (DBI), and San Francisco County Transportation Agency (SFCTA) to acquire relevant data at the sub-neighborhood scale. Notably, we worked closely with PG&E's Energy Data Request Program over a 15-month period to acquire

energy consumption data for 2013-2014 for the entire City of San Francisco at a census block group level, the smallest geographic unit at which data could be released under California's data privacy regulations.<sup>1</sup>

Previously, energy data could only be downloaded at a zip code level, which made it difficult to isolate energy usage in specific neighborhoods in densely populated, mixed-use areas such as Chinatown. In the longer term, the Planning Department and SFE plan to build on this work and explore how to make this type of neighborhood-level analysis possible in other areas of the City.

Some observations and lessons from this process include:

- In the context of a single neighborhood, having the ability to analyze energy use data at the block group level is informative, but not that useful for developing energy efficiency programs, as we would need additional building-level data or energy audits to understand why certain areas have higher or lower usage. However, this type of data would be more useful for comparing energy use across the City, where it can help us discover broader trends by neighborhood, building size/type, and other factors. City agencies are continuing to explore how to enable this type of analysis in the future.

<sup>1</sup> In California, energy data privacy is regulated by CPUC Decision D. 14-05-016, colloquially known as the "15/15 rule." This rule stipulates that data cannot be released for geographic units comprising fewer than 15 energy service accounts, with no single customer in that area consuming more than 15% of the total energy usage.



- Data coverage varied for residential versus nonresidential uses due to data privacy restrictions. For residential uses, data was available for the majority of the plan area except for one block group. For nonresidential uses, data was missing for over 1/3 of the plan area, indicating that the number of commercial accounts in those block groups did not meet the minimum threshold required for data privacy (15 commercial accounts).

Due to current regulations, we were required to make our data request at a specific geographic level without knowing what the implications were for data coverage. If we had instead requested data at a census tract level or for the entire plan area, data coverage likely would have been greater, though data granularity would be lost. Agencies are typically discouraged from making repeated data requests, thus we were unable to obtain additional data to improve this analysis.

We need publicly accessible, granular energy use data that can be used to track our progress in meeting sustainability targets, develop actionable policies and programs, and educate the public and empower them to take action. Data privacy regulations are important, but in their present form they make neighborhood- and project-level energy analysis very difficult. The City of San Francisco will continue to provide feedback and suggestions to state regulators and energy providers in order to improve the data request process moving forward.

## WATER

San Francisco residents and businesses are served by a single water utility, the San Francisco Public Utilities Commission (SFPUC). Like energy data, water data at a neighborhood or smaller geography was challenging to obtain. Publicly accessible water data is at either at a City or zip code level (with data missing for several of the neighborhoods where major new development is predicted).<sup>2</sup>

Sustainable Chinatown partnered with the SFPUC Water Resources Division on a pilot project to analyze water data at a city block level in Chinatown and in Central SoMa (to support the Eco-District proposed as part of the Central SoMa Area Plan). To maintain user privacy, each city block represented no fewer than five accounts, and any block that did not meet this threshold was manually aggregated with an adjacent block. This process was repeated for two categories of user types (residential and nonresidential). We also acquired building-level data for municipal properties, a third user type.

Classification of water accounts into residential and nonresidential categories was a key methodological issue we needed to resolve. SFPUC categorizes water accounts into 14 discrete Water Service Agreement (SA) Types. SA Types are typically assigned when an account is opened, though a major change to a property can reclassify to a new type (such as parcel being redeveloped from industrial to office). We wanted to evaluate the accuracy of the SA Type system in Chinatown, where the older, mixed use building stock increases the likelihood of misclassification. We conducted two parallel analyses, comparing water use under SFPUC's SA Types with the same data classified using categories from the Planning Department's Land Use Database, which categorizes all buildings in the City under 12 land use types.

We ultimately decided that the Planning Department land use method was more accurate for Chinatown. While neither the SA Type system nor the Land Use Database is 100 percent accurate, we believe the SA Type analysis yielded greater misclassification errors, as it resulted in residential water use figures so far below the City average that they seemed infeasible (e.g. 23 vs. 49 gallons per capita per day in FY 2013-14). One possible explanation for this discrepancy is that SA Types do not account for multiple uses in mixed-use properties. Thus, a mixed-use building with housing and retail—one of the most common building types in Chinatown—could be classified as residential or commercial, depending on the principal use when the

<sup>2</sup> San Francisco Department of Public Health. San Francisco Indicator Project – En.1.c. Water Use. Available at: <http://www.sfindicatorproject.org/indicators/view/3>

account was started. Land use types, in contrast, have two categories for mixed-use buildings (mixed-use buildings with and without residential units). We also compared the residential water use findings under the land use method with building-level water use data from CCDC's portfolio of buildings, and found that they were generally comparable.

