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Engineering Justice:
Cities, Race, and 21st Century Wastewater Infrastructure

By

Miriam Solis

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requirements of the degree of

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in

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Abstract

Engineering Justice:
Cities, Race, and 21st Century Wastewater Infrastructure

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Public works across the country are reaching the end of their life-cycle. Water infrastructure systems, particularly those in older cities, are not equipped to deal with population growth nor the potential consequences of climate change. Wastewater planning methods of the past will not sufficiently address environmental degradation or keep up with user demands. As officials look to improve their water infrastructure, scholars are advocating for “soft path” or “Water 4.0” approaches to decentralize infrastructure and management. Calls for greater equity, however, are often absent in uses of these frameworks. Furthermore, scholarship’s focus on the impacts of old and new infrastructure neglects repair as a necessary site for critical engagement. Repair can perpetuate social and spatial inequalities; it is also an opportunity to reimagine and create infrastructure that is environmentally just.

This dissertation enters this timely junction by asking how responding to environmental justice claims benefits wastewater infrastructure rebuilding in older cities. I investigate this question through an examination of San Francisco’s Sewer System Improvement Program (SSIP), a 20-year, \$6.98 billion capital improvement project. Using interviews, original document review, and participant observation, I focus on the years from 2009 to 2017 of five rebuilding phases: project objectives, environmental review, project selection, project implementation/construction, and monitoring and evaluation. I build on environmental justice scholarship that identifies the equity implications of capital improvement plans. I also apply a structural racism lens to highlight the inter-institutional relationships and processes that create racialized outcomes.

I find that the pursuit of racial justice in rebuilding projects reveals cumulative impacts, enhances organizational capacity, involves activating more substantive forms of sustainability, unlocks the anchor potential of public works agencies, and is implicated in gentrification trends. Findings are used to develop a heuristic framework to engineer justice through the consideration of procedural and distributive justice in each phase of planning. This approach to confronting structural racism elucidates the political relationships within which infrastructure is embedded. It also enhances conventional planning and engineering practice.

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1. New Water Ways

Introduction

“Water is Life” has emerged as an axiom for progressive causes.¹ The phrase was popularized in 2016, when tribal nations led a movement against the Dakota Access Pipeline. The underground infrastructure to transport oil desecrated burial sites and threatened the Missouri River, a primary source of drinking water and irrigation of the Standing Rock Sioux and many downstream communities (Taliman 2016). A year prior to the NoDAPL movement, a health crisis also brought a renewed focus to water. Residents of Flint, Michigan—57% of whom are African American—pushed government officials to test their water quality, due to its strong odor and strange color. Subsequent testing and disclosures revealed that, for the past year and half, their water source had been contaminated by lead and other metals. City officials had failed to institute the proper corrosion controls when it switched water sources, meaning that the infrastructure system’s cast iron piping was leaking contaminants. An estimated 6,000-12,000 children had elevated lead levels as result, a toxin associated with cognitive and behavioral problems (Hurley 2016). The polluted water has also been linked to an outbreak of Legionnaire’s disease that affected 91 residents, 12 of whom died (Schwake et al. 2016; Masten, Davies, and Mcelmurry 2016). Residents continue to be involved in advocating for their right to clean water.

Both campaigns generated awareness and public debate about a topic that many other marginalized communities have long-known: water, and the infrastructure used to convey and treat it, forms part of a larger structural fabric that compounds racial inequality. San Francisco, California is also an illustrative example. Since the 1970s, 80% of the city’s wastewater has been conveyed to the Southeast Treatment Plant (SEP) in the city’s Bayview Hunters Point, a historically African-American and low-income neighborhood.² The plant has long been a source of odor and pollution. As discussed later in this chapter and throughout this dissertation, siting is just one of many ways communities are adversely impacted by water infrastructure systems.

Today, the treatment plant—like other public works across the country that are reaching the end of their life-cycle—is slated to be rebuilt. Water infrastructure systems, particularly those in older cities, are not equipped to deal with population growth nor the potential consequences of climate change (Buchberger et al. 2009). Decades of data show that conventional engineering solutions to wastewater planning will not sufficiently address environmental degradation or keep up with user demands. As officials look to improve their water infrastructure, engineers, planners, and scientists are also asserting the need to do

¹ For example, social media users, organizers, and advocates are disseminating the combined expressions: “Love is Love, Water is Life, Black Lives Matter, No Muslim Registry, Trans is Beautiful, Immigrants Make America Great, and Women’s Rights are Human Rights.” (Braun 2017) This kind solidarity has emerged as part of efforts to resist Donald J. Trump’s conservative policies.

² In this dissertation, wastewater constitutes both sewer water and surface runoff, since San Francisco’s combined sewer system collects and treats both. Some systems have separate infrastructure systems for sewer water and surface runoff.

water planning differently. Christian-Smith and Gleick (2012), for example, call for a shift from a hard path to a soft path to water that involves the decentralization of infrastructure and management. The proposed approach creates more efficiencies and flexibility in resource management to match users' needs. These ideas are echoed in Sedlak's (2014) Water 4.0 concept, which calls for decentralized wastewater planning systems that involve enhanced engagement on the part of homes and neighborhoods. Calls for greater equity are often absent in uses of these frameworks.

Indeed, how the new era of wastewater infrastructure is planned remains an open question. It is possible that by relying on well-established tools and perspectives that are reductionist and deterministic cities' approaches to rebuilding will continue to adversely impact low-income residents of color. On the other hand, cities may attempt to undertake more decentralized approaches like those advocated by Christian-Smith and Gleick (2012) and Sedlak (2014), although this pursuit holds no guarantees for how already vulnerable residents will fare in this process. My dissertation enters this junction by asking, how does responding to environmental justice claims benefit wastewater infrastructure rebuilding in older cities? This overarching question prompts the following sub-questions:

- How can planners and engineers engage with disadvantaged communities to promote justice?
- How are public and private organizations equipped to undertake this work?
- How can sustainability initiatives advance racial justice?
- How can infrastructure rebuilding reduce community vulnerabilities?

I investigate this question through an examination of San Francisco's Sewer System Improvement Program (SSIP), a 20-year, \$6.98 billion capital improvement project. Using interviews, original document review, and participant observation, I focus on the years from 2009 to 2017 of five rebuilding phases: project objectives, environmental review, project selection, project implementation/construction, and monitoring and evaluation. I build on environmental justice scholarship that identifies the equity implications of capital improvement plans. I also apply a structural racism lens to highlight the inter-institutional relationships and processes that create racialized outcomes.

I find that the pursuit of racial justice in rebuilding projects reveals cumulative impacts, enhances organizational capacity, involves activating more substantive forms of sustainability, unlocks the anchor potential of public works agencies, and is implicated in gentrification trends. Findings are used to develop a framework to engineer justice through the consideration of procedural and distributive justice in each phase of planning (Figure 1). This approach to confronting structural racism elucidates the political relationships within which infrastructure is embedded. It also enhances conventional planning and engineering practices. Chapter 2 discusses the framework in more detail.



Figure 1. Diagram of Engineering Justice framework. Structural racism can be confronted by pursuing procedural and distributive justice in each phase of planning.

Why Wastewater Infrastructure?

Until recently, academic reflections on water services have tended to characterize them as buried or unseen. They were a “hidden function” of local government, and they are expected and taken for granted (Jones, Drew, and Greenberg 1980). The adverse impacts of wastewater systems have been disguised by the myth of the universal access to water services in the United States (Wescoat, Headington, and Theobald 2007). The strong perception of universal access to services is reinforced by the 100% service provision rates reported on multilateral organizations’ international surveys, such as the World Health Organization’s Joint Monitoring Programme.

This perspective of unappreciated water infrastructure and services disregards the lived experience of those who understand water systems differently as a result of being adversely impacted by them. The dissertation opened with two recent water movements that have contributed to foregrounding how water contributes to the marginalization of low-income communities of color. Here, I elaborate on several ways in which scholars have documented these impacts. I discuss another reason for the change in public awareness on water matters: the expected influx of infrastructure rebuilding projects due to their current failing state.

Inequity in Wastewater Policy and Planning

Wastewater planning has long-formed part of a larger structural fabric that sustains racial inequality. As Bullard (1993) puts it, “Environmental racism is reinforced by government, legal, economic, political, and military institutions” (451). Several bodies of scholarship have elucidated the various consequences of these structural exclusions for low-income communities of color and provide an important starting point for understanding infrastructure rebuilding’s implications for equity. Treatment plants that are sited in low-income communities of color are one widely written-about area. These “locally undesirable land uses” (LULUs) are large scale developments that were mostly built in the 1960s and 70s to adhere to the federal Clean Water Act. The siting of these plants is partly the result of the more powerful communities’ ability to assert that these be sited “not in my backyard” (NIMBY). LULUs are considered important resources but these pose health and safety hazards in the communities where they are located (Neltner 2005). Treatment plants are thus an ongoing source of debate in many cities across the country. In Camden, New Jersey, for example, the city built a large treatment plant that could process the sewage from 35 municipalities in a low- income community (Pomar and Cole 2002). In this case and in many others, the treatment plants have been only one of multiple polluters in the given area. Subterranean siting is also a problem. Large pipes channel aggregate amounts of domestic and industrial wastewater to treatment plants. A wastewater pipe that is 20 feet in diameter ran through Philadelphia’s Mill Creek neighborhood (Spirn 2005). Over time, increasing suburbanization overwhelmed the pipe, leading to pipe bursts that caused cave-ins and flooded the predominantly African American neighborhood. This chronic problem did not prevent the city from building public housing over the pipe.

