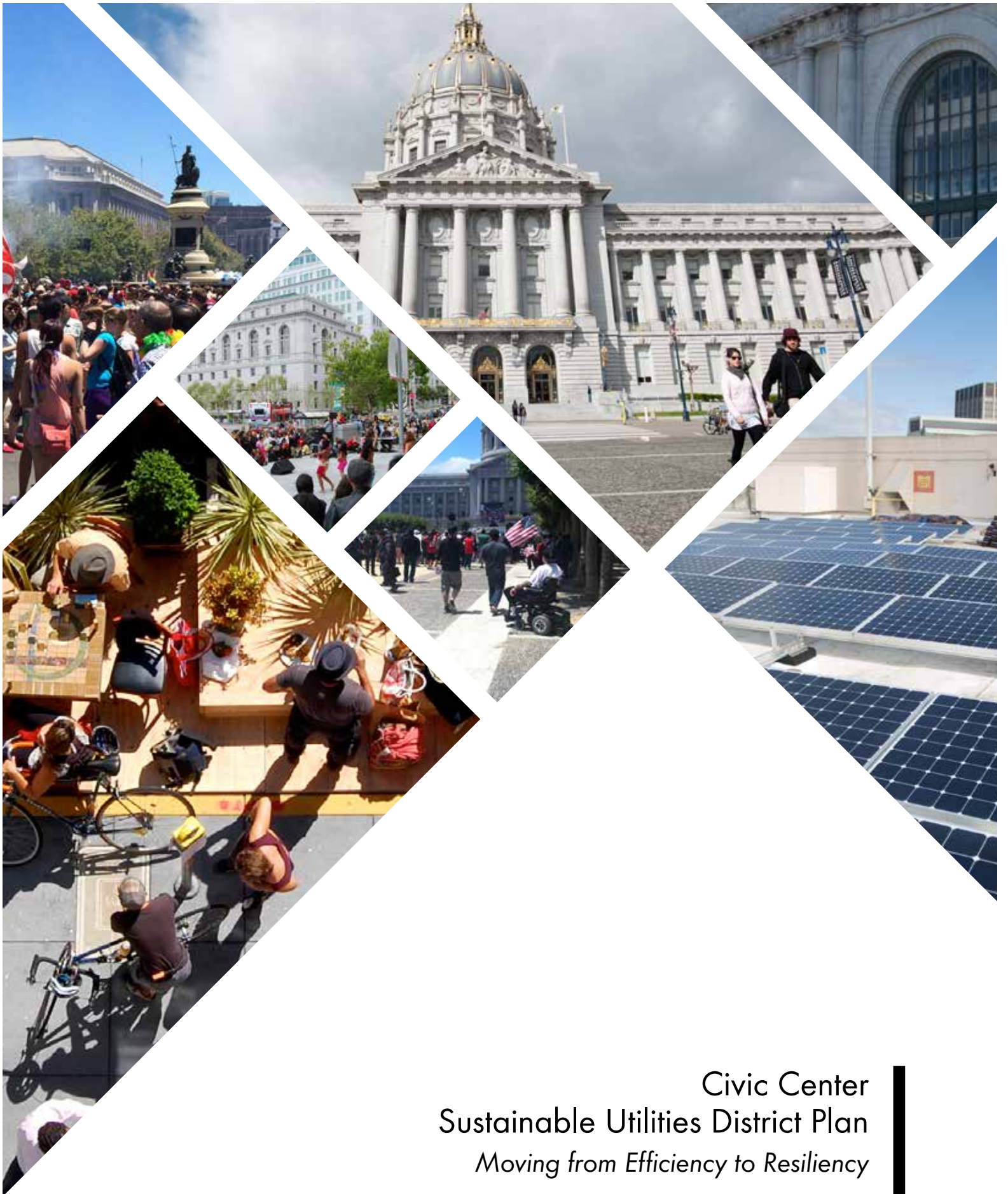

# Civic Center Sustainable Utilities District Plan

*Moving from Efficiency to Resiliency*

June 2015

COMMISSIONED BY:
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Überlingen | San Francisco 2015

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# Water | Energy | Public Realm | Education

*San Francisco Civic Center*
*Sustainable Utilities District Plan –*
*Moving from Efficiency to Resiliency*

June 2015


**CONSULTANTS:**

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PLACE

Sustainable Watershed Designs

# Executive Summary

San Francisco's historic Beaux Arts Civic Center is the seat of San Francisco's City government and home to its major cultural institutions. Visited daily by thousands, it serves both as a busy neighborhood park and as a staging ground for the City's major cultural events such as parades, demonstrations and festivals. This *Civic Center Sustainable Utilities District Plan* (District Plan) presents a long-term vision for promoting sustainability within this high visibility area while also bolstering its resilience to climate change, drought, and catastrophic events such as major earthquakes. The District Plan aims to:

- Reduce potable water consumption and treat and reuse water onsite
- Generate electricity onsite using green technology
- Support an appealing public realm
- Incorporate emergency readiness into site planning activities, and
- Provide education and outreach on sustainability concepts.

The core concept of the District Plan is the development of district-scale sustainable utilities systems that would collect, treat and reuse wastewater and nuisance groundwater in the district. Energy generated onsite from solar panels and waste materials would feed an energy loop that would allow for water and energy savings and a dramatically reduced impact on the environment. Onsite stormwater management strategies would reduce the burden on the City's sewer system while improving the appearance and function of the streets, sidewalks and other outdoor spaces within the public realm.

While the district utilities would effectively allow the Civic Center area to function independently from the citywide utility systems, connections to citywide utilities would be maintained to ensure redundancy. In the case of a major earthquake, the Civic Center area could be brought back online quickly, allowing the Civic Center to act as the central emergency response area and assist with the provision of water and other services within the Civic Center and to nearby neighborhoods.

In conjunction with district utility and urban design concepts, this District Plan contains proposals for public engagement, art and educational efforts. These proposals will help to shape the development of improvements in the Civic Center area while providing a means for showcasing sustainable technologies and sharing lessons learned.

This District Plan is the culmination of several years of work by the San Francisco Public Utilities Commission (SFPUC) in coordination with the US Environmental Protection Agency (EPA) and other City and County of San Francisco agencies. This plan represents a starting point for a more coordinated and substantive approach to sustainability in this iconic area of San Francisco. A key proposal within the District Plan is the creation of a *Civic Center District Steering Committee* (Committee). The Committee would allow for a City Agency and stakeholder coordinated effort on project development, funding, public and private partnerships and the ability to collaborate on Civic Center programing and activation of the space. The Committee would be instrumental in leading the evolution of the District toward these sustainable utility goals, while incorporating emergency readiness, in a cohesive and financially responsible way.

# Contents

# 1 Introduction

The San Francisco Civic Center was designated in 2008 by former Mayor Gavin Newsom as a *Sustainable Resource District*, promoting it as a future model for sustainability and innovative environmental technologies. In 2010, the SFPUC obtained grant funding from the EPA to help build on this vision. As part of this effort, the SFPUC has already implemented retrofits such as low flow toilets and lighting upgrades in the District's city owned buildings. These improvements have resulted in annual water savings of more than 10% and energy savings in excess of 20%. In addition to these initiatives, the SFPUC has developed this conceptual District Plan to help guide physical changes that would continue to reduce the District's impact on the natural environment by further minimizing water and energy consumption while utilizing local and renewable resources. It would serve as both a model of district sustainability in a dense urban setting and as a center of civic life that is resilient to catastrophic events such as earthquakes.

The character of the Civic Center area has always been dynamic. Since the late 1800s, the area has housed governance, judicial and cultural institutions as well as hosted events such as rallies, markets and performances essential to the life of the city. By making changes to the District, the SFPUC is not only looking to achieve environmental goals, but to foster innovative environmental ideas at this high profile site in the heart of San Francisco. The District, if successful, can serve as a catalyst for change in other parts of San Francisco, California, across the US and internationally.

To explore ways to achieve this, the project team began with energy and water efficiency and expanded to developing concepts for renewable energy and water sources. But sustainability is more than just technical solutions, it also relies on strong public involvement, ensuring that any proposed changes are relevant to the people that would be most affected by them. As part of the development of this District Plan, two public workshops were held to gather ideas for District improvements and to gather feedback on the concepts put forward in the District Plan. Additionally, a workshop was held with staff from other City agencies including the San Francisco Planning Department and the San Francisco Recreation and Park Department.

In parallel to the SFPUC's Civic Center work, the San Francisco Planning Department's *Eco-District Program* is advancing the creation of sustainability plans for existing and rapidly growing neighborhoods such as Central SoMa and Chinatown. The program seeks to align energy, water, waste and transportation infrastructure with ecological systems and community priorities to achieve and surpass citywide environmental goals. A primary goal of the Planning Department's program is to facilitate the implementation of sustainable infrastructure systems by coordinating private development and public improvements through community engagement. Eco-districts can help create more resilient and efficient neighborhoods capable of operating somewhat independently from larger regional energy and water systems. The District Plan is based on the same principles.

The Civic Center is unlike any other area within San Francisco. Many aspects of its unique character are likely to support a successful transition into a more sustainable district. These include:

- The majority of the buildings and property are publicly owned and there are no residential buildings within the established boundaries of the District. This provides unique opportunities for inter-agency collaboration and cost-sharing.
- The District and the adjacent neighborhoods are rapidly changing due to significant numbers of new residents moving into the surrounding neighborhoods. The Civic Center is home to the most important open spaces in an already dense neighborhood. The increased demands on these spaces will motivate changes and improvements.
- Significant portions of the public infrastructure are in need of substantial repairs or replacement. Sustainability projects can be conducted in concert with, or sometimes in place of, traditional infrastructure improvements.
- Both owners and operators can reap long term benefits of power and water savings.

The scope of this vision is ambitious. However the combination of unique site conditions, engaged stakeholders (i.e., government, utility providers and the public) and an innovative design will greatly increase the potential for realizing the vision outlined in this District Plan.

◂ Life in the Civic Center

**PRE-DEVELOPMENT–1850**

The pre-development landscape was characterized by tidal marshlands and sand dunes.

An ephemeral creek flowed from the present day City Hall site to marshlands, before finally emptying into Mission Bay.

**1850–1905**

**1851** – Yerba Buena cemetery opens. 1,000 people are eventually interned at the location of current day City Hall.

**1870** – Civic Center is designated a *City Hall Reservation*. Construction of a city hall (shown above) begins.

**1905** – Architect Daniel Burnham develops a master plan for San Francisco that included a Beaux-Arts style Civic Center. Burnham's plan was never fully realized.

**1905–1945**

**1906** – Earthquake and fire destroys large parts of Civic Center, including Old City Hall.

**1915** – New City Hall construction is completed.

**1917** – Asian Art Museum building is completed.

**1926** – Supreme Court of California building is completed.

**1932** – War Memorial building and Opera House is completed.

**1936** – Federal Building (50 UN Plaza) is completed.

**1941** – Temporary barracks (shown above) are constructed in Civic Center Plaza to provide lodging for World War II soldiers.

**1945–1990**

**1953** – San Francisco Planning Department publishes: *Plan for the Civic Center.*

**1958** – Underground parking garage and Brooks Hall are completed beneath Civic Center Plaza.

**1974** – San Francisco Department of Planning publishes *Civic Center, A Comprehensive Plan.*

**1975** – United Nations Plaza is completed.

**1978** – Civic Center is listed in the National Register of Historic Places.

**1987** – Mayor Feinstein submits: *The Civic Center Proposal.*

**1989** – A bond is passed to fund the *Earthquake Safety Program* providing funds to repair several Civic Center buildings damaged by the Loma Prieta earthquake.

▲
Timeline adapted from the *Civic Center Cultural Landscape Survey*, 2014

**1990–PRESENT**

**1991** – The rectangular pool in front of City Hall is removed and replaced with decomposed granite.

**1994** – *Civic Center Study* is completed by the Planning Department. Few of the recommendations are realized.

**2007** – Civic Center is designated a Sustainable Resource District by Mayor Newsom.

**2010** – San Francisco is awarded a grant from the US Environmental Protection Agency for sustainability planning in the Civic Center area.