Citywide figures of water usage shown in this report and in SFPUC's materials utilize the SA Type method. However, we expect this misclassification error to be smaller for most San Francisco neighborhoods, particularly the more homogenous areas of the City that have separate buildings for residential, industrial, and commercial uses.

Although further work is needed to refine this methodology, this innovative water analysis provided a much higher degree of geographic specificity than the zip code level data previously available to the public, and may provide a model for future analyses of neighborhood water usage to help inform conservation and outreach efforts.

## WASTE

Trash generation figures by neighborhood are unavailable in San Francisco. Sustainable Chinatown initiated conversations with Recology to assess the feasibility of developing a neighborhood-level assessment of trash generation and diversion rates in Chinatown to identify opportunities for future programs and policies aimed at achieving the City's Zero Waste goals. However, data acquisition proved more difficult than anticipated due to Recology's methods of data collection and reporting. Currently, Recology's data on waste generation and diversion is based on aggregating data from trash weighing stations located throughout the city and at waste management sites (landfills and recycling facilities). While this allows for citywide analysis of waste generation and diversion rates, it poses a challenge for analyzing data at smaller scales, such as at the neighborhood level. However, in the longer term the City is committed to working with Recology to explore innovative approaches to accessing localized data that can better inform waste programs and educational efforts.

As a proxy for estimating baseline neighborhood-level waste generation and diversion for Chinatown, we analyzed selected 2012 data from Recology Golden Gate (RGG, the division of Recology that serves the East side of City and includes Chinatown, plus other adjacent neighborhoods) for residential and commercial use.<sup>3</sup>

## URBAN ECOLOGY

As a new and growing field, data on the ecology of urban areas is less common. However, there is data estimating the amount of tree canopy (surveyed using aerial photography) as well as impermeable surfaces. The City is in the process of conducting detailed census of trees on streets, parks, and private properties that will verify this data. Similarly, although data on the location and amount of public open spaces exists, it is harder to find information on how well used these amenities are, and their strengths and areas for improvement. An extensive public life survey of Portsmouth Square has been conducted in connection with that redesign process, and Sustainable Chinatown may build upon this work in the future to evaluate opportunities for temporary public realm improvements (such as a Groundplay project) in other areas of Chinatown.

<sup>3</sup> Construction and demolition debris data was omitted, which is expected to be low in an already built-out neighborhood like Chinatown.

**APPENDIX B**

# Analysis of San Francisco Energy Watch Program Data

In order to corroborate the neighborhood-level data as well as identify opportunities for energy conservation, we utilized data available to SFE's San Francisco Energy Watch (SFEW) team on building-level audits of energy usage and conservation measures. After developing the Chinatown building typologies, we used data from the relevant City-supported energy and water efficiency retrofit programs to estimate which energy conservation measures (ECM's) might be the most common and effective.

For non-residential buildings, the team reviewed energy benchmarking and energy audit data from 253 buildings subject to San Francisco's Existing Commercial Buildings Energy Performance Ordinance (ECBPO), which requires that all commercial buildings greater than 10,000 gross square feet energy report their energy usage annually. In addition, these buildings must undergo energy audits performed by a qualified service provider every five years. At minimum, auditors must identify all relevant cost-effective ECMs (these typically have a payback period of three years or less), but they can also include more extensive measures that have a longer payback period.

For residential buildings, the team reviewed data from the San Francisco Energy Watch (SFEW) and the Bay Area Regional Energy Network (BayREN) multifamily programs (both serve multifamily buildings prevalent in Chinatown), and identified 23 buildings within our typologies that had successfully completed projects.

This data included the following variables:

- ECM type
- Peak demand savings (commercial only)
- Lifetime cost savings (commercial only)
- % of Total Energy Savings (residential only)
- Electricity savings per ECM
- Gas savings per ECM
- Project cost
- Value of incentives and rebates

At the outset, a key goal of this work was to match each of the typologies with typical ECMs, but the data did not demonstrate appreciable variations for each typology. That said, while recommended ECMs were fairly consistent across the typologies, there were observable variations in project costs and estimated energy/cost savings. Observations from this analysis include:

### Residential

- The R1 and R2 typologies showed greater energy savings potential from common ECMs (an average 22-23 percent savings, or roughly \$170/unit/year<sup>1</sup>), underscoring our hypothesis that smaller and older residential buildings across the City likely have more deferred maintenance, and thus greater potential savings from energy retrofits.
- ECMs that resulted in the greatest energy savings were: domestic hot water (34 percent of energy savings), HVAC and refrigeration (29 percent), and lighting (19 percent). This varied by fuel type, with lighting retrofits comprising the biggest electricity savings (88 percent) and domestic hot water (52 percent) resulting in the biggest natural gas savings.