The location of combined sewer outfalls has presented significant challenges for low-income communities of color. Combined sewers are designed to hold both storm-water and wastewater. During heavy wet weather periods, these systems lack the capacity to convey all of the water to treatment plants, and thus release discharges through Combined Sewer Overflow (CSO) outfalls that are located in local waterways. The water that is discharged is a “cocktail” of pollutants that includes raw sewage, pharmaceutical ingredients, chemicals, and other pollutants; these are known as CSOs (Kessler 2011). In the 1990s, the EPA estimated that 850 billion gallons of untreated sewage was released via CSO outfalls. Neltner (2005) argues that the presence of CSOs in low-income communities also contributes to depressed property values and prompts people who are concerned with the associated health hazards to move elsewhere. In Marion County, Indiana, he points out, approximately 85% African American, 3.6 times higher than the county’s average. The CSO problem was aggravated by a housing boom that increased the amount of CSOs released in the downstream communities.

Cities with CSOs have been moving toward decreasing their release due to federal decrees to improve water quality under the Clean Water Act. But even these corrective steps can disproportionately burden low-income communities of color (Jelks 2008). After being issued a consent decree by the EPA, the City of Atlanta devised a plan to address outfalls

through the construction of two mini treatment facilities and an eight-mile subterranean pipe, both of which would have been in low-income communities. Seven of the nine of the city's outfalls were already located in low-income African American neighborhoods. Grassroots organizing efforts successfully defeated the City's plan to correct the CSOs but the lesson at hand—that “correction” involved aggravating the problem for the city's African Americans—serves as a grim reminder that fixing infrastructure can mean aggravating disparities.

Another concern for vulnerable communities involves the provision of basic sanitation services to urban America is considered by many to be a great equalizer in American history. Troesken's analyses (2004, 2001) show that even as municipalities were slower to construct sanitation system in African American neighborhoods when compared to whites, the eventual expansion of services in the first half of the 20th century led to dramatic improvements in life expectancy, both in absolute terms and relative to whites. In reality, the US has at least twenty programs housed in seven federal agencies that aim to develop or enhance reliable water services in low-income communities that continue to lack them (Wescoast et al. 2007). Census data to show that affected communities include rural whites and minorities, migrant workers, residents of Indian reservations, and the homeless.

Unincorporated communities³ sometimes also lack connections to basic wastewater services in the US. These include rural, unincorporated areas, as well as peri-urban areas that, due to a history of exclusion, have not been annexed by the adjacent or surrounding municipality. Jepson applies a critical legal geography approach to examine this marginalization as it applies to Chicano *colonia* residents in the Southwest (Jepson 2012). This is no small problem: at least 1,350 *colonias* are home to approximately 238,000 people, 119, 000 of whom face water or sanitation challenges (Parcher and Humberson 2009). When challenged, Jepson shows how farmer-governed water districts successfully kept their ‘irrigation’ versus ‘domestic’ water supply status, thereby allowing territorial exclusion. The service provision problem encountered by *colonia* residents is instructive for broader debates about the fragmentation of municipal services. Urban sociologists like Frug (1999), Orfield (1997), and Rusk (1993) have argued that this fragmentation can compound inequalities, because jurisdictions can decide where to extend infrastructure and social services. Fragmentation features prominently in processes of suburbanization. Hutson et al contend that urban areas with high levels of fragmentation “may embody the spatial social, historical, and political processes of discrimination and exclusion” (Hutson et al. 2012, 194). The relationship between segregation and wastewater planning was documented in New Orleans, when the city aimed to extend sanitation services to all residents, as part of Progressive Era reforms (Colten 2002). At the same time, Jim Crow policies were working to institutionalize segregation. New parts of town that included sanitation systems were closed to African American residents through municipal ordinances and deed restrictions.

³ Areas not governed by a municipality.

Infrastructure Rebuilding Boom

Much of the country's wastewater infrastructure is at the end of its life-cycle. Many pipes undergirding cities were built in the late 1800s, and most large wastewater treatment plants were built in the 1970s. As a result, much of this infrastructure is ill-equipped to deal with climate and demographic change and it is prone to breakdowns. This infrastructure moment is the result of waning investment in water infrastructure for the past several decades (Christian-Smith and Gleick 2012). Projections on wastewater capital investment needs illuminate the extent of the problem. The Environmental Protection Agency's (US EPA 2015) Clean Watershed Needs Survey indicated an investment need of \$271 billion for wastewater and stormwater treatment and collection systems. The American Society of Civil Engineers' (2012) Report Card for American Infrastructure indicated a need of \$298 billion over the next twenty years.

Water officials across the country are thus promoting the advent of an era of infrastructure "rebuilding" (Buchberger et al. 2009). Many cities are heeding this call by launching expansive wastewater improvement programs. These include Philadelphia's Green City, Clean Water program, a \$1.2 billion system-wide upgrade that started in 2009 and is scheduled to be implemented over 25 years. The Metropolitan Sewer District of Greater Cincinnati's \$3.2 billion Project Groundwork is the utility's initiative to remove 1.78 billion gallons of Combined Sewer Overflows from the Mill Creek Watershed by 2018. Seattle, Washington DC, and Los Angeles are undertaking similar overhauls of their wastewater systems. Spending by thirty of the country's largest water and wastewater utilities is expected to add \$524 billion to the economy and create 289,000 permanent jobs over the next twenty years (Daly, Brun, and Guinn 2015).

The importance of this rebuilding for state and local governments is reflected in two sets of statistics made available by the US Congressional Budget Office (Musick and Petz 2015). The first pertains to the types of public infrastructure investments being made; there are two categories: new capital and operations and maintenance. In the water utilities sector, 67% of public spending was dedicated to operations and maintenance in 2014 (Figure 2). The gap between capital and operations and maintenance expenditures has widened since 1980. Second, the federal government has a small share of spending on water utilities. State and local governments accounted for 96% of all expenditures. The proportion of state and local government spending on water infrastructure is greater than their share of spending on other forms of infrastructure, including highways, mass transit and rail, aviation, water resources, and water transportation.

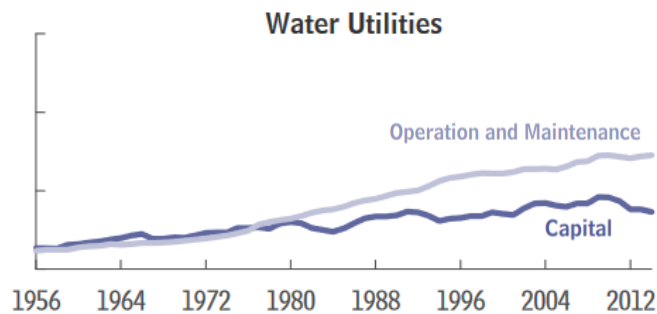


Figure 2. Public spending for capital and for the operation and maintenance of water utilities, 1956 to 2014.
Source: Musick and Petz (2015)

In addition to the primary state and local government role in water infrastructure, the federal government has undertaken several infrastructure investment initiatives. President Barack Obama made this a central feature of the American Recovery and Reinvestment Act of 2009, “the largest new investment in our nation’s infrastructure since Eisenhower built an interstate highway system in the 1950s” (*The New York Times* 2009). ARRA invested \$18 billion in “shovel-ready” projects in the areas of water, sewage, the environment, and public lands, including \$4 billion for the Clean Water State Revolving Fund, \$1.38 for drinking water and waste disposal projects, and \$4.6 billion for the Clean Water State Revolving Fund. The shovel-readiness of the projects meant that workers—construction works in particular – were immediately put to work. More recently, Donald Trump’s infrastructure plan promises to turn “crumbling infrastructure into a golden opportunity for accelerated economic growth and more rapid productivity gains,” although observers caution that the plan is designed to benefit investors and contractors (Klain 2016). These projects have been touted as essential to bolstering the country’s competitiveness. The underlying economic theory holds that basic water infrastructure, like other types of infrastructure such as roads and electricity networks, are long-term investments that yield returns over time. It is “physical capital” that supports existing firms and enables the founding of new ones (Putnam 1993). Those who work on these projects obtain economic stability for themselves and their families, as well as contribute to the stabilization of the economy through spending. For example, an investment of \$188.4 billion in water infrastructure over the next five years would create approximately 1.9 million jobs (E. Gordon et al. 2011).

The move to fix urban water infrastructure thus presents a critical opportunity to create more equitable cities. Graham and Thrift (Stephen Graham and Thrift 2007) point out that repair and maintenance are understudied because this work is considered routine or monotonous. But these tasks are critical sites of analysis because they reveal decay, they are sites of innovation, and a large amount of financial resources are directed to them. They note, “Maintenance and repair is an ongoing process, but it can be designed in many different ways in order to produce many different outcomes and these outcomes can be more or less efficacious: there is, in other words, a politics of maintenance and repair” (17). Scholarship’s focus on the impacts of old and new infrastructure neglects repair as a

necessary site for critical engagement. Indeed, repair has the ability to perpetuate social and spatial inequalities and to provide an opportunity to reimagine and create infrastructure that is socially just.

Organization of the Dissertation

The next chapter provides the theoretical framework for this dissertation. It includes a synthesis of environmental justice scholarship and engages the principles of environmental justice created by the delegates to the First National People of Color Environmental Leadership Summit in 1991 as the basis for the pursuit of justice at every point in the planning process. It combines an environmental justice approach with a structural racism lens to produce engineering justice, a framework to respond to distributive and procedural racism in all planning phases. This chapter also brings in relevant public health and engineering ethics literature to draw out engineering justices' interdisciplinary implications. I conclude with a summary of my findings; the pursuit of engineering justice reveals cumulative impacts, enhances organizational capacity, involves activating more substantive forms of sustainability, unlocks the anchor potential of public works agencies, and is implicated in gentrification trends.