**2015** – *Civic Center Sustainable Utilities District Plan* is completed.

**2015** – City Hall becomes oldest building in US to receive LEED Platinum Certification for existing buildings.

# 2 Project Background

## Site History

Prior to development, the Civic Center site was dominated by marshlands and sand dunes. While evidence of human habitation in San Francisco dates to 3,000 BC, intensive human use of the Civic Center site began when California's Gold Rush brought an enormous influx of people to San Francisco – raising the city's population from 1,000 in 1848 to 25,000 by December 1849. A cemetery was opened on the Civic Center site in 1849 and approximately 9,000 people were eventually interred there. By the mid-1860s, however, the City began relocating graves in order to make way for development and in 1872 construction of a city hall (*Old City Hall*) began in the area of the former cemetery. Consistent with its expanding importance, the Civic Center area featured prominently in urban planning efforts at the time, including Bernard J.S. Cahill's 1899 plan for Civic Center and Daniel Burnham's 1905 master plan for San Francisco.

The defining event of the Civic Center was not planned, however. In 1906, an earthquake and subsequent fire destroyed the buildings at the site almost totally. Reconstruction began quickly but did not precisely follow any of the previously developed plans for the site. The area's major buildings, most of which had been completed by 1945, did largely adopt a Beaux Arts style reflecting the recommendations of Burnham's 1905 plan.

While Civic Center's buildings are generally acknowledged to have a cohesive character, the Civic Center's public realm – that is, its streets, plazas, and other public spaces – face numerous design challenges and shortcomings. A variety of proposals for improving spaces such as Civic Center Plaza and Fulton Street have been created over the years, but implementation has been hampered by lack of funding, false starts, and changing demands for these spaces

Nevertheless, the importance of the public realm remains constant even as the needs and wants of the city change. In 2008, the site was designated as a *Sustainable Resource District*. This *Civic Center Sustainable Utilities District Plan* outlines a vision for incorporating sustainable ideas and technology into future efforts to alter and improve the public realm while at the same time respecting the historical significance of landscape features and their relationship to the site's history.


Civic Center Sustainable Utilities District – District Boundary and Building Ownership

## Project Area

The Civic Center Sustainable Utilities District covers approximately 62 acres and is shown on the map on the preceding page. It is bounded by Hayes Street to the south, Van Ness Street to the west, Golden Gate Avenue and McAllister Street to the north, and Market Street to the east. These boundaries were established for the purposes of the EPA grant and include most of the major publicly-owned buildings in the area. As shown on the adjacent map, some buildings are owned by the City while others are owned by the State and Federal governments. The District boundary is also similar to the boundaries of the *Civic Center San Francisco Landmark District* and the *Civic Center National Historic Landmark*.

The District boundary is not set in stone but rather delineates the project boundaries that were agreed upon for the EPA grant that has funded a portion of this work. Participants in the workshops conducted for the District Plan expressed an interest in expanding the District boundaries and adding the additional areas shown on the map. The area between Golden Gate Avenue and McAllister Street includes the University of California Hastings College of the Law. The triangular area between Grove Street and Market Street includes privately owned buildings but workshop participants expressed a strong desire to see improvements in this area. Thus, the ideas and concepts described in the District Plan are not restricted to the boundaries outlined in this plan.

A section of the *Living Machine* – the ecological wastewater treatment facility at SFPUC's headquarters.

Installation of solar panels at City Hall in January 2015.

# Work Conducted to Date

The work conducted in association with the EPA grant has consisted of the implementation of water and energy upgrades to City owned buildings in the District. These upgrades were completed in order to realize immediate benefits and assist with the development of this District Plan which will help chart a course for a more sustainable and livable public realm. The upgrades led to the May 14, 2015 announcement that City Hall became the oldest building in the US to receive LEED Platinum Certification for existing buildings.

### BUILDING UPGRADES FOR WATER & ENERGY EFFICIENCY

The SFPUC worked in coordination with other City departments to implement water and energy upgrades within the City-owned buildings in the District.

#### Building Audits

Energy audits were conducted for the City-owned buildings in the District to identify opportunities for greater efficiencies.

#### Building Retrofits

From October 2012 through March 2015, SFPUC conducted a program of retrofits in City-owned buildings that included:

- Replacement of 389 toilets, 160 urinals, and 200 faucets with low-flow fixtures. Overall, SFPUC estimates that the retrofits will save over 4.6 million gallons of water per year (more than 10%).
- Upgrades to building heating, ventilation and air conditioning (HVAC) systems and lighting to reduce energy use. Overall, SFPUC estimates that these improvements have increased the efficiency of the buildings in excess of 20%.

#### Solar Installations

In March 2014, the installation of a solar array on the roof of Davies Symphony Hall was completed. The Davies solar array will provide approximately 15% of Davies' electricity needs, producing 248,200 kWh of electricity, the equivalent of powering 60 San Francisco homes annually and removing about 50 tons of carbon dioxide from the environment.

In January 2015, 230 high-efficiency solar modules were installed on the south light court side of City Hall. The 80 kW PV system spans approximately 8,000 square feet and further improves the regal structure's low greenhouse gas emission profile.

### CULTURAL LANDSCAPE INVENTORY

The *Civic Center Historic District Cultural Landscape Inventory* provides information about the historic landscape features that contribute to the Civic Center Historic District. The objective of the Inventory is to inform planning decisions within Civic Center and to encourage sensitive design and maintenance of the cultural landscape.

### DISTRICT PLAN DEVELOPMENT

Key intermediate steps in the development of this District Plan are described below.

#### Existing Conditions Utility Balance Analysis

The *Utility Balance Analysis* (Appendix A) provided an examination of on-site non-potable water demands and supplies, including estimates of modeled rainwater and stormwater runoff, and incorporation of the energy utility analysis provided by SFPUC Power Enterprise.

#### Best Practices Review

The project team reviewed relevant best practices from other municipalities worldwide with particular attention to examples in urban historic districts as detailed in Appendix B. Best practices related to sustainable streetscapes, open space design and water-energy nexus topics (e.g. steam loops, thermal energy, and wastewater centric energy schemes) were highlighted.

#### Public Workshop Series

As part of the development of this District Plan, two public workshops were conducted:

- October 30, 2013 – At the first public workshop, the project team presented work conducted to date and solicited public input about the most desirable and least desirable aspects of the Civic Center area and ideas for potential sustainable infrastructure projects.
- December 3, 2014 – The purpose of the second workshop was to present the draft District Plan concepts and gather feedback on these concepts in advance of finalizing the District Plan.

Brief summary reports from both public workshops are included in Appendix C.

# District Goals

**ZERO WATER**
Replace imported water with local water resources (rainwater, stormwater, blackwater and groundwater) delivered via a District-scale distribution system.

**ZERO WASTEWATER**
Redirect stormwater and blackwater away from the combined sewer system and to green infrastructure, District-scale treatment/reuse, and a day-lit Hayes Creek.

**ZERO ENERGY**
Achieve net-zero imported energy use and carbon emissions through conserving and generating energy from renewable, local resources.

**EMERGENCY READINESS**
Ensure that services can be restarted within first 72 hours of a major earthquake.

# 3 District Sustainability

Sustainability is a broad concept with many varying and sometimes conflicting definitions. The District Plan looks at sustainability first in terms of the environmental impacts of the utilities that provide energy, water, wastewater, stormwater and solid waste services for the buildings and the public realm within the District. The quality of the public realm, education and innovation, and emergency readiness and resiliency have also been considered in order to develop a more integrated and holistically sustainable outcome for the site.

## Sustainable Utilities

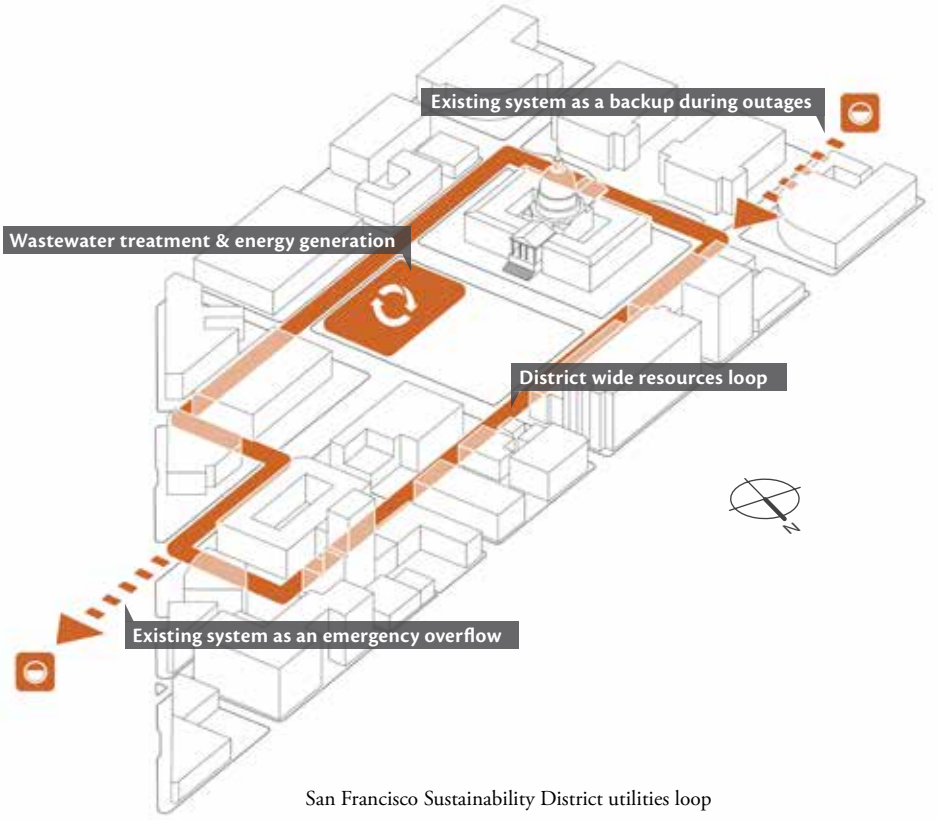
To give direction to the District Plan's project concepts, the following objectives for sustainable utilities were created:

- Zero Water – Replace the use of imported potable water with local water resources.
- Zero Wastewater – Treat and use wastewater and manage stormwater onsite.
- Zero Energy – Achieve net-zero imported energy use and carbon emissions through conservation and onsite generation from renewable, local resources.

As discussed earlier, steps have already been taken to move the District closer to these objectives through the implementation of building retrofits including low-flow toilets, efficient lighting systems, and rooftop solar installations. However, the extent to which measures such as these move the District toward the *zero* objectives is obviously limited. While the replacement of toilets and urinals in District buildings can result in significant water savings, potable water is still used in these fixtures. Currently, low-flow toilets in the District use 1.28 gallons of potable water with each flush. To significantly reduce its use of natural resources, water reuse and additional energy generation must be employed. While the SFPUC is continuously working to improve the sustainability of the utility infrastructure that serves San Francisco and other Bay Area communities, the Civic Center area represents a unique opportunity to employ District-scale utilities that allow for onsite water reuse and expanded energy generation with increased efficiency of energy delivery.

The advantages of decentralized treatment and supply systems over centralized systems are:

- Decentralized systems allows for efficiencies that would not be possible in a large scale system.
- Decentralized systems provide opportunities for reduction in infrastructure costs. Costly upgrades to the existing utility system can sometimes be avoided by the installation of smaller, localized schemes.
- Decentralized systems make users more aware of environmental impacts and local resources are more visible and therefore more likely to trigger a local response.




San Francisco Sustainability District utilities loop

There are already a few building scale decentralized systems in the District such as the SFPUC's headquarters (525 Golden Gate), Davies Symphony Hall, and City Hall. In San Francisco, via the *Non-potable Water Ordinance*, there is a streamlined permitting process to install decentralized water reuse systems at both the building and district-scale. Moving beyond the building scale to the district-scale expands the potential for decentralization to improve the sustainability of the District. While bringing the District's net resource use to zero is not immediately achievable, sustainable infrastructure projects implemented over the long-term can combine with technological improvements to move the District closer and closer to these objectives. The next page gives an overview of the district-scale utilities concept while Chapters 4 and 5 outline the water and energy district-scale strategies.