### Non-residential

- Data on total energy use before and after the audits was unavailable, so we could not calculate the percentage of total energy savings for each typology. However, it does appear that the average energy savings—particularly for electricity—remain relatively high in the smaller-scale C1 and C2 buildings.
- In contrast with the residential findings, energy savings did not vary much by energy source (electricity versus natural gas). For both energy types, the measures that had the greatest impact on energy use were HVAC and refrigeration (71-74 percent of energy savings), and building commissioning/retrocommissioning (10-20%).

The key findings from this analysis are summarized in the following pages. Tables B-1 and B-2 summarize the total potential energy and cost savings for all combined ECMs, grouped by typology, while; Charts B-1 and B-2 show which ECMs resulted in the greatest energy savings (combining all typologies for residential and commercial projects).

<sup>1</sup> Assuming the energy cost for an average multifamily unit in California is \$738/unit/year (source: Survey of 471 multifamily households in CA from 2009 EIA Residential Energy Consumption Survey (Public Use Microdata File): <http://www.eia.gov/consumption/residential/data/2009/>)



## RESIDENTIAL ENERGY SAVINGS

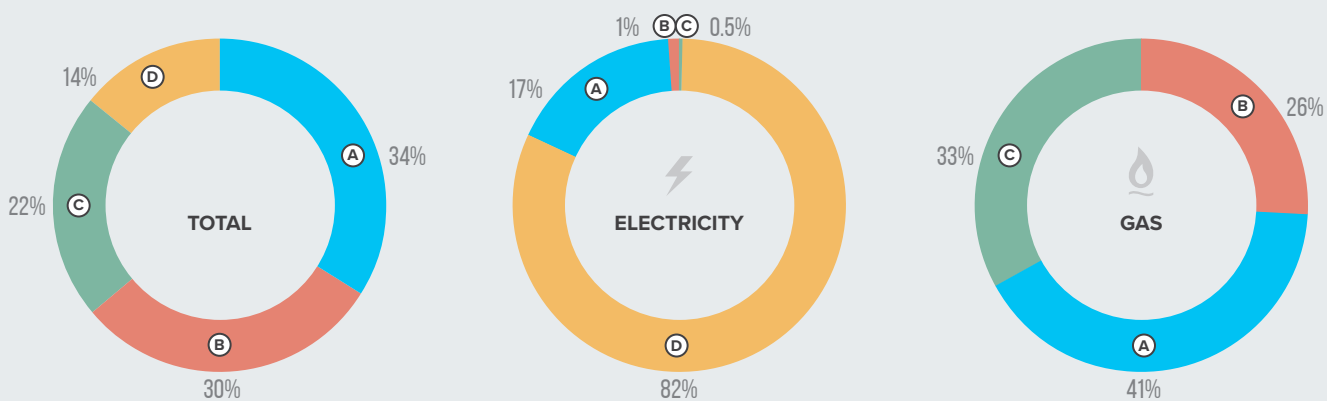
TABLE B-1

### Projected Energy Savings From SF Energywatch and BAYREN Audits

Residential Building Typology		R1	R2	R3	R4
<b>Total % of Energy Saved</b> (21 projects)	Min	20%	14%	11%	10%
	Max	27%	32%	23%	10%
	Average	23%	22%	15%	10%
<b>Energy savings: Electricity (kWh)</b> (22 projects)	Min	31	347	7,601	196,682
	Max	74,665	144,003	136,589	196,682
	Average	33,569	82,306	68,339	196,682
<b>Energy savings: Gas (therms)</b> (23 projects)	Min	1,307	1,735	932	26,584
	Max	7,861	14,906	14,292	26,584
	Average	3,890	6,875	7,479	26,584
<b>Total retrofit cost (\$)</b> (9 projects)	Min	\$29,541	\$73,867	\$29,546	--
	Max	\$129,938	\$73,867	\$79,585	--
	Average	\$67,710	\$73,867	\$59,106	--
<b>Total program incentive (\$)</b> (13 projects)	Min	\$12,000	\$18,000	\$10,500	\$77,250
	Max	\$34,500	\$56,250	\$48,750	\$77,250
	Average	\$22,500	\$37,125	\$30,536	\$77,250