The remainder of the dissertation chronicles how engineering justice is pursued in various phases of San Francisco's wastewater rebuilding process. My examination of certain phases reveals how the incorporation of this normative goal benefits the wastewater planning process, as well as the communities that are adversely impacted by infrastructure rebuilding projects. In Chapter 3, I ask, how can planners and engineers engage with historically marginalized communities to promote justice? I answer this question by chronicling the contestation between residents and public works officials, as well as the efforts to redress the plant's expansion. I provide a brief history of wastewater planning to show how decades of technical policy and measures created the basis for this decision. Findings show the importance of understanding residents' concern in relation to other challenges residents faced—namely, growing unemployment and poverty. Planners and engineers must thus understand battles over environmental burdens in relation to other social and environmental stressors, or cumulative impacts.

Chapter 4 also explores the theme of how planners and engineers engage with disadvantaged communities by focusing on the inner workings of planning organizations and upstream decision-making. In this chapter I ask, how are engineering and planning organizations equipped to engineer justice? I find that the pursuit of engineering justice requires building the organizational capacity of planning organizations. I do this through an analysis of SSIP's project objectives and environmental review. A strong nexus of progressive policy, as well as dedicated staff and resources, are crucial to the pursuit of these goals.

In chapter 5, I turn my attention to how sustainability initiatives—a dominant planning paradigm—can advance environmental justice. I find that sustainability initiatives on their own can omit justice concerns, but can be used as vehicles to pursue social justice—or “just sustainabilities.” Findings are based on an examination of the SSIP's project selection phase,

which involved the development and use of the triple bottom line tool, an accounting framework that considers social, environmental, and economic impacts. The governing principles of San Francisco's rebuilding program required that the TBL tool consider how projects might benefit disadvantaged communities. I engage scholarship that is concerned with the social justice implications of sustainability, as well as critiques of standardization and quantification in analytical planning tools, to query how TBL was used to advance environmental justice. I argue that the uptake of environmental justice goals in rebuilding requires enacting more substantive forms of sustainability.

In chapter 6, I query the role of private sector planners and engineers in promoting justice. Planning scholarship has drawn attention to the equity implications of the privatization of infrastructure, but minimal attention has been paid to the temporary involvement of the sector. A strong regulatory role on the part of utilities can reshape the implications of large firms for local social justice efforts. I argue that the private sector can advance social justice through a strong commitment to corporate social responsibility and the diversification of corporate staffs. These changes also enable consultants to effectively carry out local mandates. I note how the sector stands to benefit from environmental justice initiatives insofar as it clarifies community engagement expectations that their public sector clients hold. I conclude with a reflection on the relevancy of an anchor institution approach for the utility sector.

In the final empirical chapter, I ask, how can infrastructure rebuilding reduce community vulnerabilities? I find that the potential benefit that gray infrastructure can bring to a community needs to be understood in relation to citywide trends. I use the rebuilding of the SEP to show how the incorporation of environmental justice in the upgrade will result in an increase in the plants value for the neighborhood, as well as residents citywide. More specifically, the transformation of the plant involves turning a LULU into an asset, implicating the structure in gentrification trends. I explore how workforce development practices are conceptualized as opportunities to mitigate the impacts of this change. I argue that wastewater monitoring and evaluation must include efforts to address these emergent patterns of exclusion.

In chapter 8, I synthesize my findings by pointing out how procedural and distributive claims and responses to injustice featured in each planning phase. I also present the ways in which each phase's respective environmental justice interventions benefitted the overall planning process, as well as the residents adversely impacted by wastewater planning. The chapter discusses three enabling conditions for the pursuit of change through an engineering justice approach, as well as a set of challenges that may prevent communities from advancing it. I conclude with a summary of how this project's findings contribute to infrastructure planning scholarship and practice.

Study Design

I take a case study approach to understand how public works agencies create socially just infrastructure. This method is due to the "how" nature of the leading question: it

requires an examination of the functioning associations between present phenomenon.⁴ As a single-N case study, it is not a sample of American cities and its examination cannot provide statistical generalization, but it does aim for analytic generalizability (Yin 2013). Findings can be generalized to a range of cities also undertaking infrastructure rebuilding programs. In this dissertation, I examine prevailing notions of environmental justice to understand how public works agencies create infrastructure that is socially just. Walton (1992) points out that cases “are made by invoking theories, whether implicitly or explicitly, for justification or illumination, in advance of the research process or as a result” (121). A case is thus made through the reformulation of existing interpretations of a case. The propositions I make and investigate are based on ideas of environmentally just processes and outcomes. I build on this work by presenting an engineering justice framework.

The planning process behind San Francisco’s SSIP is both a critical and common case. San Francisco’s unique liberal base is a primary reason for this case study selection. SSIP is likely to incorporate social justice principles, making the infrastructure program’s planning process a critical site for analysis. This selection rationale has methodological merit: “Atypical or extreme cases often reveal more information because they activate more actors and more basic mechanisms in the situation studied.” (Flyvbjerg 2006, 13). In another respect, however, the planning behind San Francisco’s SSIP is also a common case because wastewater systems adversely impact low-income communities of color in many cities. San Francisco is no different.

Because I ask about how responding to environmental justice claims benefit wastewater infrastructure rebuilding in older cities, the unit of analysis in this research is the planning process, including the relationship between the public works agency and firms. My research covers two time periods. I examined documents dated from 1974 to 1986, to provide historical context for present-day environmental justice work. My remaining chapters, however, cover the period between 2009 and 2017. Most environmental justice interventions are discussed in relation to Bayview Hunters Point, although several hold implications for other parts of the city.

I used several methods to gather empirical data. I conducted 26 in-depth, semi-structured interviews from 2015 to 2017. During interviews, I asked about (1) the nature of the environmental justice intervention; (2) if and how residents participated in its development; (3) the anticipated outcome; and (4) limitations or challenges of this initiative. I also asked for general perceptions of the Community Benefits and Environmental Justice policies. Respondents included ten members from neighborhood organizations or small businesses. These individuals were in some way impacted by SSIP, either as tenants of agency’s facilities, members of the agency’s advisory council, subcontractors or grant recipients. BAYCAT and Young Community Developers are examples of organizations that partner with the agency through grant programs. I also interviewed ten agency officials, half of whom were tasked with carrying out environmental justice goals. Finally, I interviewed six consultants from engineering firms. A list of respondents can be found in Appendix A.

⁴ Survey and history methods also lend themselves to answering ‘how’ and ‘why’ questions, but I have limited control over the behavioral events and phenomenon of the objects of my study and my research focuses on contemporary events.

From 2013-2015, I also conducted participant observation as an Evaluation Associate at the San Francisco Public Utilities Commission (SFPUC). I worked on various priorities for the agency's Community Benefits division. This allowed me to learn about the agency operations and organizational structure. This role at the agency allowed me to generate the list of interviewees and identify key relevant documents for this study.

I triangulated interview and observation data with a review of key documents, including policy and program reports and memos, project plans (e.g., capital improvement plans, site plans), administrative records (e.g., budgets, organizational charts), local news clippings, correspondence, and public notices provided details on the specific plans and actions of the utility. Some material was also derived from social media, such as YouTube. The earliest document reviewed is dated 1906, although most documents are dated between 2009 and 2017. To analyze data, I drew on both inductive and deductive methods to generate analytical codes. These codes were identified through categorization and interpretation of the data. I also synthesized the codes to generate overarching findings.

Case Study: Wastewater System Rebuilding in San Francisco

San Francisco's residents are all served by one sewer system. It consists of over 25,000 catch basins, 1,000 miles of sewer, three treatment plants, and 27 pump stations that collect and treat up to 575 million gallons of wastewater in a day (SFPUC 2014). But the system is aging, and it was not designed to deal with the storm surges and rising sea levels associated with climate change. In addition, the sewer system requires enhanced seismic reliability. Without any upgrades, more than half of the system would be over 100 years old by 2030 (Chiu et al. 2010). San Francisco, like many of the country's oldest cities, must also address the consequences of having a combined sewer system, or infrastructure that captures and conveys domestic sewage and rainwater runoff. Combined systems are environmental burdens when they are overwhelmed by periods of heavy rain. Federal regulations advise and, in some cases, require cities to reduce these overflows. These sewer system challenges have prompted the SFPUC to undertake SSIP, an overhaul of the sewer system scheduled to take place from 2012 to 2032.⁵ SSIP includes upgrades to the city's treatment plants and collection system, as well as land acquisitions to expand or relocate operations.

The SFPUC, the agency which governs the wastewater systems, is the largest public agency in San Francisco and the third largest utility in California.⁶ It employs 2,300 people and has an operating budget of over \$1 billion. In addition to managing the city's wastewater, the agency provides water services to city residents and it wholesales water to three counties. The SFPUC also provides clean power services to public buildings, and a growing number of residents and businesses. The agency's chief executive is a General Manager. A group of five commissioners appointed by the San Francisco Board of Supervisors and the Mayor oversee operations. Of the five Commissioners, one is an at-large representative; the others are appointed to represent in the areas of environmental justice,

⁵ Throughout this dissertation I refer to San Francisco as a "city", although it is also a county.

⁶ It also provides retail and wholesale water service and energy services.

ratepayer or consumer advocacy, project finance, and experience in water systems, power systems, or public utility management.

San Francisco’s wastewater system has contributed to the city’s environmental disparities. At least 67 million gallons of sewage a day are treated at the SEP in Bayview Hunters Point, a historically African American Neighborhood (Figure 3). When first built in 1946, the SEP only treated 20% of the city’s wastewater. The treatment ratio flipped when, in the 1970s, the SFPUC expanded the plant to meet Clean Water Act requirements. Since then, the plant has significantly burdened residents, despite their efforts to hold water officials accountable for the expansion decision. Chapter 3 describes the history of the plant’s expansion.