## District Utilities Infrastructure

The District utilities can conceptually be viewed as a loop, where each of the supply and waste streams pass through the treatment area as shown. Each of the buildings will have their water and energy needs supplied by the loop and each building will supply their wastewater products and excess energy to the loop.

Achieving the District loop would involve the construction of new infrastructure beneath the District's streets in parallel with existing pipelines and electrical cables. With its wide streets, the District is unusually well-suited to accommodate additional underground infrastructure. The District utilities loop concept does not however require changes to the utility infrastructure within the buildings. This is the advantage of applying decentralized concepts at the district-scale rather than the building scale.

Although the District utilities would be capable of functioning independently of the the wider San Francisco infrastructure network, this District Plan recommends that the connection to the wider network be maintained for the following reasons:

- To allow for resiliency, the existing citywide utilities will act as a backup during possible outages of the District utilities
- Peak demand can be met by the two utility systems together, minimizing the size of the District water treatment and energy generation facilities and maximizing efficiency and return on investment
- To allow for opportunistic resource generation, any excess water and energy produced by the District water treatment and energy generation facilities can potentially be directed for use outside of the District via the existing citywide utilities.


6
5
2

To create the District utility system, the following new infrastructure is proposed:

1. **A WATER TREATMENT FACILITY AND ENERGY GENERATION FACILITY**. Brooks Hall, the former convention space beneath Civic Center Plaza, is one potential location for these facilities. Because it is underground, wastewater could be directed to Brooks Hall for treatment via gravity flow. While other proposals exist for reviving Brooks Hall, using the space for water and energy generation facilities would require relatively few upgrades. Additionally, the 90,000 square foot area of Brooks Hall could potentially accommodate multiple uses.

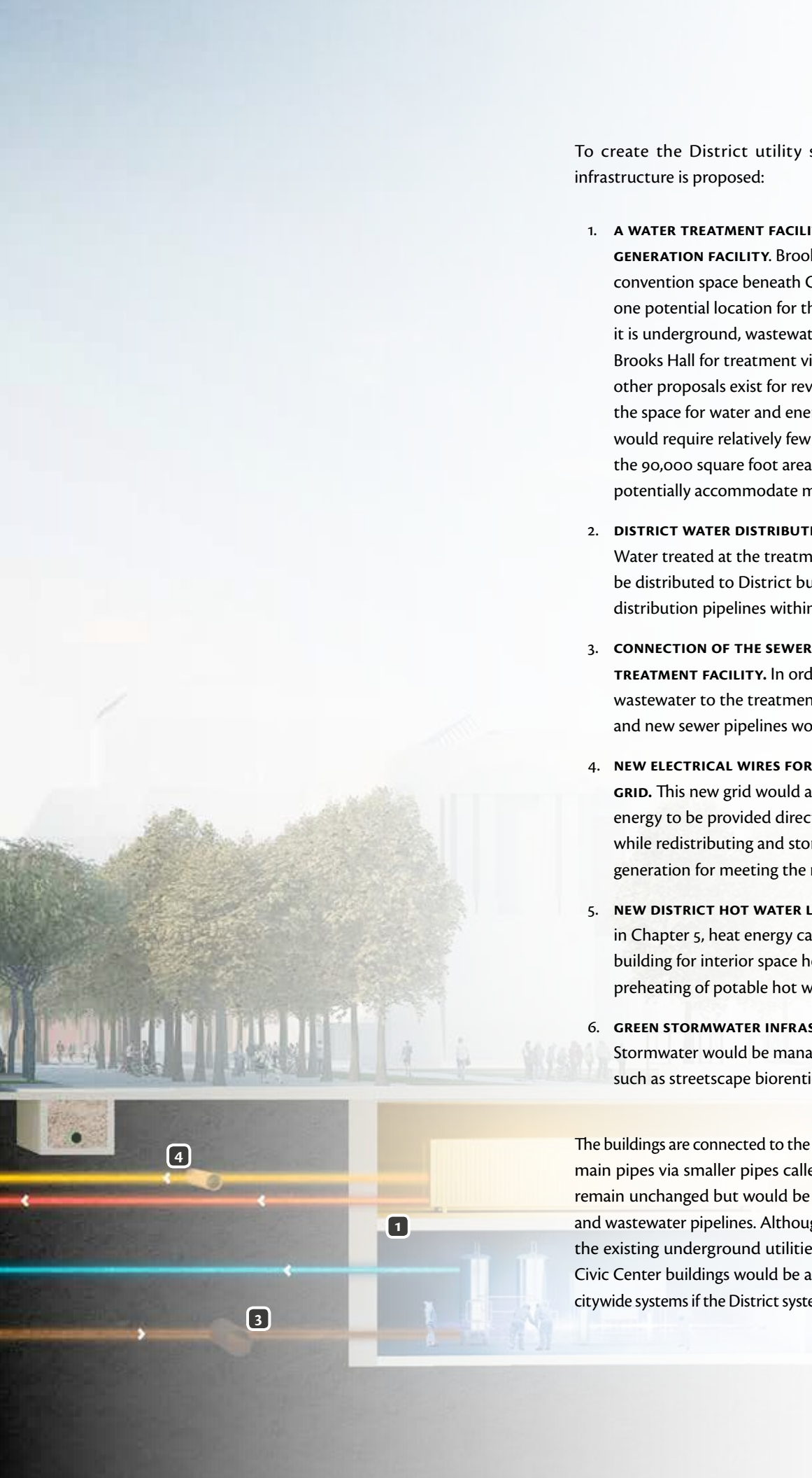
2. **DISTRICT WATER DISTRIBUTION PIPELINES.** Water treated at the treatment facility would be distributed to District buildings via new distribution pipelines within the District.

3. **CONNECTION OF THE SEWER TO THE WATER TREATMENT FACILITY.** In order to transport wastewater to the treatment facility, both existing and new sewer pipelines would be utilized.

4. **NEW ELECTRICAL WIRES FOR A DISTRICT ELECTRICAL GRID.** This new grid would allow for alternative energy to be provided directly to each building while redistributing and storing any excess generation for meeting the next peak demand.

5. **NEW DISTRICT HOT WATER LOOP.** As discussed in Chapter 5, heat energy can be moved to each building for interior space heating along with the preheating of potable hot water supplies.

6. **GREEN STORMWATER INFRASTRUCTURE.** Stormwater would be managed on site using strategies such as streetscape biorention and green roofs.




The buildings are connected to the existing water and wastewater main pipes via smaller pipes called laterals. The laterals could remain unchanged but would be connected to the new water and wastewater pipelines. Although not shown on this graphic, the existing underground utilities would be retained and the Civic Center buildings would be able to easily reconnect to the citywide systems if the District systems experienced any problems.

# Goals for the Public Realm

**EFFICIENCY**

Demonstrate energy, water and wastewater resource efficiency through the use of advanced technologies to supplement existing energy and water supplies with local, renewable sources.

**IDENTITY**

Create a lively, liveable environment that offers a strong sense of place, supporting a mixture of uses. The area will respect the past and embrace a creative and sustainable future.

**EDUCATION**

Educate the public through early adoption of sustainable measures as an incubator for inspiring & engaging all passers-by.

**EQUITY**

Contribute to an open space for a broad spectrum of social groups, while developing a valuable asset for coming generations in the spirit of intergenerational responsibility.

## Public Realm Transformation

While most utilities are hidden from sight and are typically only noticed when they don't work, this plan proposes to make these critical functions visible while providing much needed improvements to the public realm. While the new district-scale utility infrastructure would be underground like existing utilities, installing new infrastructure and maintaining existing infrastructure will require construction within the public realm. Additionally, opportunities exist for managing stormwater, generating energy, and improving energy and water use efficiency in more visible ways while also improving the public realm.

Although this District Plan focuses on utilities rather than on urban design, it incorporates the general goals for the public realm as shown on the preceding page.

Designs illustrated in this District Plan are conceptual and meant to inspire further discussion and planning for these spaces, particularly via the upcoming Civic Center Public Realm Plan being led by the San Francisco Planning Department.

This District Plan envisions the District as a local and national example of progressive urban planning and infrastructure development which both informs and is informed by the global community (see Chapter 7). It also provides a strategy for increasing San Francisco's resilience to immediate catastrophic events as well as the long-term challenge of climate change (see Chapter 8).

# 4 Water

◂ San Francisco Bay Bridge.

**Existing Water System**

Potable water is only used once

Rainfall and groundwater are conveyed to the sewer without being used

# Existing Water System

Potable water supplies are delivered to the Civic Center via the Hetch Hetchy Regional Water System. An extensive water system delivers water from the Hetch Hetchy Reservoir (160 miles east of San Francisco) and several smaller reservoirs in the Bay Area to San Francisco and other nearby communities. Once used in sinks, toilets and other water fixtures in Civic Center area buildings, water is transferred via the sewer system to the Southeast Treatment Plant (1.5 miles from Civic Center) which treats the wastewater before discharging into San Francisco Bay. The sewer system is a combined sewer system, where wastewater from buildings, stormwater from streets and rainwater from roofs are all conveyed to the treatment system using this one pipe network. To maintain their structural integrity, some of the buildings in the Civic Center area manage nuisance groundwater by pumping it into the combined sewer system.

Currently, water is supplied to a variety of end uses and wastewater is removed via the combined sewer system. However, Civic Center is affected by broader pressures on the existing water supply and treatment systems. Foremost among them are an increasing population, a changing climate, aging infrastructure and the possibility of a major environmental event such as an earthquake or extended drought which jeopardize the security of water throughout California.

Bathroom use

Potable, Kitchen etc.

Landscape Irrigation

Cooling

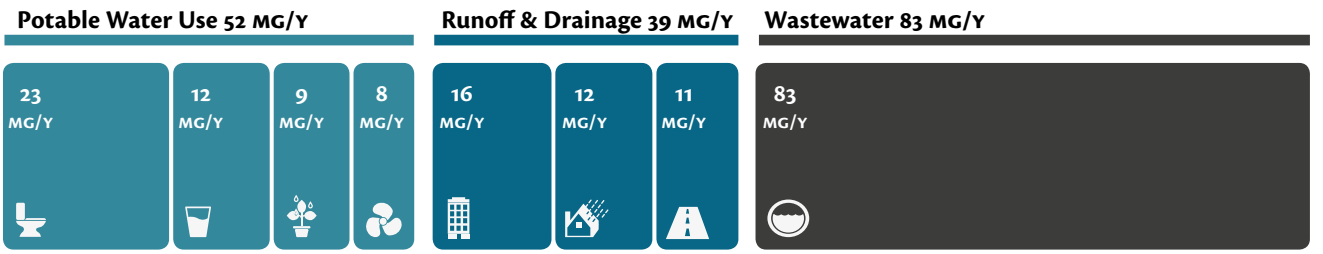
Foundation Drainage

Roof Runoff

Street & Surface Runoff

Combined Sewer

Million gallons/year MG/Y




Current annual water use at the Civic Center

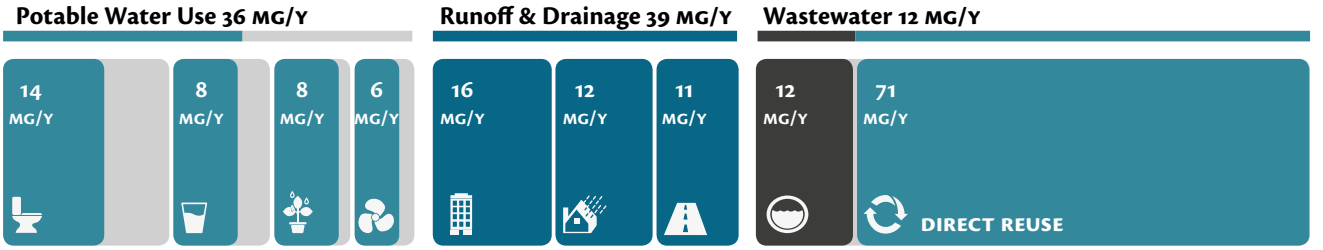
## Proposed Water Systems

The project team aimed to use an integrated water management approach to develop this District Plan. This is a paradigm shift, focused on how each component affects the system as a whole and examining the multi-functional outcomes possible from system changes.