CHART B-1

### Savings From Energy Conservation Measures (All Typologies)



A. Domestic Hot Water    B. Envelope    C. HVAC and Refrigeration    D. Lighting



**NON-RESIDENTIAL ENERGY SAVINGS**

TABLE B-2

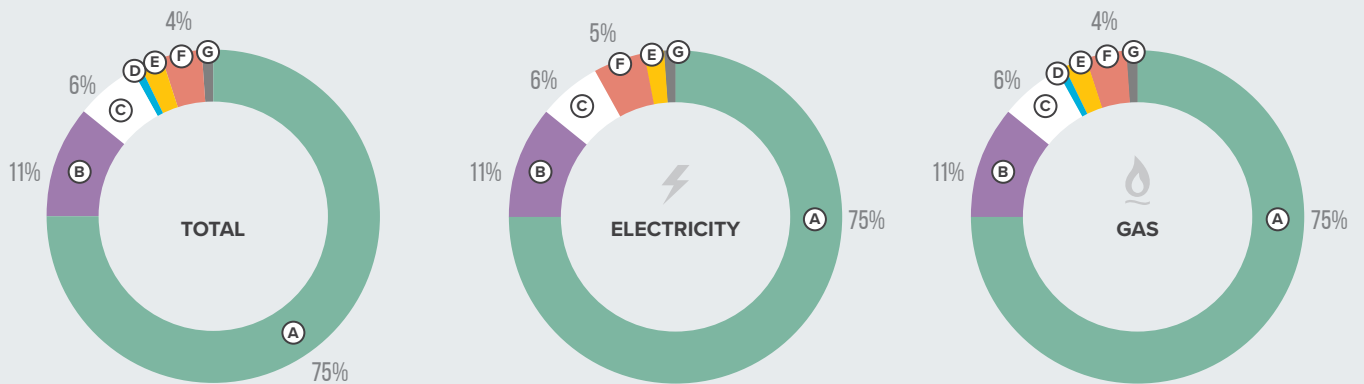
**Projected Energy Savings** From Existing Commercial Buildings Performance Ordinance (ECBPO)

Commercial Typology		C1	C2	C3	C4
<b>Energy savings: Electricity (kWh)</b>	Min	1,441	7,490	148	4,431
	Max	856,059	195,292	2,292,221	1,482,015
	Average	59,934	44,731	118,722	355,110
<b>Energy savings: Gas/Fuel (therms)</b>	Min	18	89	336	449
	Max	11,682	2,544	84,590	38,199
	Average	993	929	9,574	12,498
<b>Retrofit cost: Before rebates</b>	Min	\$15	\$32	\$15	\$75
	Max	\$250,000	\$97,091	\$322,560	\$550,000
	Average	\$33,581	\$36,756	\$75,083	\$268,097
<b>Retrofit cost: After rebates</b>	Min	\$15	\$10	\$2	\$75
	Max	\$224,202	\$79,258	\$315,257	\$529,500
	Average	\$27,718	\$30,666	\$62,248	\$234,620
<b>Total cost savings*</b>	Min	\$233	\$1,354	\$245	\$925
	Max	\$215,108	\$39,210	\$258,985	\$193,249
	Average	\$10,813	\$8,354	\$20,333	\$57,926

\* Total cost savings are measured over the expected life of the ECM being implemented.

CHART B-2

**Savings From Energy Conservation Measures (All Typologies)**



- A. HVAC and Refrigeration      B. Commissioning or Retrocommissioning      C. Other      D. Process & Plug Loads
- E. Domestic Hot Water      F. Envelope      G. Training & Documentation

## APPENDIX C

# San Francisco Energy, Water, and Zero Waste Programs

## ENERGY EFFICIENCY AND RENEWABLE ENERGY ASSISTANCE PROGRAMS

### Bay Area Multifamily Building Capital Advance Program (BAMCAP)

#### DESCRIPTION

BAMCAP, also sponsored by BayREN, provides 0% interest loan capital to augment loans provided by your lender of choice, which cuts the market interest rate for qualifying energy efficiency projects in half. For example, if the lender approves their portion of the energy efficiency loan at 7% interest rate, BAMCAP provides half of the capital at 0%, the combined interest rate on the loan would be 3.5%. The program's share of the financing is limited to no more than 50% of the cost of the approved scope of work minus any program incentives.