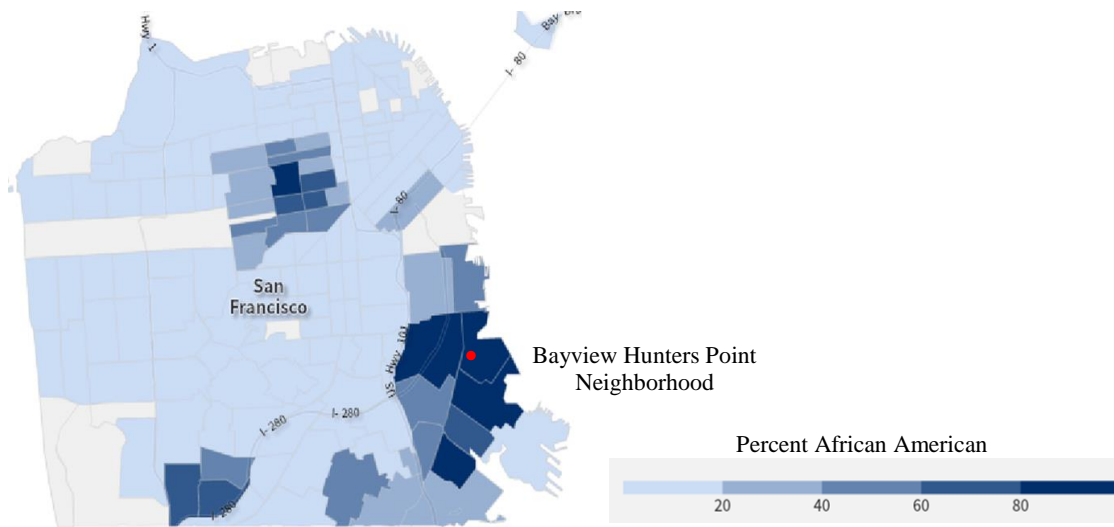


Figure 3. Percent African American, 1970, and the approximate location of the Southeast Treatment Plant added by author.

Source: Anti-Eviction Mapping Project

Bayview Hunters Point

Bayview Hunters Point is a neighborhood located in southeast San Francisco. It is bounded by the Highway 101 on the west and south. The San Francisco Bay lies to its east, and Cesar Chavez Street marks its northern end. Third Street, a popular commercial corridor, vertically stretches along the middle of the neighborhood. The neighborhood is largely comprised of residential and industrial zones. How I refer to the neighborhood—“Bayview-Hunters Point”—follows current nomenclature. However, this name reflects the combination of two historic neighborhoods. Hunters Point has historically had a larger African American population and a higher rate of poverty than Bayview (Hunters Point Family n.d.). The media and non-neighborhood residents began to refer to the two neighborhoods as one in late 1960s and 1970s, when more African Americans moved to Bayview due to large-scale redevelopment that forced many African American residents to

move from other parts of the city (2014). This, as well as the 1966 riots that took place on 3rd street, contributed to non-neighborhood residents and the media joining the two names. Dillon (2014) calls the current convention, “a product of racialized postwar metropolitan development” (29).

Bayview Hunters Point has undergone much change over time but it remains a neighborhood primarily populated by people of color: more than 90% of residents are Latino, African-American, or Asian (Table 1). Residents are also among the city’s most disadvantaged. For example, the neighborhood’s unemployment rate and number of individuals living below the poverty line are higher than those in San Francisco and California, and the unemployment rate is more than 7% higher relative to San Francisco. The California Environmental Protection Agency’s CalEnviroScreen 3.0 (CA Office of Environmental Health Hazard Assessment 2016), a tool to identify communities that are disproportionately burdened by multiple sources of pollution and with population characteristics, identifies the tract where the SEP is located as “high pollution, low population” (Figure 4). Tellingly, the adjacent tract—which borders the plant—is at the 81-85% disadvantaged relative to other San Francisco neighborhoods for combined environmental burdens and social vulnerability indicators.

Table 1. Bayview Hunters Point Demographics Compared to San Francisco and California, 2009-2013.

| | Bayview Hunters Point | San Francisco | California |
|--|----------------------------------|----------------------|-------------------|
| Population Estimate | 37,363 | 817,501 | 37,659,181 |
| Race/ethnicity | | | |
| <i>Latino</i> | 24.2% | 15.2% | 37.9% |
| <i>Black/African-American</i> | 33.1% | 5.6% | 5.7% |
| <i>Asian/Asian-American</i> | 29.8% | 33.3% | 13.3% |
| <i>Non-Hispanic White</i> | 7.5% | 41.7% | 39.7% |
| Median Household Income (2009-2013) | \$58,033 | \$75,604 | \$61,094 |
| Unemployment rate | 15.8% | 8.3% | 12.2%* |
| Individuals below poverty level | 21.2% | 13.5% | 15.9% |

Source: Adapted from ESA (2017), *Bureau of Labor Statistics (2017)

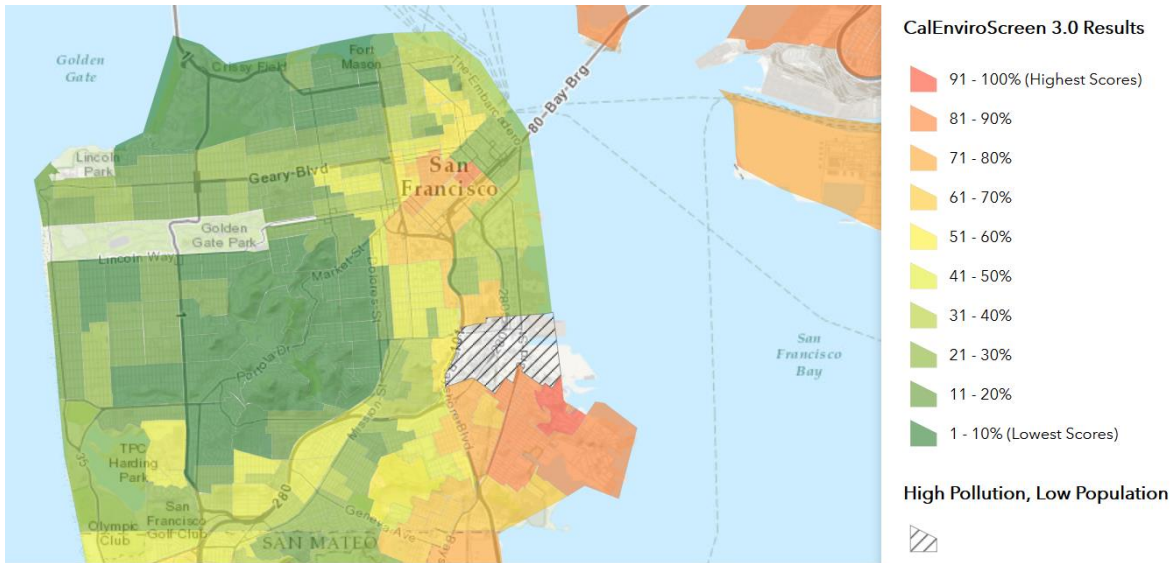


Figure 4. San Francisco CalEnviroScreen 3.0 results.

Source: CA Office of Environmental Health Hazard Assessment (2016)

These stressors are evident in the built environment and in health impacts on residents. A 2003 report by the SF Human Rights Commission (2003) noted that, at the time, the neighborhood had no supermarket, and that its health center lacked a medical director for almost five years. Great disparities still exist. In 2009, emergency room visits for diabetes, bacterial pneumonia, congestive heart failure, and adult asthma were more than three times the city average (Harder and Company Community Research 2012) (Figure 5). And Bayview Hunters Point residents made 409 preventable emergency room visits per 10,000, compared to 238 citywide (Figure 6). An SFPUC commissioned study on indicators found that 33 were “indicators of environmental justice concern” (Appendix C). siting of energy plants and the decontamination of the Naval Shipyard are two examples of recent and ongoing injustices.

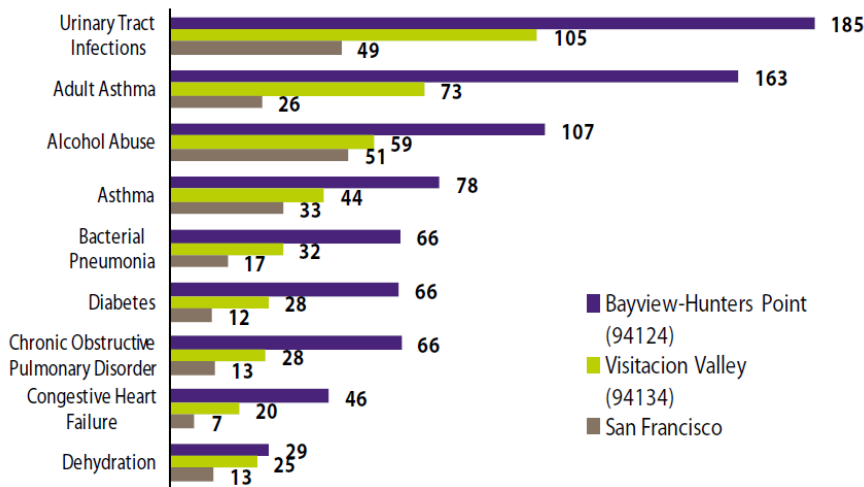


Figure 5. Leading emergency room visits per 10,000, 2009.

Source: Harder and Company Community Research (2012, 3)

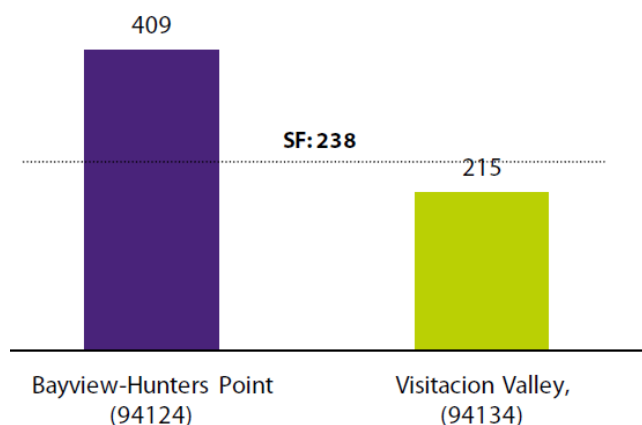


Figure 6. Preventable emergency room visits per 10,000, 2009.