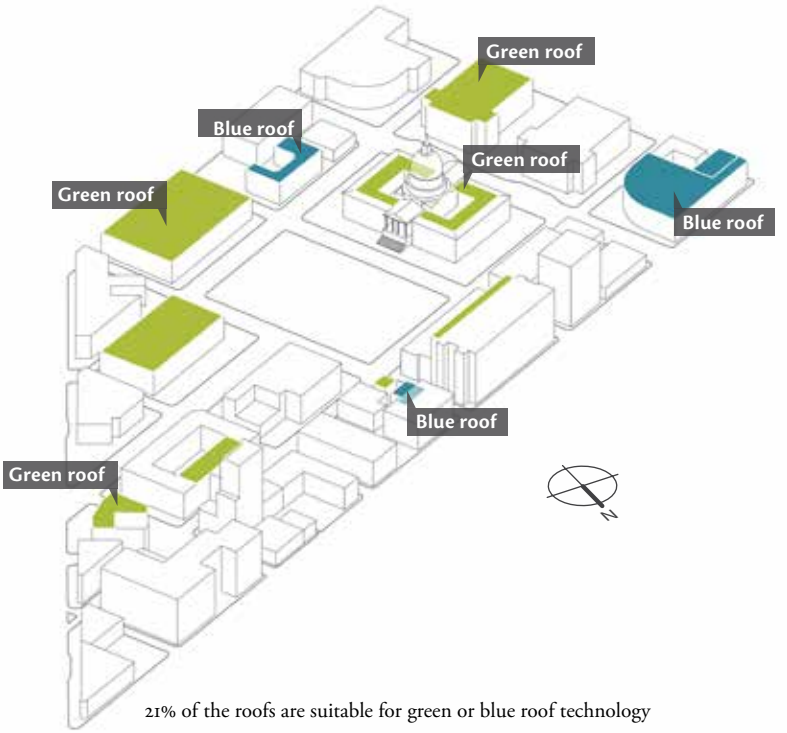
**THE FIRST PRINCIPLE** to consider when designing a district-scale water reuse system for the Civic Center is effectiveness as opposed to efficiency. While the current system is very efficient at delivering and removing water from the site, it does not consider the other potential uses or co-benefits of the water, which include: reuse, enhancing the public realm and safety during emergency events. These functions can work together to enhance public realm spaces.

**SECOND**, redundant solutions make the system more resilient. For example, during a catastrophic event such as an earthquake, it is possible that the citywide water supply, water treatment and energy systems will be compromised. A district treatment and reuse system powered by locally generated energy could allow Civic Center to continue to function during extreme events. While not invulnerable to catastrophic events, damage to the smaller scale District systems could potentially be repaired more quickly than damage to the citywide systems.

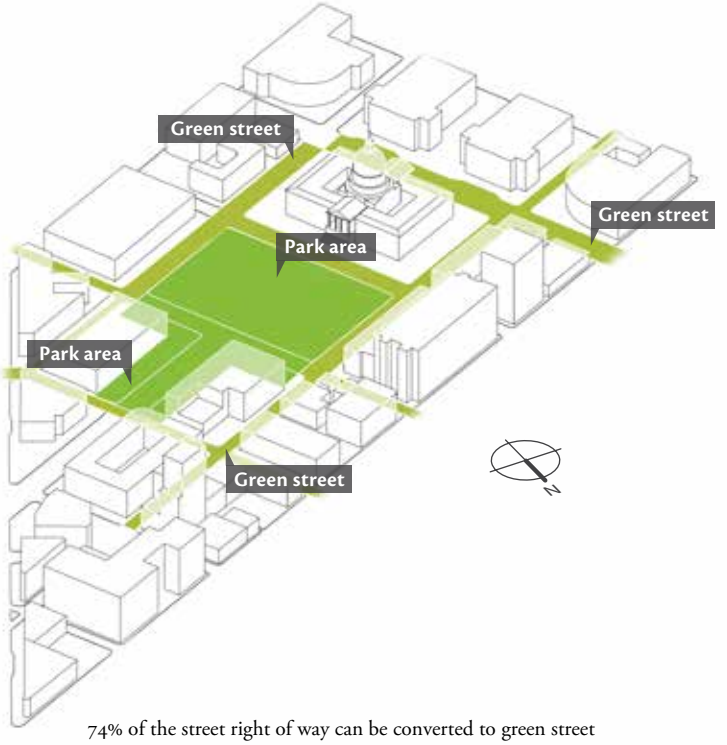
**THIRD**, water management strategies can be flexible and adaptive at the site. Technologies for water treatment and reuse are evolving rapidly, the task of this plan is to allow these ideas to be able to be incorporated as they become available.




Proposed Water System Concept showing potential for reduction and reuse




21% of the roofs are suitable for green or blue roof technology




74% of the street right of way can be converted to green street

# MANAGE STORMWATER WITHIN THE DISTRICT

## Rainwater and Stormwater

Development of the Civic Center District has changed the natural water balance, altering the relationship between infiltration, run-off and evaporation. A more natural water balance can be achieved through a decentralized system that increases infiltration and evaporation rates close to the source of rainfall.

The implementation of the stormwater management system has the potential to have the biggest impact on the appearance of the District as it requires changes to the surfaces through the introduction of techniques such as swales, green roofs, filtration strips and permeable surfaces.

As detailed in Appendix D, preliminary analysis conducted as part of the development of this District Plan identified opportunities to implement green street, blue roof and green roof technologies within the District. The study found that approximately 74% of the street right-of-way could be converted to green streets and 21% of the roofs are possibly suitable for green or blue roof technologies. Combined, these technologies alone have the potential to reduce annual stormwater runoff from the District by 22%. As discussed in Chapter 6, additional stormwater could be managed within a park that could be created on Fulton Street. Chapter 6 also discusses how green streets can help transform and beautify the public realm while also managing stormwater.

**Strategies to Achieve Long Term Vision**

Utilize green and blue roofs to minimize roof runoff

Implement green streets to reduce flows to the combined sewer

Manage additional stormwater in open spaces such as a newly created park within Fulton Street

# MINIMIZE POTABLE WATER DEMAND AND REPLACE WITH ONSITE RECYCLED WATER

## Potable Water

**Strategies to Achieve Long Term Vision**

Continue conservation efforts

Treat on-site wastewater for potable reuse

Supply recycled potable water via district-wide potable water network

A sustainable utility district begins with water efficiency. This process is underway with the SFPUC having already achieved more than a 10% reduction in demand from the installation of low flow fittings in existing City-owned buildings within the District.

Potable water can be generated at a new district-scale recycled water plant and then distributed via a new, district-scale water network. The district-scale water network would run alongside the existing citywide potable water network beneath the streets. It would connect to the existing water pipes in the District's buildings, feeding sinks, toilets and other plumbing fixtures. While many new developments are dual-plumbed to allow for treated non-potable water to be used for non-potable purposes (e.g. toilet flushing), retrofitting the historic buildings in the District with dual-plumbing would be a significant and costly undertaking. Creating a new district-scale water distribution system is an efficient way to maximize water reuse in this unique and historic area. The technology for treating wastewater to potable standards is mature and successful, however it will still need to be carefully designed, with monitoring and safety checks built into the system.

There are likely to be significant challenges to overcoming community concerns about direct potable reuse. Indirect potable reuse (when treated wastewater is first added to a reservoir and/or groundwater basin) is common in Southern California, while two cities in Texas have implemented direct potable reuse. Many cities in California are seriously exploring direct potable reuse and it is likely to be implemented with greater and greater frequency as drought conditions persist and other pressures on water supplies, such as climate change, continue. Key factors for successfully implementing water reuse projects include:

- A clear explanation of the current situation, with examples of where potable reuse already takes place
- A comprehensive explanation of the science
- Partnerships with organizations willing to demonstrate the technology
- Case studies to highlight where this has been done in the past
- If direct potable reuse were to be successfully implemented in Civic Center, it would inspire the necessary public confidence for wider adoption

# TREAT WASTEWATER AS A VALUABLE RESOURCE

## Wastewater

While California is in the process of developing regulations to allow direct potable reuse, this technology has already been successfully used within the United States at Wichita Falls and Big Springs, Texas. The District Plan provides opportunities for San Francisco to lead in California. Internationally, Singapore has the highest uptake of potable reuse. Recycled water is currently meeting 30% of the country's demand, with a projected capacity of 55% of total demand.

Due to the central location and prominence of Civic Center, there is an opportunity for direct potable reuse to be used as a showcase for other projects, not only within San Francisco, but in California and the rest of the United States.

At present, the treatment process used in most potable reuse applications is micro-filtration followed by reverse osmosis membrane treatment and disinfection. The exact treatment type has not been specified for this project, however, as the above local and international sample projects show, the technology is available and proven in the field. The intent of this report is to set targets for treatment and then find the best available technology at the appropriate time to meet the goals.

**Strategies to Achieve Long Term Vision**

Net treatment of all wastewater on-site

Treatment of water to potable standards

Distribution of water in the District potable water network

## Groundwater

Currently nuisance groundwater (sometimes referred to as foundation drainage) is managed in the District buildings via sump pumps. The pumps transfer water into the combined sewer system in order for the buildings to maintain their structural integrity. Data is not complete regarding the quantity of nuisance groundwater, but anecdotal evidence suggests a supply in the range of 12–100 MG/yr. This groundwater could potentially be treated at the District water treatment facility along with other wastewater from the buildings and added to the potable supply to help move the District closer to the goal of zero imported water.

**Strategies to Achieve Long Term Vision**

Nuisance groundwater to be treated to a potable standard and distributed to the potable network


BBR
BBR

# 5 Energy

Installation of solar panels on the south side roof of City Hall. January 2015.

# Existing Energy System & Energy Balance

The current power system in the Civic Center is typical of large cities where electrical energy and natural gas are supplied for heating water and running electrical equipment and devices. Natural gas is a fossil fuel that is drilled from the earth at large distances from San Francisco. This gas is then pressurized and piped into urban areas to run building boilers, hot water heaters and cooking stoves.

| | |
|---|---|
| Megawatt hour | MWh |
| Megawatt | MW |
| Kilowatt | kW |

Electrical energy is, for the most part, produced outside of San Francisco and delivered via electrical transmission lines to substations throughout the City. From there, smaller distribution lines extend throughout the neighborhoods connecting to each power customer through smart meters. Based on the 2003 US Energy Information Administration Commercial Building Energy Consumption Survey, it is estimated that approximately 66% of the power to commercial buildings like in Civic Center is used as electrical energy and 33% is used as natural gas. Natural gas is used primarily for heating buildings and hot water.

The SFPUC has been performing extensive energy efficiency evaluations and retrofits for 11 of the buildings in the area, providing $16 million in funding for efficiency and solar projects. Some retrofits have been completed and others are underway. These investments, retrofits and educational efforts have increased the efficiency of the buildings by approximately 20%. This has reduced the annual energy consumed by about 4.5 MWh while shaving peak demand by 834 kW. Remarkably, these projects provide payback periods of less than 10 years at current utility rates. As a result of this effort, a number of buildings are receiving US Green Building Council LEED certifications, leading with the City Hall as the first historic building in the nation to receive LEED Platinum certification for Existing Buildings: Operations and Maintenance (LEED–EBOM).

In addition, the SFPUC has been installing solar panels and has initiated or completed an acre of panels for 0.4 MW of power generation on just three buildings. These projects have developed the renewable energy capacity in the District and demonstrated cost effective strategies for meeting energy goals.