#### CONTACT

[http://bayareamultifamily.org/sites/default/files/BAMCAP%20Information%20for%20Borrowers\\_V3.pdf](http://bayareamultifamily.org/sites/default/files/BAMCAP%20Information%20for%20Borrowers_V3.pdf)

### Bay Area Multifamily Building Enhancements (BAMBE) Energy Efficiency Incentive Program

#### DESCRIPTION

- Customized project consultation, and can include utility analysis, priority setting, energy modeling, and site visit.
- (Value of up to \$5,000 paid for by the program).
- Flat per-unit rebate paid to property owner for achieving about 15% savings through multiple energy saving improvements (\$750 per unit).

#### CONTACT

<https://www.bayareaenergyupgrade.org/bay-area-multifamily-building-enhancements>

### CleanPowerSF

(community choice energy offered by the City of San Francisco, alternative to PG&E with higher renewable content)

#### DESCRIPTION

- CleanPowerSF is San Francisco's Community Choice Aggregation (CCA) program and provides San Francisco electricity customers with new clean energy alternatives.
- CleanPowerSF gives residents and businesses a choice of having more of their electricity supplied from clean, renewable sources—such as solar and wind—at competitive rates while supporting growth of local clean energy and combating climate change.

By law, CleanPowerSF is an opt-out program, meaning you must opt-out to stay with Pacific Gas and Electric Company (PG&E) - currently providing 29.5%.

#### CONTACT

<https://sfwater.org/index.aspx?page=748>

## ENERGY EFFICIENCY AND RENEWABLE ENERGY ASSISTANCE PROGRAMS

### Existing Commercial Building Energy Performance Ordinance

(mandatory energy benchmarking and audits)

#### DESCRIPTION

San Francisco's Existing Commercial Buildings Ordinance applies to existing commercial buildings with 10,000 square feet or more of space that is heated or cooled. The Ordinance has two separate requirements:

1. Energy Benchmarking - due annually on April 1, where the building owner must report the total amount of energy that the building uses every year using the US Environmental Protection Agency's free 'ENERGY STAR Portfolio Manager' website.
2. Energy Audit - required every 5 years, the building owner must ensure the building receives an energy audit by a qualified energy professional every five years. The audit, which must examine the entire building, provides a list of specific opportunities to save money and energy in the building, as well as any available rebates.

SFPUC financial incentives for rooftop solar installations are provided to CleanPowerSF and Hetch Hetchy Power customers in San Francisco.

#### CONTACT

[www.sfenvironment.org/ecb](http://www.sfenvironment.org/ecb)  
[www.sfwater.org](http://www.sfwater.org)

### GoSolarSF

(city rebates for solar electric and hot water systems)

#### DESCRIPTION

GoSolarSF was established by the City to encourage installations of solar power systems by offering one-time incentive payments to reduce project costs for homeowners, businesses and non-profit organizations. The program also provides jobs to disadvantaged San Franciscans and supports solar projects for low-income households.

Incentive payments are provided to residential, commercial, and non-profit (including local government) applicants for installations located in the City.

For residential, business, and non-residential non-profit applicants, one incentive is available per electric meter, meaning that installations serving more than one meter in a building are eligible for more than one incentive. Non-profit multi-unit residential incentives are available per service site. Multi-unit Residential Virtual Net Metering (VNM) incentives are available per building.

#### CONTACT

<http://sfwater.org/index.aspx?page=133>

### PACE Financing

(GreenFinanceSF)

#### DESCRIPTION

- Convenient, property-based financing for energy efficiency, renewable energy, and water conservation upgrades paid back via property taxes over longer terms than traditional loans.
- Available for privately owned non-residential, multifamily properties, non-profits, and single family homeowners.

#### CONTACT

[www.greenfinancesf.org](http://www.greenfinancesf.org)

### Renewable Energy Technical Assistance

#### CleanPowerSF and Hetch Hetchy Power

(community choice energy offered by SFPUC)

#### DESCRIPTION

- Free assistance for a solar or wind installation determination and guidance for solar incentives, financing options, and installers' bids.
- Clean energy options offered by the SFPUC.

#### CONTACT

[www.sfenvironment.org/energy/renewable-energy/solar](http://www.sfenvironment.org/energy/renewable-energy/solar)  
[www.sfwater.org](http://www.sfwater.org)

### SF Energy Watch

(utility ratepayer-funded incentives and rebates)

#### DESCRIPTION

- Free on-site energy efficiency assessment.
- Expert installation of new equipment at reduced cost.
- Rebates for qualified, installed energy efficient equipment.