Source: Harder and Company Community Research (2012, 3)

Energy Plant

In the 1990s, Bayview Hunters Point residents organized against the San Francisco Energy Company's proposal to create a 240-power plant on city property (C. Johnson 1995). The company assured neighborhood residents that the plant would have minimal environmental impacts, due to state of the art technology they planned to use. Residents organized against the Board of Supervisors, whose approval was required, noting that the energy facility would have created the highest concentration of power plants in the country (C. Johnson 1996). In shepherding the plant through the planning process and facing immediate criticism, company spokesman Robert Morgan requested that there "not be a witch hunt over [the] plant." (Rubenstein 1995).

Residents and community organizations coordinated under the Southeast Alliance for Environmental Justice. As Wendy Brummer-Kocks, director of the coalition put it, "Industry cannot peacefully coexist with residents without repercussions" (Rubenstein 1995). The coalition filed a temporary block on the auction of the land for the facility. San Francisco Energy Company's plan was turned down in 1996. "Today marks the beginning of the end of dumping on Bayview- Hunters Point," said Supervisor Angela Alioto, who introduced the resolution (Epstein 1996). In addition, in 1998, Mayor Willie Brown and PG&E agreed to close the utility's main plant in the neighborhood.

Residents continued to challenge energy plant siting plans in the years that followed. In the early 2000s, the SFPUC drafted plans to build three small city-owned plans in the neighborhood, in exchange for the closure of the PG&E plant. "The closure of Hunters Point (power plant) is a bigger and bigger carrot that is being dangled in front of us to get us to accept these plans," noted Dana Lanza, founding director of Literacy for Environmental Justice, a Bayview-Hunters Point nonprofit group (McCormick 2003). California Independent System Operator also issued preliminary plans to build another power plant in the neighborhood. Residents were victorious in challenging both plans.

Naval Shipyard

In the 1970s, the 986-acre Naval Shipyard went from being a boon to a bane for San Francisco's Bayview Hunters Point community. It drew a large number of African American residents from the South during World War II for wartime jobs at the Naval Shipyard and related industries. The shipyard became the lynchpin for the creation of zones designated for heavy industrial uses in Bayview Hunters Points (SF Human Rights Commission 2003). When the shipyard shuttered in 1974, 8,000 people became unemployed, creating large levels of unemployment in the neighborhood. Military barracks were turned into public housing, further concentrating poverty. And the toxicity and environmental degradation caused by the shipyard was not remediated upon closure.

Thirty years after the shipyard's closure, the Navy had still failed to begin decontamination efforts. A report by the San Francisco Human Rights Commission (2003) compared this failure to act with the prompt cleanup of Crissy Field, a former US Army airfield, in the city's affluent Marina District. "The difference in outcome," the report notes, "is surely a tragic and classic example of the malignant effects of environmental injustices" (51). The shipyard's operations created toxic byproducts, including arsenic, zinc, asbestos, toxic levels of lead and copper. PCBs, which cause cancer and organ damage, were also among the contaminants. Chemicals were dumped and leached into the ground and water systems. An industrial landfill located less than 800 feet from homes was also previously sited there.

Both delay in, and the methods used for, cleanup have been gross indications of injustice. Postponements in environmental testing prompted the EPA to include the site on its priorities list. In 1993, when the Department of Defense transferred the shipyard to the city and county of San Francisco, the Board of Supervisors designated the shipyard as a "Redevelopment Survey Area," prompting a site plan that was approved in 1997. The City subsequently chose Lennar/BVHP as the master developer of new residential, commercial, and recreation space. Six parcels are now undergoing decontamination to accommodate the development. But residents and observers view this progress in clean-up efforts with skepticism for two reasons. On the one hand, Tetra Tech, a US Navy contractor, falsified radioactive contamination reports (Pardee 2018). On the other, the clean-up efforts are thought to accelerate gentrification and displacement: "They symbolize hard fought political victories and yet are inseparable from broader, market-led transformations that are experienced by many in the neighborhood not as a wave of progress, but rather as a forceful tide of displacement"(L. Dillon 2014).

The environmental burdens experienced by Bayview Hunters Point residents are a critical point of a departure for understanding the social justice interventions enacted in the wastewater system rebuilding process. In the next chapter, I discuss the engineering justice framework that emerged as a result of a close examination of these efforts. I subsequently provide historical context for Bayview Hunters Point treatment plant siting and expansion to demonstrate how conventional engineering and planning approaches fail low-income

residents of color. Only through activism and the institutionalization of environmental justice goals can residents more equitably benefit from urban infrastructure systems.

2. Engineering Justice

Introduction

“We, the People of Color,” begins the preamble of *The Principles of Environmental Justice* written by delegates to the First National People of Color Environmental Leadership Summit in 1991. The document goes on to define seventeen principles of environmental justice, noting over 500 years of colonization and violent oppression. The statement’s play on the US Constitution’s “We the people” is an upfront reminder of the deep history of racism in the country, as well as the solidarity forged by people of color to challenge their marginalization. Among the principles is “the right to participate as equal partners at every level of decision-making, including needs assessment, planning, implementation, enforcement and evaluation.” This idea challenges the notion that environmental justice is achieved through one or two equity considerations of a given project; rather, it features in multiple ways. Since the list of principles was created, the needs assessment stage they refer to has been extensively written about, as part of a broader body of environmental health justice literature that promotes participatory based-research methods (Corburn and Bhatia 2007). Other stages called for by Summit leaders in 1991, such as enforcement and implementation, also have distinct bodies of work.

Infrastructure’s role to sustaining systems of the inequality makes it a critical site to understand how social justice features various phases of planning. This chapter puts forth the concept of engineering justice to demonstrate how this occurs in a single planning project, as well as what can be done to prevent and mitigate racial disparities at each phase. The concept builds on environmental justice scholarship and movements that have been central to identifying how projects have been unjust. The notion of engineering justice also draws on key insights from related bodies of scholarship—urban health equity and engineering ethics—to draw out engineering justice’s multi-sectoral and interdisciplinary implications. In concert with existing literature, I argue that infrastructure projects can engineer justice when both the benefits and burdens are equitably distributed in all stages of project planning and implementation. The chapter concludes with a presentation of key reasons for the adoption of this approach to planning.

Environmental Justice

Environmental justice is a framework rooted in grassroots mobilizations that emerged to contest the adverse impacts of environmental burdens on low-income communities of color. In the 1970s and 80s, nascent environmental justice movements distinguished themselves from mainstream environmentalism by ‘reinventing nature’ (Di Chiro 1996). The movements’ predominantly low-income women and women of color leaders, and the communities they advocated for, drew on their histories of oppression to converge notions of social and environmental justice. Their understanding of the environment challenged the colonial discourse that separated humans from nature. Environmental justice was further concretized through “Principles of Environmental

Justice,” seventeen organizational tenets developed by participants of the First National People of Color Environmental Leadership Summit.

Scholarship that emerged in the 1990s would document these movements and theorize their implications. Dr. Robert Bullard (2006, 2000), a pioneering figure in the development of an environmental justice body of scholarship, chronicled how and why low-income communities of color came to be the targeted for the siting of noxious facilities. Residents’ contestations of these land use decisions were significant features of many of these accounts (Been 1992; Morello-Frosch, Pastor, and Sadd 2001). Subsequent scholarship developed spatial analysis techniques to identify correlations between adverse impacts and the demographic characteristics of communities (Fisher, Kelly, and Romm 2006). Morello-Frosch, Pastor, and Sadd (2001) provide an example of this through their study of poor residents who have greater exposure to pollutants as a result of where they live. Following a distributive justice framework Schweitzer and Valenzuela’s (2004), this early, formative research’s focus on land use decisions reshaped how we think about the just distribution and adverse impacts of costs. A distributive approach to environmental justice also encompasses the distribution of benefits associated to a project. Benefits include instances where low-income communities of color receive fewer environmental protections, as well as when these communities do not have equal access to employment and the awarding of construction contracts (Bullard 1994). In wastewater planning, for example, new, coveted green infrastructure is being developed, such as including rain gardens, green bulb-outs, and permeable pavement.

Environmental justice scholarship has also pointed out that participatory justice is as essential as distributive justice. Participatory justice has been defined in different ways although it generally entails an opposition to exclusive, top-down decision making. For Schlosberg (2013), participatory justice consists of “speaking for ourselves, or a seat at the table” (40). Others, like Schweitzer and Valenzuela (2004), explicitly identify the groups who have been most affected by unequal processes: “Low-income and minority communities have less access to, less influence in, and are shown less deference in collective decision-making than other communities” (285). Their synthesis of claims of environmental injustice in the transportation sector—costs, benefits, and process—is used in this dissertation (Table 2).