The SFPUC provides power from Hetch Hetchy to some of the municipal buildings in the District. Currently, each City Department pays either at or below market rates to the SFPUC for providing this service. The new proposed energy system would ensure that Civic Center reduces reliance on imported Hetch Hetchy power, which in turn makes additional clean hydroelectric power available for sale on the open market.

The current energy system in Civic Center has a peak electrical demand of roughly 7 MW of power and involves the following key characteristics:

- Most of the energy is generated outside of the District
- There is a large reliance on fossil fuel to energize the power and gas grids
- Knowledge and control over energy production methods and materials is not possible
- No integration of local sustainable energy feedstocks
- Power supply is susceptible to significant interruptions during natural disasters

# EFFICIENCY FIRST

## Energy Efficiency

The first principle of sustainable energy use is efficiency. For every unit of power not used, significant annual savings are realized in both the cost of energy purchases and in reduction of infrastructure needed to generate energy. In addition, the size of equipment used to gather, generate and deliver the renewable energy can be scaled appropriately to the dense urban setting. The effects of efficiency are most impactful at peak grid load when demand is high and energy is the most expensive. Reducing power consumption creates many benefits and cost reduction opportunities. Efficiency projects and programs are an ongoing effort for all utility providers, district-scale and larger.

Approaches to efficiency are divided into two categories. The first is the consumption choices of building occupants and operators. The second is the efficiency of the building energy systems themselves. Outreach and education can be used for supporting the building staff and the people living and working within the space to foster behavior changes. These outreach efforts can be part of an ongoing strategy to lower costs and can be connected to similar programs industry wide. Energy efficiency retrofit projects can be as simple as updating lighting or as complex as automated management of new advanced building equipment with an interconnection to district utility systems. These projects have large up front costs, but realize savings over time. To facilitate this initial capital, the typical approach is to provide incentives and access to low cost financing.

To understand the design and impact of an efficiency effort, there is a need to gather consumption patterns within the District. Typically usage is tracked through building or tenant smart meters. While significantly helpful, there are new monitoring tools such as wireless sensors to record time of usage information for key equipment within each building. This larger set of usage data will inform energy efficiency efforts that create the most benefit.

The SFPUC generates the *San Francisco Electricity Resources Plan, Achieving San Francisco's Vision for Greenhouse Gas Free Electricity* which has specific recommendations for advancing energy efficiency efforts.

Davies Symphony Hall is a good example in the District where energy efficiency projects have reduced the power consumption of the facility by 36%. The SFPUC looked first at the lighting systems and implemented retrofit measures, realizing annual electricity savings of 585,819 kWh – approximately 23% of electric usage. As a result, the project has an overall payback of 4.9 years. Next, the SFPUC completed retrofits of the building mechanical equipment and realized annual electricity savings of 348,339 kWh – approximately 13% of total usage. This results in an overall payback of 13.8 years.

**Strategies to Achieve Long Term Vision**

Create efficient systems and management strategies to reduce demand

Retrofit buildings with advanced energy controls

Provide building occupants with education and continuous feedback

# Proposed Energy System Concept & Design

Generating electricity creates significant amounts of heat. Typically this heat energy is lost to the environment and is not fully captured for reuse. With strategies including a district hot water loop, sewer heat mining and solar water heating, natural gas consumption will gradually be eliminated in the District. The proposed system aims to first use all available resources within the District to generate electricity and heat. As engineering and technology evolves, embodied power in commodities such as solar exposure, biomass, paper recycling and trash can be exchanged efficiently for heat and electricity on smaller district and building scales. Over time, resources may be developed and conserved to the extent that no imported fossil derived energy may be needed except as a backup source. By relying on readily available low cost urban waste materials, the District can not only create clean low carbon energy but will also increase service resiliency while mitigating future energy price instabilities.

Advanced thermal conversion of biomass to energy will constitute 50 percent of the new energy svstem. Biomass such as wood chips, construction debris, paper recycling, plastic and trash can all be cleanly converted for energy. The second largest energy source for the District will be solar energy, which can be used to produce electricity and heat water and interior building space. However solar gain is limited to half of the day and can be blocked by clouds. The remaining energy sources will come from heat recovery loops and anaerobic digestion. In the future, wind generated power will be integrated into the District's sustainable energy portfolio, pending the development of wind generators that effectively operate in gusty, urban environments. Each of these resources and technologies are being rapidly developed all over the world and district-scale energy planning will ensure that they can be deployed when performance targets are met.

The proposed concept also closely follows the 14 recommendations made in the *San Francisco's Updated Electricity Resource Plan, 2011.* This proposed system design for energy in the Civic Center has some key characteristics:

- The energy is generated inside the sustainable district
- Solar, natural biomass, trash/recycling is used to energize the power and gas grids
- Knowledge and control of energy production criteria is possible
- Low or negative net carbon dioxide and climate change impacts are minimized
- Environmental justice and community impacts are well known
- Full integration of local sustainable energy feedstock is possible
- Energy used during peak periods costs and pollutes no different than at other times
- Small grid energy systems are robust and reliable in natural disasters

**Pilot Projects (SMALL SCALE)**

Implement efficiency retrofits and behavior change education

Estimate district power potential (solar, forest, waste resources)

Demonstrate district-scale electrical, heat and thermal conversion infrastructure

**Building and District Asset Development Projects (MEDIUM SCALE)**

Install building and plaza heat recovery loop (passive, sewer heat, flue stacks)

Integrate solar generation into buildings and public space

Develop resource handling facilities

**Capital Improvement Projects (LARGE SCALE)**

Implement district heat and power loop management systems

Construct energy storage facilities

Install district-scale thermal conversion

**PROPOSED ENERGY PORTFOLIO**

| | | Contribution (%) | Energy (MW) | |
|---|---|---|---|---|
|  | Biomass Thermal Conversion | 50% | 2.0 | 60 tons/day of biomass, plastic, paper, etc. |
|  | Future Solar and Wind Energy | 25% | 1.0 | Approximately 2 acres roof area and ½ acre of pedestrian rain and shade covers |
|  | Existing Solar Energy Installed | 10% | 0.4 | 0.65 acres of roof area for solar |
|  | Heat Energy Recovery Loops | 12.5% | 0.5 | Sewer heat and flue mining, combined heat and power, passive solar |
|  | Anaerobic Digestion | 2.5% | 0.1 | Wastewater energy potential for 0.5 M people |
| | **Total** | **100%** | **4.0 MW** | |

# Balancing the Power Grid

The key objective when balancing the power grid is to reduce baseline peak energy in three steps and to use renewable energy to effectively meet those demands.

**STEP 1** Reduce the baseline peak demand by approximately 14% or 1 MW through short-term retrofits such as:

- Building Energy Audits and fixture replacement
- Building occupancy education

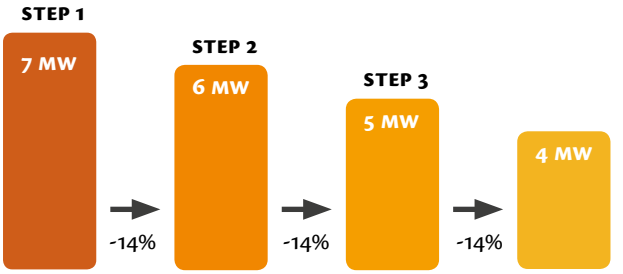
**STEP 2** Reduce the efficient demand by another 14% or 1 MW through long-term retrofits such as:

- Building renovation
- New advanced building management systems

**STEP 3** Reduce the energy demand another 14% or 1 MW through the installation of the district-scale electrical grid and hot water loop. This creates key advantages such as:

- Ability to distribute heat from electricity production to each building
- Energy storage to reduce peak demand
- Energy efficiency through load sharing between buildings

The build out of the district-scale utilities may be completed through a variety of small, medium and large infrastructure projects. A proposed list of projects is shown on the previous page.




Power Grid Balancing – Peak Demand Reduction

# SHARING DISTRICT ENERGY AND SMOOTHING OUT THE PEAKS AND VALLEYS OF CONSUMPTION

## District Energy Grid and Storage

The proposed District energy system is a new set of electrical wires that connects each building (behind the meter) to a central facility where generation, storage and usage monitoring occurs. Each building's existing connection to the larger City grid can be maintained as a backup or supplemental power as needed. This new District grid allows for alternative energy to be provided directly to each building while redistributing and storing any excess generation for meeting the next peak demand. The District electrical system can also assist with emergency readiness goals by providing a resilient energy supply to the Civic Center without depending on a larger grid and substation network.

Energy consumption varies widely between day and night. Low demand occurs for a third of the day, partial-peak demand for another third and peak demand is from mid afternoon and into the evening for the final third of the day. To generate electricity for the peak hours of the day, utilities often make the least efficient and clean energy and/or pay the highest cost on the open market to meet demand. It is at these times that low cost electricity storage can help transfer easily generated power during the night time and deliver it to buildings during peak afternoon periods, thus reducing environmental and financial impacts of peak energy use.

Energy storage often consists of industrial size batteries that can store up to several megawatts of power. Battery technology is rapidly advancing to meet the market challenge of high peak demand prices and the size of these batteries are often no more than a few parking spaces. Energy storage can also be a renewable generating technology that can be deployed or ramped up during peaking periods. Feedstocks or supply material such as wood chips or biogas for generators can also be delivered and stored during the night to be used during the day. There is also an opportunity to integrate the batteries within the City's electric and future hydrogen vehicle fleet to store and balance the District's energy supply. Other potential revenue positive activities may include utilizing low cost energy during the night from the larger regional electrical grid and then providing the stored renewable energy to the surrounding neighborhoods to meet high value peak power.

For example, peak power is twice as high as partial peak, which is about twice as high as off peak power rates. Energy storage can be utilized to smooth out the peak and create a steady partial peak demand throughout the day. For the District, this can mean that as much as 2 MW of power could be stored and transferred from nighttime generation to daytime use.

**Strategies to Achieve Long Term Vision**

Actively manage loads while distributing clean energy production

Identify locally available energy resources and optimize their use

Generate renewable energy onsite when district grid use is low and store for peak evening time use

# URBAN WASTE REUSE AND GROWING ENERGY WITH PUBLIC SPACE

## Thermal Conversion

**Strategies to Achieve Long Term Vision**

Develop feedstock handling facilities and thermal generation

Source feedstock material primarily from within and near the district

Integrate electricity and heating through district heat and power loops

Thermal conversion is the process where carbon dense materials are converted into a syngas or natural gas, which is burned in a generator for electricity, heat and ash residue. The process of the carbon moving from a solid state to a gaseous one is called gasification or pyrolysis and occurs under high temperatures and pressure changes with controlled amounts of oxygen. This creates a clean burning natural gas and, when combusted, creates similar emissions. The heat from combustion can be collected and directly reused within a district hot water loop. The remaining ash content can vary in quality but still contains valuable carbon and can often be sold directly as a soil amendment or introduced into other industrial fuel streams.

The main benefit of thermal conversion is the reuse of urban waste material such as street trees and clippings from green stormwater infrastructure. Woodchips from proactive pruning and thinning of the urban forest offers a steady supply of an energy rich feedstock. Also, the plastic, paper and carbon from the municipal black, blue and green trash bins can be utilized.

Thermal conversion is different than open air burning in that the syngas can be cleaned to a comparable quality of stove gas prior to combustion in a generator. Within the conversion chamber, the conditions are more extreme than in open air burning, further reducing formation of air pollutants from the potentially harmful mix of chemicals found in regular trash.

To generate the 2 MW of power estimated as the new efficient demand in the District, roughly 60 tons or about 4 full semi trucks per day of energy rich feedstock material, otherwise discarded as garbage or waste, would be needed. This material could first be sourced from within the District and then from surrounding neighborhoods. Information published by *CalRecycle* was used to estimate the available feedstock within the District at approximately 50 tons per day, plus another 10 which will come from trees and vegetation in the form of woody material.