#### CONTACT

[www.SFEnergyWatch.org](http://www.SFEnergyWatch.org)  
[sfenergywatch@sfenvironment.org](mailto:sfenergywatch@sfenvironment.org)  
 415-355-3769



## WATER PROGRAMS

### SFPUC Non-potable Water Program

#### DESCRIPTION

In 2012, San Francisco adopted the the Non-potable Water Ordinance, adding Article 12C to the San Francisco Health Code, and allowing for the collection, treatment, and use of alternate water sources for non-potable applications. It was later amended to allow district-scale water systems consisting of two or more buildings sharing non-potable water.

SFPUC provides grants to support implementation of qualifying projects.

In 2015, the Non-potable Water Ordinance was amended to require the following:

- that all new buildings of 250,000 square feet or more of gross floor, located within the boundaries of San Francisco's designated recycled water use area be constructed, operated, and maintained using available alternate water sources for toilet and urinal flushing and irrigation;
- that all new buildings in San Francisco of 40,000 square feet or more of gross floor area prepare water budget calculations;
- that subdivision approval requirements include compliance with Article 12C of the San Francisco Health Code; and
- facilities constructed in accordance with Article 12C of the San Francisco Health Code and located in public rights-of-way are subject to approval as minor encroachments and exempt from payment of public right-of-way occupancy assessment fees.

#### CONTACT

<http://sfwater.org/index.aspx?page=686>

### Water Conservation Program

#### DESCRIPTION

- Free Water-Wise Evaluations to suggest indoor and outdoor efficiency improvements.
- Rebates for purchasing high-efficiency fixtures and other water-using equipment.
- Custom rebates up to \$75,000 for qualifying water saving retrofit projects.
- Free water saving devices.

#### CONTACT

[www.sfwater.org/conservation](http://www.sfwater.org/conservation)  
[waterconservation@sfwater.org](mailto:waterconservation@sfwater.org)  
 415-551-4730

## ZERO WASTE PROGRAMS

### Recycling & Composting

#### DESCRIPTION

- Free on-site assistance, including outreach materials and staff/management training.
- Reducing trash sent to the landfill can lead to a 75% discount on your bill.
- Zero Waste Facilitators Pilot for multifamily buildings.

#### CONTACT

<http://sfenvironment.org/commercialtoolkit>  
 415-355-3745

### Waste Cooking Oil Collection

#### DESCRIPTION

- Free collection of cooking oil from SF food service establishments through SF GreaseCycle. Weekly, monthly and as-needed scheduling.
- Containers provided free of charge.

#### CONTACT

[www.sfgreasecycle.org](http://www.sfgreasecycle.org)  
 415-695-7366

## GENERAL RESOURCES

### Green Building Incentives (new construction)

#### DESCRIPTION

- Priority permitting for high-performance green buildings (that exceed green building code minimum requirements).
- Free assistance on San Francisco's requirements for new construction.

#### CONTACT

[www.sfenvironment.org/greenbuilding](http://www.sfenvironment.org/greenbuilding)  
415-355-3753

### PACE Financing (GreenFinanceSF)

#### DESCRIPTION

Convenient, property-based financing for energy efficiency, renewable energy, and water conservation upgrades paid back via property taxes over longer terms than traditional loans.

#### CONTACT

[www.greenfinancesf.org](http://www.greenfinancesf.org)

### San Francisco Green Building Code

#### DESCRIPTION

Building sustainability and energy code requirements for new construction projects, major renovations, and ensuring conformance with applicable state and local codes and ordinances.

#### CONTACT

<http://sfdbi.org/sites/default/files/AB-093.pdf>

### SF Green Business Program

#### DESCRIPTION

- Learn how to green multiple facets of your business to save money and lower your environmental impact.
- Get connected to free city resources, services, and rebates in one place.
- Participate in our recognition program and be recognized as a leading Green Business of San Francisco.

#### CONTACT

[www.sfgreenbusiness.org](http://www.sfgreenbusiness.org)  
415-355-3778

### Toxics Reduction Resources

#### DESCRIPTION

- Information for low-cost disposal of hazardous waste.
- Free assistance for choosing less-toxic cleaning products.

#### CONTACT

<http://www.sfenvironment.org/toxics-health>  
415-355-3766





[sustainablechinatown.org](http://sustainablechinatown.org)



**San Francisco**  
**Planning**



Chinatown Community  
Development Center  
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**SF Environment**  
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