Table 2. Claims of Environmental Injustice.

| Claims of Injustice | Description |
|----------------------|--|
| Process-based | Low-income and minority communities have less access to, less influence in, and are shown less deference in collective decision-making than other communities |
| Benefit-based | <ul style="list-style-type: none"> - Poor and minority urban residents, especially those living in inner cities, have less access to social and economic opportunity than others - Low-income and minority residents receive less mitigation and less protection from the enforcement of environmental regulations than other groups - Low-income and minority residents should benefit equally in employment and the award of construction contracts in their communities |
| Cost-based | <ul style="list-style-type: none"> - Poor and minority neighborhoods are targeted to host unwanted transportation facilities more than affluent communities - Policies, regulations, and taxes designed for environmental protection can cost the poor more than the rich - Those who are poor or live in minority neighborhoods are subject to greater levels of environmental externalities from transportation, such as accidents and pollution than those who are white and more affluent |

Source: Adapted from Schweitzer and Valenzuela (2006)

Environmental justice is the subject of fields beyond those pertaining to the built environment. Public health scholars, for example, have closely examined the connection between racial equity and socio-economic stressors. Even when controlling for economic and land-use factors, race is an explanatory factor in risk distribution, creating distinct urban “riskscapes” (Morello-Frosch, Pastor, and Sadd 2001). Maternal-child health disparities, for example, are shaped by a complex links between environmental hazards and psychosocial stressors (Morello-Frosch and Shenassa 2006). These riskscapes are better understood and addressed through research and interventions that consider cumulative impacts of inequalities and social determinants of health. The unsafe and unhealthy environmental conditions that exacerbate the socio-economic challenges faced by low-income communities and people of color have led planning scholars to call for the re- engagement of a public health lens. Wilson et al (2008), for example, show how planning policy shapes physical design, which in turn adversely affect the neighborhood health of low-income communities of color. Corburn (2013) promotes a relational approach in the pursuit of urban adaptive health justice. This involves accounting for both the physical and social characteristics of a “place,” as well as the meanings that each is ascribed by different groups of people.

Environmental justice scholarship has grown to include a wider range of concerns. In arguing for a plural understanding of environmental justice, Schlosberg (2013) notes that it has also come to include basic needs, capabilities, and functioning. Others have discussed its implications across places and scales, including transnational organizing efforts (Sze and London 2008). The exportation of waste and hazardous materials to the Global South is often of concern in these debates (Pellow 2007). In its all-encompassing form, environmental justice is advanced for preventive, corrective, and retributive action (Ikeme 2003).

While environmental justice has been primarily used by local residents and advocates to promote change, in recent years, it has also become

institutionalized by government agencies to address inequities. At the federal level, Executive Order 12898, issued by President Bill Clinton, requires agencies to assess and respond to adverse environmental and health impacts, to the greatest extent possible. More recently, the Environmental Protection Agency issued EJ 2020, the agency's environmental justice strategy, which aims to improve disparities in the areas of lead exposure, drinking water, air quality, and hazardous waste sites through on-the-ground efforts and the further institutionalization of environmental justice in EPA decision-making.⁷ Several cities and states have adopted environmental justice policies, including the SFPUC, the agency at the focus of this study.

Environmental justice also continues to be a predominant framework for radical change. Harvey (1996) insists on its use to generate action that challenges existing material conditions. Environmental justice, he notes, has uniquely radical potential: its "discourse is radically at odds with the standard view of ecological modernization... it has proven far less amenable to corporate or governmental co-optation" (385). This radical potential is what continues to drive why communities employ and researchers study it. Ikeme (2003) further cautions for the interchangeability of "environmental justice" and "equity," arguing that in environmental policy, the latter typically holds only a distributive dimension. Environmental justice is more all-encompassing and consistent.

Despite its traction, academic reflections of environmental justice have pointed out its limitations. For example, Pellow and Brulle (2005), argue that, at times, environmental justice activists and scholars do not challenge overall consumptive behavior or environmental degradation--i.e., its protagonists seek to relocate a noxious activity, not to eliminate it. For others, this is partially due to the framework's roots in liberal political philosophy (Swyngedouw and Heynen 2003). Even so, environmental justice scholarship's focus on the regulatory state and social movements can contribute to a repertoire of more critical takes on, and response to, uneven power relations (Ranganathan and Balazs 2015).

Engineering Justice

The engineering profession privileges scientific knowledge and applies mechanical and linear approaches to problem-solving. Reductionism and technological determinism are underlying perspectives in this work (Riley 2008). Yet racism is a complex social phenomenon that cannot be solved through technology. The pursuit of racial justice must thus involve methods that are anti-reductionist, anti-positivist, and anti-deterministic (Corburn 2017)—a structural lens to racism enables this approach. In the United States, racial meaning and hierarchies pervade social and political relationships (Omi and Winant 2014). Individual and institutional analyses of racism are often deployed to understand these relationships, but they are incomplete. Structural analyses highlight how intra-institutional relationships and processes contribute to racialized outcomes.⁸ According to Powell, (2007) in a structural approach, "Causation [of racialized outcomes] is understood as cumulative within and across domains... It shifts our attention from the single, intra-institutional setting

⁷ EJ2020, and all other federal environmental justice programming, will be weakened if not entirely terminated under Donald Trump (Rushing 2017).

to inter-institutional arrangements and interactions” (796). Racialized outcomes may be produced by individuals and institutions but they also persist through the interactions between the institutions involved.

A structural lens is critical to addressing how infrastructure perpetuates racial inequity. Environmental justice, on its own, is not always deployed as an anti-racist framework. Indeed, the first environmental justice movements were advanced by both whites and people of color in opposition to toxic facilities. Since then, environmental justice has become more strongly associated to the challenges people of color face, largely due to the emergence and strength of an “environmental racism” strategy (Pulido 1996). Still, anti-racism cannot be assumed. An engineering justice approach thus uses and deploys structural racism lens for two reasons: it activates anti-racism and it is used as an analytical tool to identify the various ways in which a capital improvement plans can contribute to racial justice. More specifically, engineering justice involves identifying and addressing the ways in which distinct phases of planning use commonplace policies, tools, and techniques that interact to create racialized outcomes. Interventions at each planning phase are thus sites to advance distributive and procedural justice.

By every phase, I am referring to distinct segments over the course of a project. Planning relies on sequential processes to organize and manage project implementation, as well as to communicate project developments to the public and collaborators. Hall and Tewdr-Jones (2010) point out that early and mid-20th century planning schematics were simple and sequential; the survey-analysis-plan approach originated from the work of Patrick Geddes. “This process,” Hall and Tewdr-Jones point out, “will continually be repeated as the monitoring process throws up divergences between the planner’s intentions and the actual state of the system” (229). “New planning,” shepherded by Britain’s 1968 Planning Act, introduced a focus on objectives and alternatives to identify the best path forward. In either case, the phases of an infrastructure planning process are institutionally-defined, even as diversions, incrementalism, and learning are unanticipated or premeditated aspects of the process. Thus, as contrived as phases may be, they are helpful in demonstrating that environmental justice involves addressing more than a singular issue associated to a project. Responding to inequities in every phase is particularly important considering that planning projects are often presented to community for input after key decisions have been made—i.e., during the public review phase of the project.

The pursuit of engineering justice thus refers to the anti-racist interventions to the procedural and distributive claims of injustice in each phase of planning (Figure 7). Importantly, these phases of planning are not deterministic. Rather, they are heuristic categories meant to capture all phases of the infrastructure planning process. With every planning project, the five categories can be further elaborated. For example, this dissertation focuses on five phases of planning in San Francisco’s Sewer System Improvement Program: project objectives, environmental review, project selection, contracting, and monitoring and evaluation. Contracting, which is further discussed in chapter 6, forms part of the project implementation/construction phase. The phases discussed in the empirical chapters were identified through my data analysis and do not reflect the official planning process or entire range of phases under SSIP. These categories of activity, however, are often used by utilities

to manage capital improvement projects. Public and private planning institutions, when pushed by local communities, can enhance a project's "just-ness" by addressing the equity implications of each phase.⁹

The engineering justice framework merits a discussion on the deliberate pairing of "engineering" with "justice." This is especially critical given this dissertation's critique of technocratic planning methods. The basis for the use of engineering is two-fold. On the one hand, the heuristic framework was developed for use in infrastructure planning, which is dominated by the engineering profession. The use of 'engineering,' however, is also an aspirational decision, since this dissertation is one of many academic reflections that are pushing the profession to incorporate equity as a primary concern. Engineering ethicists, for example, point to the limited considerations made by the National Society of Engineers' Code of Ethics, which holds that engineers must consider "paramount the safety, health, and welfare of the public." An alternative response is a structural ethics approach, which emphasizes the role of technology in creating or compounding moral consequences (Epting 2016). This take challenges notions of technological determinism—particularly those found in Science and Technology Studies—which do not address human responsibility, particularly as it pertains to intentionality and the extent of agency. Others in the field link a consideration of equity to sustainability. "Social justice is a necessary condition for sustainability," notes Brauer (2013), in response to work in the field arguing for sustainability as an all-encompassing goal. The ongoing debate is manifest in proposals for engineering solutions to respond to climate change, since these proposals, on their own not question the social and political forces driving the material growth responsible for the problem (D. M. Karwat, Eagle, and Wooldridge 2014).

⁹ Scholars and practitioners define infrastructure in various ways. For the purposes of this dissertation, infrastructure is defined as those physical features of the built environment that local and regional governments have a responsibility to finance and govern. This includes water and wastewater systems, transportation, schools, and parks. The federal definition includes forms of infrastructure that are not considered here, such as military bases, aviation, and chemical laboratories.