# COLLECTING, STORING AND DISTRIBUTING HEAT AS ENERGY

## District Hot Water Loop

Low temperature hot water is an efficient way to store energy generated at both a centralized district heating plant along with distributed heat sources throughout the District. Once captured the heat energy can be moved to each building for interior space heating along with the preheating of potable hot water supplies. At the central facility, heat can be captured that is generated as a byproduct of burning syngas for electricity generation. The low temperature of the hot water loop allows for the economical recovery of nearly all of the heat from the flue stack of the thermal conversion unit. Distributed heat sources throughout the District include solar gain, such as solar water heating, and sewer water heat mining.

Solar hot water is one of the most efficient ways to capture incoming light energy and represents one of the best strategies to reduce consumption of imported energy into the District. By storing excess energy from the sun during the day, the heat can be used at night.

Sewer heat mining is another strategy that involves transferring the energy of sewer water into heat energy for the hot water loop. Removing heat from sewer water prior to it dissipating in the sanitary sewer system represents an opportunity to capture energy. This is an emerging approach to gathering heat energy and multiple manufacturers are new providing sewer heat recovery valves and equipment.

The flexibility of a low temperature hot water loop helps make it a good approach for district heating systems, particularly when transitioning from the energy dense steam loops that have traditionally been operated for district heating.

**Strategies to Achieve Long Term Vision**

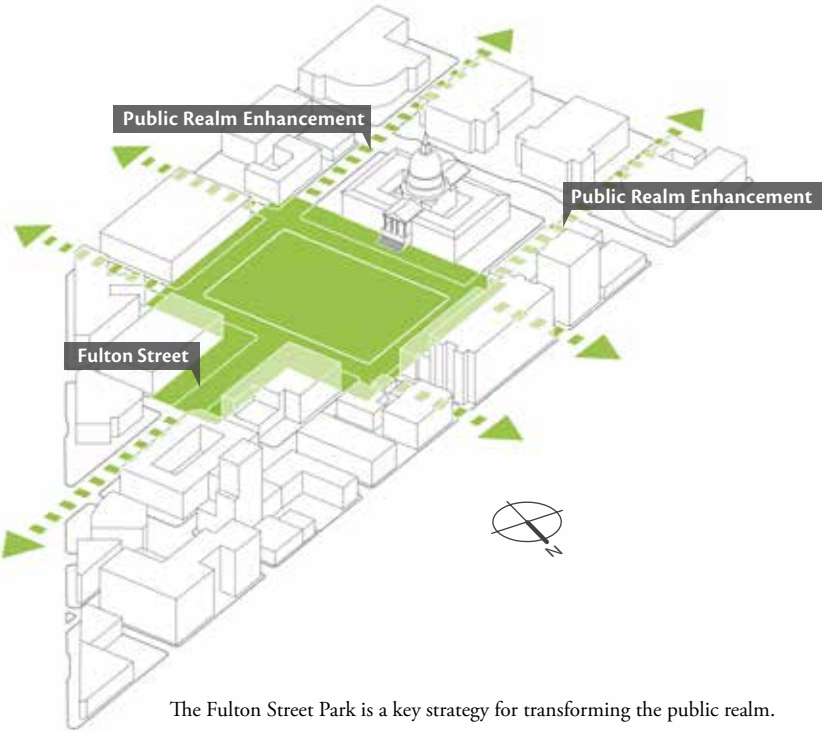
Install low temperature hot water loop to distribute heat from centralized power plant

Scavenge heat from both solar gain and sewer heat mining


6 A.M.
HOLIDAYS
CLEANING
HAVELI
MIRCH MASALA


# 6 Public Realm

◂ Placemaking: Market and 6th Street
San Francisco, May 2013.




The Fulton Street Park is a key strategy for transforming the public realm.

Maintain the District's wide open spaces and expansive character

Utilize green infrastructure improvements as a catalyst to bring nature to the District

Create a framework of green streets to improve function, character and unify the District

Redevelop streetscapes to narrow excessive walks and widen inadequate corridors

Transform the Fulton Street corridor into an urban green space

Engage visitors with a daylit reach of Hayes Creek

Reveal the water cycle through design

Integrate the water into public spaces to improve quality and character

Weave in visible stormwater management systems, energy production, and resource conservation

Improve connections to adjacent neighborhoods via physical changes in the public realm

Use lighting and programming to improve nighttime conditions

Add special qualities and flexible programing to targeted areas

Provide incentives to private sector to support ecodistrict efforts

Incorporate opportunities for urban agriculture

# District Wide Public Realm Strategy

Public spaces present the opportunity to improve a city's quality, usability and character through the thoughtful balancing of form and function. With the on-going infrastructure updates within the District, many opportunities to redevelop sidewalks, streets and park spaces will arise. The area surrounding the District is also changing rapidly due to the number of new employees and residents moving into close proximity. With the opportunity and the need to improve the public realm, a scaled approach can be used to make small scale improvements in the near term while planning for large scale transformations in the long term.

By incorporating energy, water and wastewater demonstration strategies in the public realm, these improvements will educate the public on sustainable concepts and practices and help further the evolution of citywide sustainability.

Improvements in the District will seek to balance the needs of all street users, with a particular focus on the pedestrian environment and how streetscapes can be used as public space. They are informed by four overriding City policies:

- Complete Streets Policy
  (Public Works Code Section 2.4.13)
- Better Streets Policy
  (Administrative Code Section 98.1)
- Better Streets Plan
  (adopted December 2010)
- Transit-First Policy
  (City Charter Section 16.102)

Adhering to these policies and plans will create a vibrant and connected public realm that is coordinated with new sustainable district infrastructure. While the work is focused on the public right-of-way, it should also influence the park spaces, entry courts and publicly accessible spaces around buildings.

The landscape within the District can be beautiful, functional and informative. The daily use, programed events and evolving recreational uses of the District's varied landscapes have the potential to create a basic conflict with water conservation. Specifically the extensive lawn areas require large amounts of irrigation water. Yet these lawn areas provide a high degree of program and recreational flexibility. Recycled water, paired with conservation, can address these concerns. Redevelopment projects can utilize appropriate landscape typologies where the program and site conditions match. Lawn space should not be completely eliminated; however, they should be used selectively in areas where gathering and recreation require it as a flexible surface. These landscape areas have the capacity to engage the public by being demonstration gardens, such as native collections or adaptive plantings that target pollinators, resident and migratory song birds and help residents connect to nature in their urban environment.

# Demonstration Project: Fulton Street

In the public workshops conducted for this plan, Fulton Street between Larkin Street and Hyde Street was widely acknowledged to be the most underutilized section of the District's public realm. This area presents a tremendous opportunity to make a transformation which addresses the District's sustainability goals and open space needs. This block of Fulton Street is framed by the Asian Art Museum, the San Francisco Public Library, United Nations Plaza and Civic Center Plaza. City Hall is a powerful backdrop to the west and the bustle of Market Street and the activities of the plazas make this an ideal addition to the District's recreational public realm. Sustainability can take many forms and provide vital opportunities to address stormwater issues, generate power, communicate with the public and provide recreation and program opportunities. Integration of programmable space with sustainable infrastructure would allow redevelopment to bring together key goals of the District into one place of renewal. The programing, design and development of this area would be a significant undertaking and with its potential to integrate significant infrastructure elements is seen as a long term effort. Planning and creative thinking should continue in an effort to convert Fulton Street to a meaningful part of the District's sustainable character.

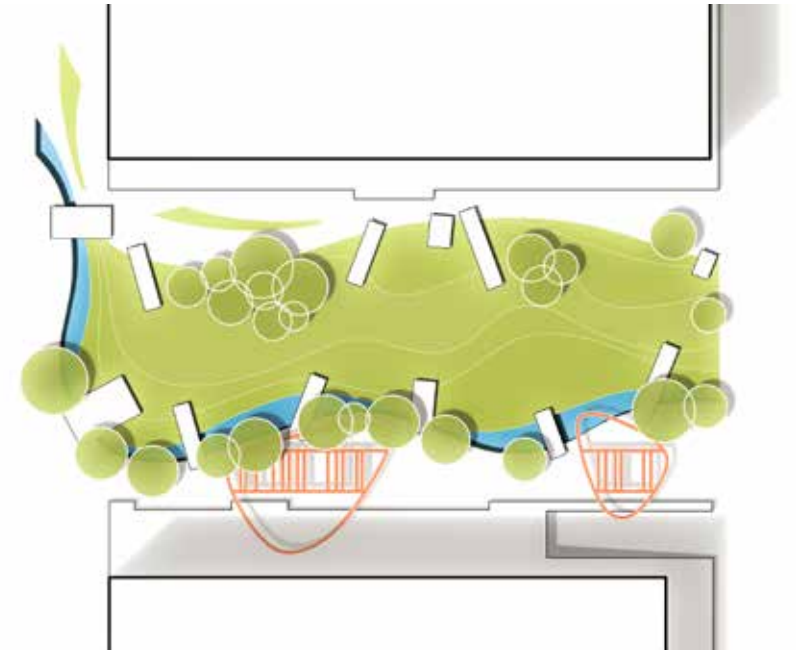
**Key components:**

- Reclaim the public realm from an auto-centric condition for the benefit of the neighborhood, pedestrians and daily visitors
- Connect public spaces at Civic Center Park and United Nations Plaza to form a unified setting
- Allow for stormwater function and demonstration on a significant level
- Daylight Hayes Creek to connect to natural history and create unique urban setting
- Create additional space for emergency preparedness and resiliency
- Establish much needed recreational and programmable space for the growing community
- Allow for fixed kiosks and flexible vendors to provide day and evening services
- Provide visitor education and interpretation

# Fulton Street Transformation

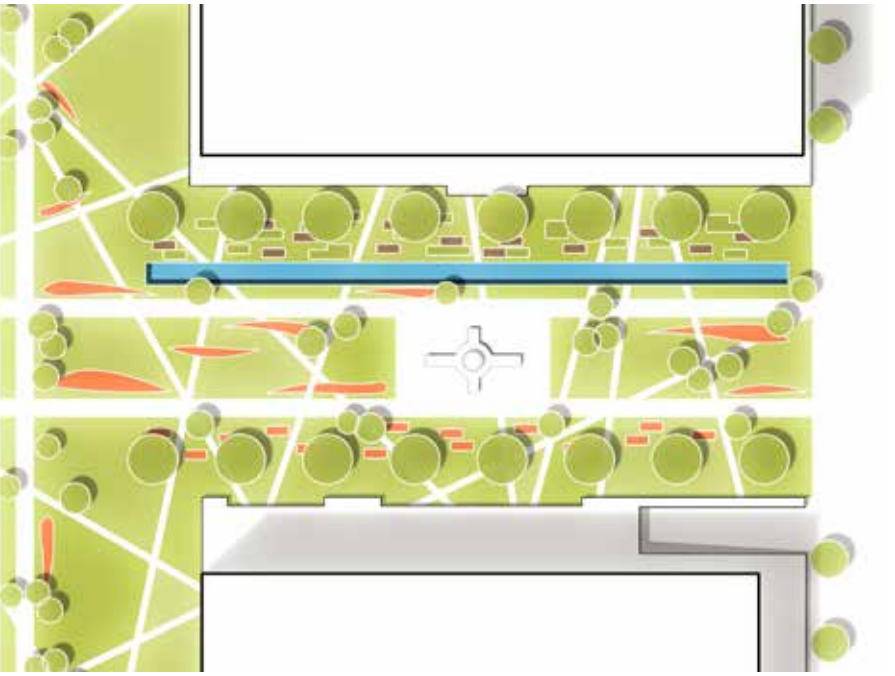
**Concept 1**

Transforming the urban street into a more natural space with a water feature, including a day-lit reach of Hayes Creek. The creek and park, coupled with flood storage, can link the users to their water cycle and function as an attractive public amenity.