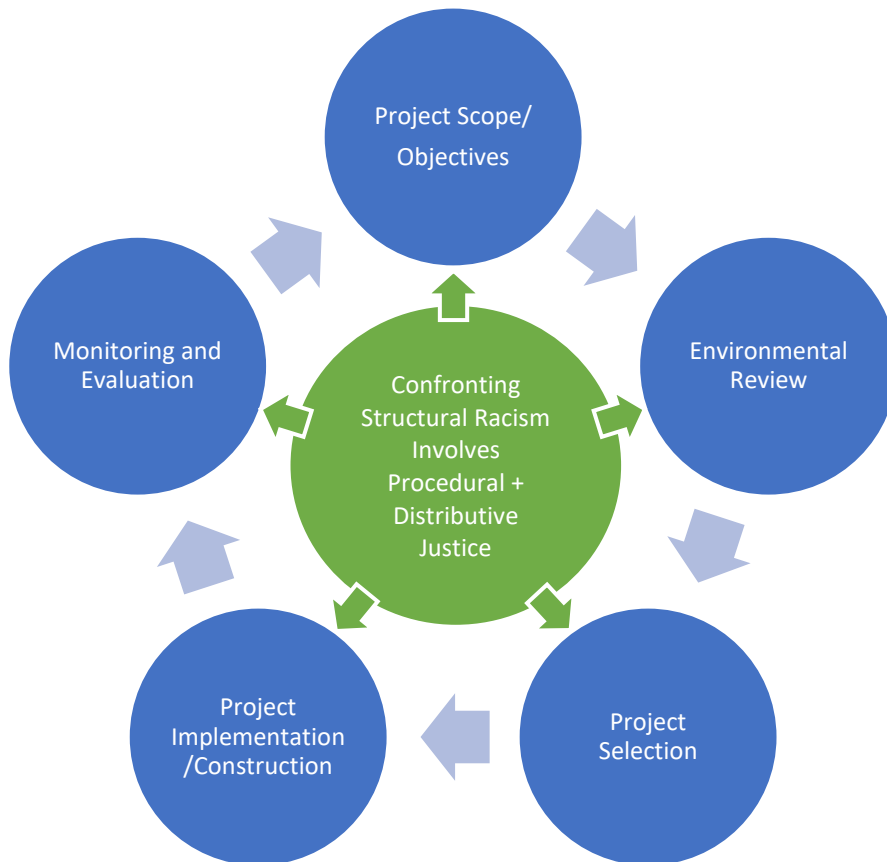


Figure 7. Diagram of Engineering Justice framework. Structural racism can be confronted by pursuing procedural and distributive justice in each phase of planning.

To build or not to build

The pursuit of engineering justice includes the most upstream of phases—whether an infrastructure project should be considered at all (Figure 8). Infrastructure is built for many reasons, one of which is non-negotiable: the public health and safety of residents. For example, cities require water and wastewater treatment systems to prevent the outbreak of disease. Emergency services are also critical to addressing the residents’ urgent, sometimes life-threatening needs. An engineering justice framework adheres to this idea. But cities cannot build blindly. Other criteria must also be met when deciding whether to build a new infrastructure project and what values it should reflect.

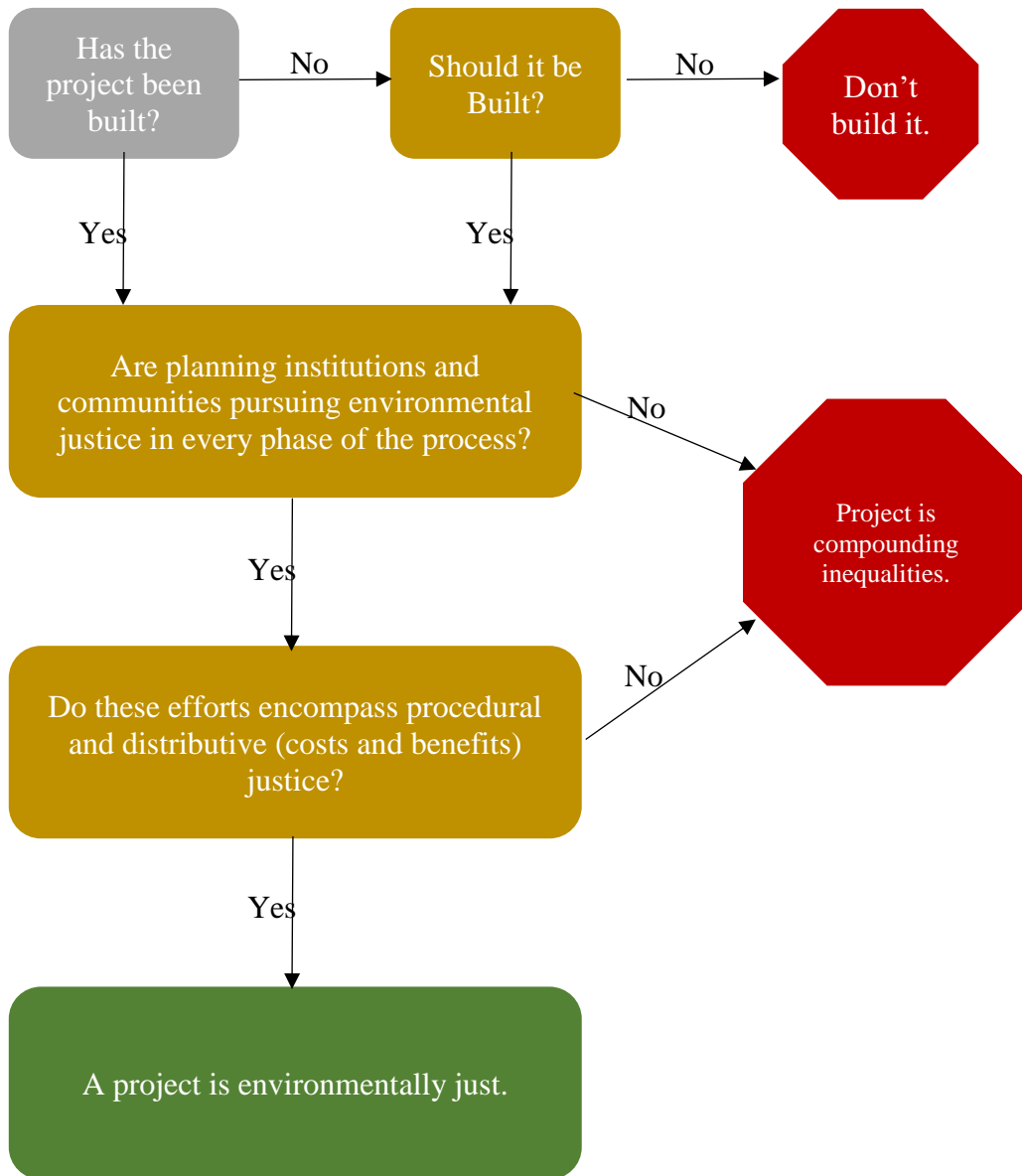


Figure 8. Is an infrastructure project engineering justice? Flowchart.

First, a new infrastructure project must be the best available option for reducing our ecological footprint. Communities across the country are already experiencing the consequences of climate change—low-income communities of color have been the hardest hit (Masozera, Bailey, and Kerchner 2007; Maantay and Maroko 2009). Considering all available information and using the best availability technology, infrastructure must provide net environmental improvement. This saliency of ecological sustainability must counteract the tendency to create planning projects that are captured by economic imperatives, especially under the guise of sustainable development (Gunder 2006). Jobs and economic

competitiveness are among the most common reasons used to generate public support for infrastructure. On their own, these reasons are reductionist because they reproduce a liberal capitalism that marginalizes vulnerable communities and harms the environment. Karwat and others (D. M. Karwat et al. n.d.; D. M. Karwat, Eagle, and Wooldridge 2014) call for an activist engineering that deliberates the possibility of *not* engineering a solution. In current practice, he argues, “While an engineer may raise concerns about the safety of a project... there tends to be little to no support for engineers who question the morality of the project they work on” (D. Karwat 2017). Projects that are not the best alternative for the environment thus need to be rethought. Ill-conceived projects, for example, include desalination plans to generate a new source of drinking water. These plants require large amounts of energy, cause costal harm, and have been pursued without first undertaking water reuse projects.

Second, projects must create equity within their given infrastructure sector. Agencies and residents have to make difficult decisions regarding which types of projects to pursue; their preferences reflect a set of values. These organizations need to consider how various project options benefit disadvantaged communities in relation to one another. For example, we know that low-income communities of color rely on public transit more than other groups (Lucas 2004). Yet local agencies spent nearly \$300 million on a 3.2 mile connecting line between the Bay Area Rapid Transportation System and the Oakland International Airport. This is an instance where this criterion was not applied because the investment happened as the bus system received decreased levels of funding. Local advocacy groups filed an environmental justice lawsuit indicating that, in addition to being cost-prohibitive to low-income residents, the projected cost would “drain scarce funds from local, state and federal sources that could otherwise provide operating and capital assistance for low-cost transit on which East Oakland residents rely very heavily to access employment, education and other essential opportunities” (Allen-Taylor n.d.).

In some instances, a project will already exist, and the aim will be to rebuild or improve existing capital. These initiatives require that all stakeholders reconsider how existing infrastructure contributes to social and spatial inequalities. If the next iteration of a project will be equitable, agencies and other involved parties will need to change the built environment, as well as established norms and practices. In this respect, the potential for social and physical change through infrastructure rebuilding projects is vast and critical.

A project that addresses the three claims of environmental injustice in each phase of planning is an ideal type. The infrastructure project would need to meet all the elements laid out in the following sections. In addition, for a project to create social justice, structural racism would need to be absent in the socioeconomic context and history of where a project is built. This is not a reality for American cities. In most cases, decisions at different points in the planning process will reveal trade-offs: some will include equity goals and others will not. For many communities, including the one at the focus of this study, this might mean accepting the siting of a facility, on account that the jobs will go to local residents. These kinds of benefits are often deemed “wins” after hard-fought environmental justice campaigns, but “partial wins” is a more sobering and accurate description. In their

examination of benefits-sharing agreements, Rosen and Schweitzer (2017) explain these instances:

Planning interventions that attempt to alter costs and benefits distributions employ nonideal theory, as they implicitly aim to progress society toward a (potentially unachievable and frequently unspecified) ideal state. This approach recognizes that planning operates in underlying, influential conditions of injustice and within imperfect institutions (Fainstein, 2010; Schweitzer, 2016), and yet acts anyway because of the potential for good to result, even if it is partial (6).