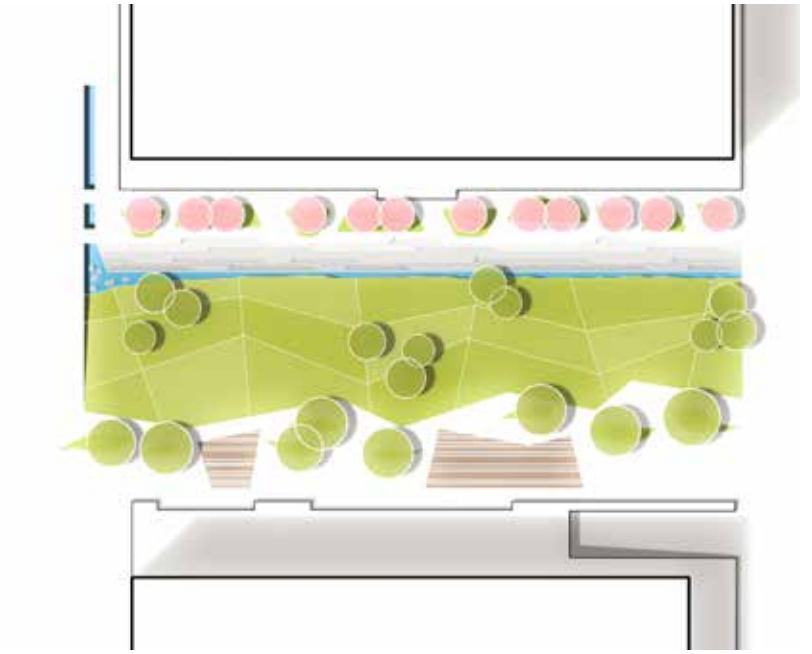
**Concept 2**

Converting the Fulton corridor from an auto-centric zone to an expansive park-like setting can unify the District's major public spaces. The integration of sustainable measures and improvements to the public realm can boldly extend into reclaiming roadway and parking.



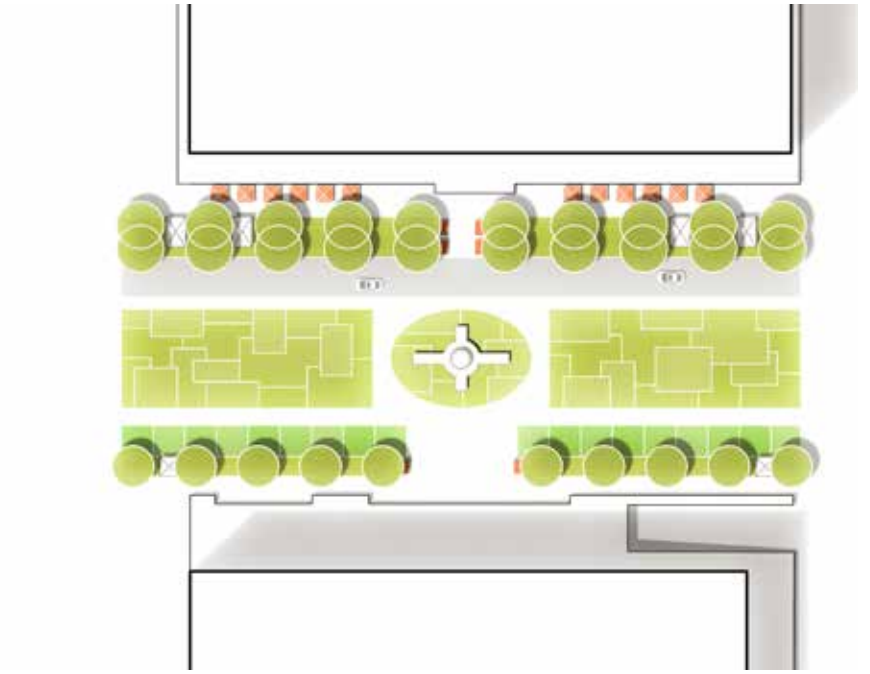
**Concept 3**

Removing the structure of the street and formal tree plantings could create an independent space within the District. Stormwater management and connecting the public to the water cycle add value and atmosphere to the landscape.



**Concept 4**

Gaining public gathering and recreation space is a key opportunity with the redevelopment of this space. Minimal structural changes can create a valuable demonstration space that contributes greatly to the public realm.



# Demonstration Project: Grove Green Street

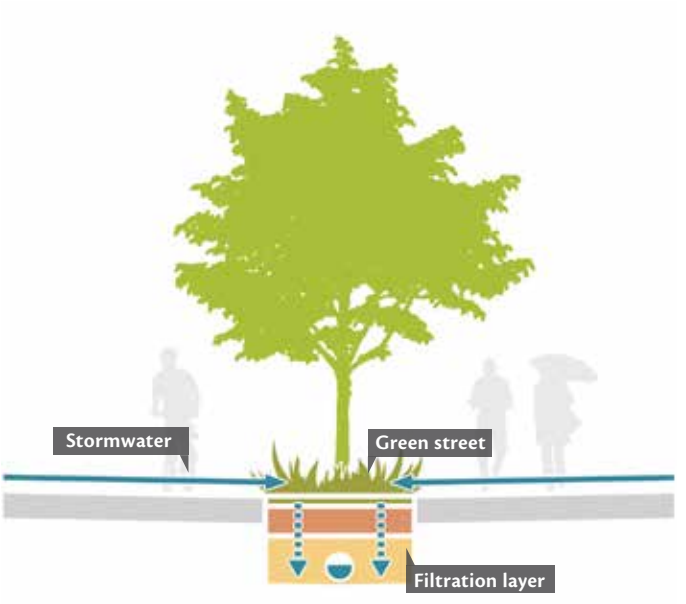
An improved pedestrian environment along Grove Street was identified as a key need during both public workshops. Linking the District to the Market Street corridor and establishing a beneficial gateway for visitors is also necessary. In keeping with a district wide approach, an improved Grove Street attends to the needs of people first, considering pedestrians, cyclists, businesses, street trees, stormwater management, lighting and livability, as well as parking and vehicular circulation. The Grove Street link is a prime candidate for improvement because of its immediate need, potential for public-private partnerships and reasonable scale. By pairing the improvements with district utility upgrades, the corridor has the potential to be a catalyst for the District Plan. Improvements can range greatly from pedestrian and public realm intensive solutions to modest changes which do not include infrastructure.

**Key components:**

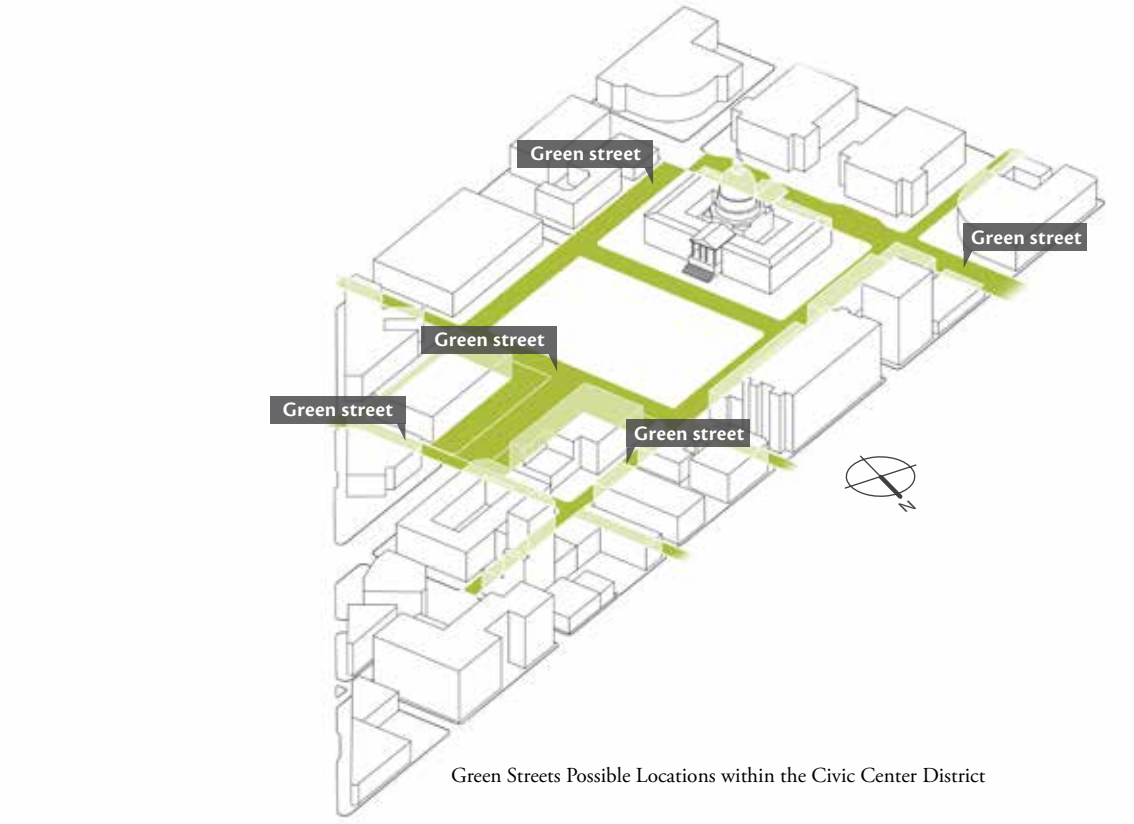
- Widen the sidewalk for better access and café seating opportunities
- Improve street lighting for comfort and safety
- Add bicycle lanes for connectivity
- Provide streetscape furnishings such as benches, planters and recycling-waste
- Introduce green infrastructure and stormwater planters
- Narrow the road to allow for sidewalk improvements
- Adjust parking layout to allow for street trees and stormwater planters
- Promote public-private partnerships to foster redevelopment

**Green Streets**

Stormwater from public rights-of-way can be cleaned, infiltrated or detained through a series of green street corridors and integrated planters.




Green Streets Infiltration Planters

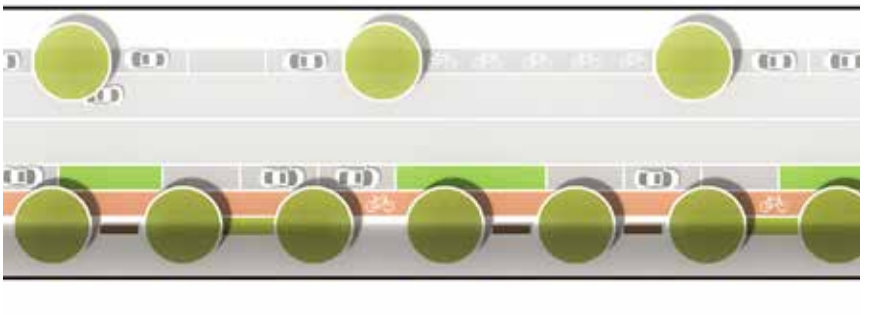



Green Streets Possible Locations within the Civic Center District

## GROVE STREET DEMONSTRATION PROJECT CONCEPTS

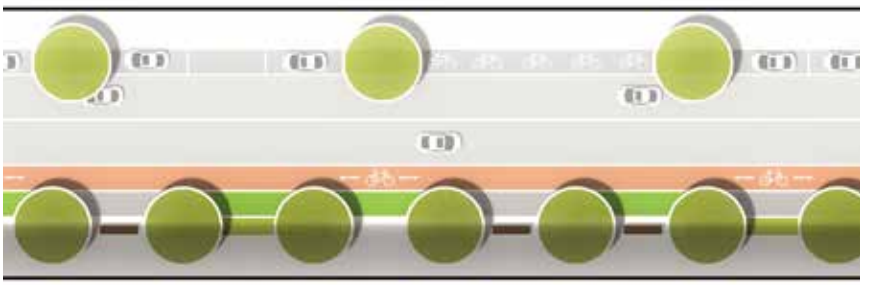
**Concept 1**

Create a more complete street by increasing the appeal and function of the Grove Corridor through wider sidewalks, increased lighting and the addition of stormwater treatment. Provide a balanced approach to a broad set of goals.



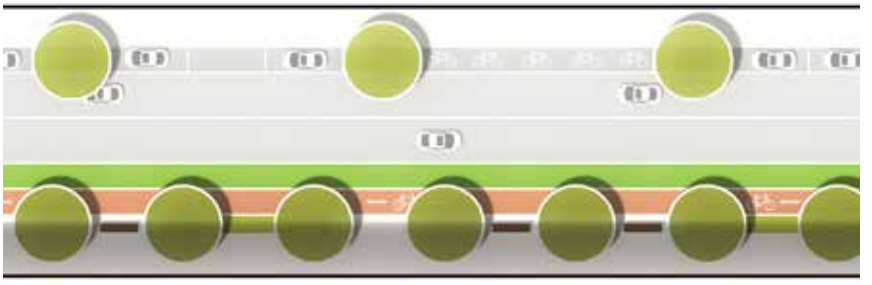
**Concept 2**

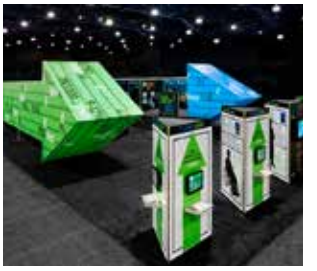
Expand the vibrancy of the street by increasing opportunities for sidewalk activities that support the commercial and entertainment character of the corridor. Gain space by putting Grove Street on a *road diet*.

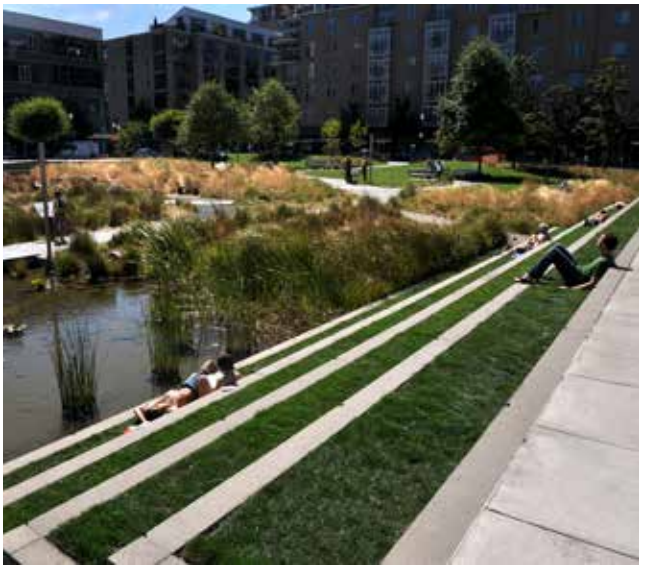


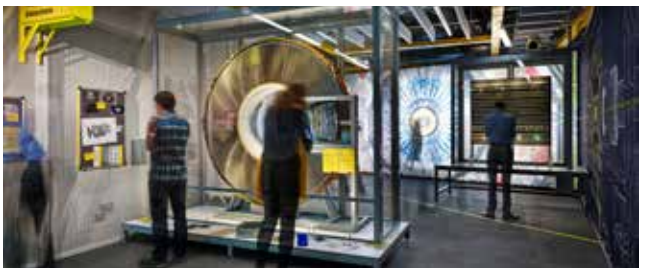
**Concept 3**

Expand bicycle circulation and stormwater treatment to help define the corridor as a gateway into the District.









## Public Involvement

The public involvement process that was used to support the creation of this District Plan was a public workshop format with information presented by the project team and feedback from the public collected to inform the next phase of planning. Summary reports for the public workshops area included as Appendix C. Implementation of the District Plan must also be based on an inclusive and intensive public process. By gaining public understanding, project development can be better informed and the developed concepts are more likely to be supported and successfully implemented as projects. Regular communication is therefore essential and should be engaged at multiple levels. Parallel to the general public involvement, targeted public and private stakeholders should be involved in the input process. Most importantly and beyond these typical involvement formats, the concept of a Steering Committee will be an essential mechanism for implementing an ongoing participation and activation process.

## Education and Art

Sustainable infrastructure can take many forms and is often difficult to see or fully comprehend. Expressing the more intangible aspects of the District's sustainable systems through art and interactive interpretive kiosks presents opportunities to connect to a broad audience and activate the public realm. During the public workshops, art was mentioned multiple times as a desirable tool to transport the ideas and sustainable concepts to those that inhabit and visit the District. With large numbers of visitors coming to the District for leisure, recreation or business, the story of Civic Center sustainable improvements can be shared via a playful and interactive network of art and education. Many great examples exist elsewhere, ranging from artful downspouts and water elements to sculptural water treatment structures or photo-voltaic elements woven throughout the landscape.

## Visitor Center

To maximize the benefits of the new sustainable district, ideally a visitor center would be formed to serve the ongoing development and distribution of knowledge. This center can take many forms and be both a physical destination and an institutional organization of inspired people. The physical center would serve as a destination for visitors eager to learn more about San Francisco's progressive urban infrastructure and the commitment to our common future. The institutional center would consist of a consortium of innovative thinkers creating a sustainable hub that is able to promote local technology, develop site specific strategies and parlay its strengths to bring state, national and world-wide experts together. In addition to daily activities and ongoing research efforts, the Center's central location and scale has the potential to support discussions, tours and interactions with local universities.

◂ Public education and art can be integrated into an enhanced and sustainable public realm

# 7 Resiliency

The ruins of San Francisco's former City Hall building at McAllister St. and Larkin St. after the 1906 earthquake and fire.


Water, wastewater treatment and energy could be made available to City citizens in case of a catastrophic event

## Emergency Readiness and Disaster Response

The proposed district-scale utilities concept would essentially create two redundant systems for the provision of water, power and sewer services. On a day-to-day basis, the district-scale utility system would be used to conserve imported water and to generate local energy supplies. If there were problems with any of the district-scale systems, the existing City systems could be relied upon until those issues were resolved. If the City systems were to be compromised, the fully independent district-scale utility would continue to serve the Civic Center and neighboring areas.

The Civic Center is home to San Francisco's City government and keeping this area on line in the event of a catastrophic event should be a critical component of San Francisco's response to earthquakes or other catastrophic events. The public realm, so often used for large public events such as the Gay Pride Parade and World Series celebrations, could function as a staging area for emergency response. Potable water from the district-scale treatment system could also be made available to City residents if the city-wide potable water system were to be impacted by a catastrophic event.

Another important benefit of the district-scale concept is that coordination among the Civic Center buildings on the management of the district-scale utility system would provide an existing network for coordinating emergency response in the area. The buildings managers in the area currently have an informal emergency response working group. With guidance from the Steering Committee, this existing collaboration could be further developed in coordination with the work on establishing and maintaining elements of the district-scale utilities.

## Climate Change Adaptation

As discussed previously, the district-scale utilities concepts that have been proposed will directly respond to climate change by lowering the carbon footprint of the area, providing a drought-resistant water supply and contributing to flood management.

The Civic Center Sustainable Utility District is also intended to serve as model for potential future sustainability improvements elsewhere in San Francisco and beyond. In this way, the impact of actions taken in the Civic Center area can have an even greater impact on how our society addresses and adapts to global climate change.

# 8 Steps Towards Implementation

## General Approach

The following measures will support implementation of the concepts outlined in this District Plan:

- **SUPPORT CIVIC CENTER PUBLIC REALM PLAN.** The Civic Center Public Realm Plan is a project led by the San Francisco Planning Department in close partnership with other City agencies, Civic Center organizations, and the broader community. The plan will coordinate various plans and city projects within the Civic Center to create a unified design vision and implementation plan for improvements to the Civic Center's streets, plazas, and other public spaces.
- **CREATE A STEERING COMMITTEE.** In conjunction with the development of the Civic Center Public Realm Plan, bring together a Steering Committee that can oversee coordination and implementation of major infrastructure and public realm projects within the Civic Center. The Committee would consist of representatives from key City agencies, the District buildings, and local non-governmental organizations.
- **IDENTIFY FUNDING.** To the extent that projects overlap with necessary improvements to existing infrastructure, they can be funded through the usual mechanisms for infrastructure upgrades within San Francisco. Additionally, grant funding for some portion of these projects is especially desirable and appropriate due to the innovative nature of the projects and high public profile.
- **CONTINUE PUBLIC ENGAGEMENT.** Building on the two public workshops that were part of the development of the District Plan, public outreach should be continued as the projects move through the design and implementation process.

The design concepts proposed in this District Plan are intended to inspire and fuel future efforts to revitalize the Civic Center area. Major changes to the Civic Center area will require intensive coordination between City agencies as well as expanded public outreach. Additionally, design concepts will need to be updated through this process as technologies change and new opportunities for creating more sustainable infrastructure arise.

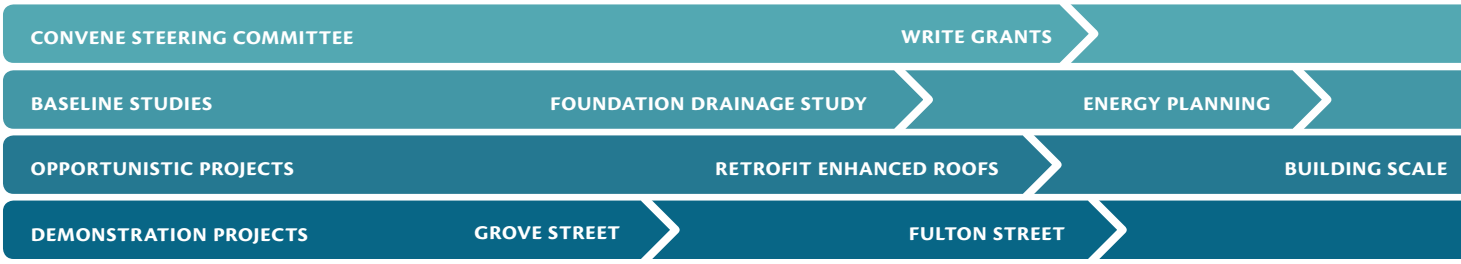
# Implementation – Project Types

The vision laid out by this plan will be accomplished by a combination of small and big moves. Generally, the actions to be taken include:

- Conduct baseline studies to fill existing data gaps and support future projects
- Support and coordinate opportunistic projects that help fulfill the overall District goals
- Implement demonstration projects that provide immediate benefits and can be integrated into the long term vision
- Construct District-scale utility infrastructure to provide maximum resource use efficiency and District resiliency.

**BASELINE STUDIES**

Additional information is needed in order to move forward with some portions of the District Plan. Some additional baseline studies will be required to better inform project design and implementation. For example, several buildings in the District have operational foundation drainage pumps that discharge to the combined sewer. The quantity of discharge is not currently monitored. Additional information about foundation drainage and local groundwater will help future planning for district-scale water supply.




Steps Towards Realization – Timeline

### OPPORTUNISTIC PROJECTS

Civic Center is being rebuilt every day. Some measures that will help move the District toward the vision for sustainable utilities can be implemented opportunistically along with other needed repairs. Buildings in the District will need upgrades in the future to both comply with regulations and replace infrastructure that has exceeded its useful life. As these upgrades are made, sustainability features such as green roofs and solar panels could be installed. With leadership from the Steering Committee, upgrades can be done in a more sustainable way while opportunities for utilities improvements are identified and acted upon.

### DEMONSTRATION PROJECTS

Highly-visible demonstration projects are needed to catalyze bigger changes and to help realize the long term vision. The District Plan is recommending two demonstration projects:

1. Grove Street – demonstrates stormwater management and public realm improvements
2. Fulton Street – demonstrates district-scale water and energy concepts

### DISTRICT-SCALE UTILITY INFRASTRUCTURE

Constructing district-scale utility infrastructure (i.e. water treatment and energy generation facilities, including water pipelines and energy grid) is a significant undertaking. This District Plan envisions that the district-scale utility infrastructure would be constructed after the implementation of the Grove Street and Fulton Street demonstration projects. Preliminary design of the district-scale utility infrastructure should, however, be completed in advance of implementing the demonstration projects so that accommodations can be made for the future utility infrastructure.

# 9 Appendices

## List of figures

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TYPEFACES USED:
Cronos Pro, Adobe Garamond Pro

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