They caution that, under these nonideal conditions, agencies can revert to the status quo in instances of inaction, tokenism, and rhetorical trickery. What this dissertation urges, then, is a critical engagement of the various ways in which projects can promote racial equity. Furthermore, upstream decision-making and concurrent discussions of the distribution of both benefits and burdens throughout the course of the planning project can yield not only more just outcomes (a better nonideal scenario) and prevent regression.

Engineering Justice in Infrastructure Projects: Other Cities

Several utilities and public works organizations across the country are incorporating environmental justice goals at various phases of their infrastructure rebuilding programs and in their service delivery. The examples below demonstrate that environmental justice is pursued in different ways across contexts, although Cincinnati and Washington DC's emphases on jobs may suggest that this is one of the most feasible ways to do so. Seattle's pursuit of equity does not form part of a rebuilding program per se, but it does indicate that environmental justice can be activated in ongoing operations.

Service Equity in Seattle. In 2009, the Seattle City Council authorized the Race and Social Justice Initiative (RSJI) to eliminate institutional racism in City policy and operations. The Seattle Public Utilities (SPU), the regional water and wastewater services provider, took up the RSJI in several ways (Seattle Public Utilities 2017). The utility is focused on internal "capacity building" through trainings, including an eight-hour training session on race and social justice. As part of the trainings, staff applies RSJI concepts to agency programs and policies. When it comes to interfacing with communities, SPU has developed a "service equity" approach that involves rethinking how city residents are differently impacted by all agency decisions and how to create more access for disadvantaged communities.

One way it has tried to support equity is through increasing outreach and adjusting guidelines for a natural resource improvement grant program run with its partner, King Conservation District. Prior to making these changes, a small group of mainstream conservation groups from particular parts of the city knew of and were awarded the grants, leaving many community organizations out of the process. To change this, program administrators added review criteria and information about who the projects would serve

and their spatial distribution in the city. They also conducted targeted outreach and included applications questions pertaining to demographics and service population.

Jobs and Contracts in Washington D.C. From 2015 to 2025, DC Water, the local water and wastewater agency, plans to spur \$13.1 billion in regional economic investment that will create 70,900 jobs. To ensure that those jobs reach disadvantaged residents, the utility has created the DC Water Works! (DC Water 2017) program that advertises jobs to local residents. It also uses contracting as a lever to reach underserved communities by prioritizing contracts in these communities and incentivizing companies to interview and employ residents. The utility holds high local hire standards: For example, 51% of the labor under the construction and design contracts must be constituted by local residents. 60% of new jobs created by contracts or procurement (e.g., promotions, workforce expansion, etc.) will also go to local residents.

Jobs and Community Revitalization in Cincinnati. Metropolitan Sewer District of Greater Cincinnati's (MSD) Project Groundwork is the utility's \$3.2 billion initiative to remove 1.78 billion gallons of combined sewer overflows (CSOs) from the local watershed (Metropolitan Sewer District of Greater Cincinnati 2017). The plan was approved by the EPA, after the federal agency ordered a consent decree to reduce CSOs. The county's outfall is located in the predominantly African American community of South Fairmont. The neighborhood's wastewater burdens compound other longstanding challenges, including poverty and unemployment, and, more recently, foreclosure. The EPA had originally encouraged the city to achieve this goal through the construction of a deep, underground storage tunnel. Instead, MSD has planned to remove CSOs through green infrastructure: the Lick Run Greenway project, which forms part of a South Fairmont revitalization initiative, will include daylighting and stormwater detention basins that will create open space for recreational uses in the neighborhood and improve water quality. Project Groundwork is being leveraged to create job opportunities for local residents, including programs like Get Skills to Work Initiative that train veterans in manufacturing. The SuperJob Center, a capital improvement plan partner, works to outreach to unemployed and underemployed residents for job placement opportunities that pay living wages.

The Benefits of an Engineering Justice Approach

Infrastructure projects can sustain or disrupt the status quo. Shifts in environmental planning and racial inequality point to the urgency of the latter for several reasons. First, making the engineering of justice part of infrastructure rebuilding programs enables cities to consider how their operations contribute to the cumulative impacts, or social and environmental stressors that have additive impacts. Strictly assessing the chemical exposure generated by utility operations fails to consider the additive effects of the multiple hazards that often burden disadvantaged communities (Clougherty and Kubzansky 2009; DeFur et al. 2007). Nor does it consider the social determinants of health, such as economic inequality, discrimination, and limited social and community networks (Corburn and Bhatia 2007). Addressing the cumulative impacts experienced by disadvantaged communities requires regulatory interventions on land use planning decisions (Morello-Frosch et al.

2011). Through the pursuit of engineering justice, public works agencies are poised to engage in decision making that remediates its role in health and environmental disparities.

Second, the engineering of justice enhances the organizational capacity of all entities involved. Utilities and private actors that pursue racial justice require new forms of in-house expertise, such as professionals with backgrounds in community and economic development. These organizations must also diversify their staff to reflect the communities they serve. Community-based organizations enhance their capacity by having a role in planning decisions, as illustrated in Chapter 6, benefitting the strong regulatory role of local government.

Third, the engineering of justice involves activating more substantive forms of sustainability. In the absence of federal and state leadership on climate change, public works agencies are implementing plans to respond to its effects. Private actors have also made sustainability a part of their repertoire, leading to the adoption innovative sustainability practices, including green infrastructure. Gunder (2006) troubles notions of sustainability that have rendered the concept hollow: “Under dominant market interpretations of the discourse of sustainable development, planning risks marginalizing its role of serving today’s public good in turn for serving the further depletion of the environment...” (209). This dissertation, for example, notes how this can manifest when sustainability tools do not account for demographic and spatial patterns.

Fourth, the engineering of justice in wastewater planning unlocks the anchor potential—or the equitable community and economic development role—of utilities. Historically and culturally, utilities are perceived and managed strictly as service providers. But their large-scale operations create transactions of capital that low-income communities of color should benefit from. In this dissertation, I use an anchor institution approach in reference to other place-based institutions that, in partnership with communities, are creating opportunities for local residents. Utilities have the capacity to follow suit.

Finally, the engineering of justice is implicated in gentrification trends. In strong-market cities like San Francisco, infrastructure improvements are intimately linked to urban revitalization. Large streams of infrastructure investment in both green and grey infrastructure will improve or sustain public health standards and the quality of life in cities, but the displacement of low-income communities of color means that large groups of residents may not benefit from these improvements. It is essential to approach infrastructure spending as part of large urban shifts that are adversely impacting historically marginalized residents. New grey infrastructure projects and the rebuilding of existing ones cannot sufficiently fend off these urban phenomena but are central to discussions on mitigating their adverse impacts.

Discussion

This chapter draws on the environmental justice movement and literature to present an engineering justice framework for infrastructure projects. Engineering justice refers to how racial equity features in every stage of the planning process, as well as the costs-

benefits-, and process-based claims pertinent to each phase. Capital improvement plants require an interrogation of the basis for planning, including ecological and inter-sectoral considerations. Relevant public health and engineering ethics literature cited to draw out the interdisciplinary implications of engineering justice. I conclude by summarizing the basis for the pursuit of engineering justice in infrastructure planning: reveals cumulative impacts, enhances organizational capacity, activates more substantive forms of sustainability, and is implicated in gentrification and displacement trends. In the next chapter, I discuss the first of six phases of engineering justice addressed in this dissertation: the expansion of the San Francisco Southeast Treatment Plant.

3. From Burden to Trade-Off: Plant Expansion under the Clean Water Act

Introduction

Along San Francisco's Phelps and Jarrold Avenues are homes on one side and the Southeast Treatment Plant (SEP) on the other. The plant, which sits on 40 acres of land, includes two smokestacks and ten cylinder structures that protrude from a 10-foot brick wall. Every day, for 24 hours a day, 60 million gallons of wastewater are conveyed from across the city to the plant, and up to 250 million gallons reach the plant during rainstorms. The plant also receives wastewater flows from Daly City and Brisbane, two neighboring cities. The eyesore and constant source of foul odors is one of many environmental burdens in the low-income and historically African American community of Bayview Hunters Point. But the treatment plant was not always a burden. When first built in 1952, the SEP represented a grand accomplishment for San Francisco. The new structure subjected the city's wastewater to a primary treatment process: it contained the wastewater, settled solids, and then released liquid into the San Francisco Bay. Two decades later, the treatment plant underwent a massive expansion as part of the city's effort to meet federal Clean Water Act requirements. In the 1970s and 1980s, residents challenged the plant's expansion.

This chapter asks, how can planners and engineers engage with historically marginalized communities to promote justice? I answer this question by chronicling the contestation between residents and public works officials, as well as the efforts to redress the plant's externalities. I provide a brief history of wastewater planning to show how decades of technical decision-making created the basis for the expansion. Findings illustrate the importance of understanding residents' concerns in relation to other challenges they faced—namely, growing unemployment and poverty. Planners and engineers must thus understand battles over siting in relation to social and environmental stressors. I show how the incorporation of environmental justice goals led to a more comprehensive regulatory framework in the area of wastewater planning and how community members formalized their role in wastewater planning efforts.

Wastewater Planning in Brief

Prior to the middle of the 19th century, formal and centralized wastewater planning did not exist in Western Europe or the United States. Urban residents primarily used privy vaults and cesspools to contain and discharge wastewater (Tarr et al. 1984). Cities had low population densities that made wastewater nuisances – such as the contamination of ground water and surface water – tolerable. This changed in the middle of the nineteenth century, as the industrial revolution spurred urban growth and increased density (Burian et al. 2000). Heightened amounts of human waste accrued, spilling into urban waterways and streets. Sanitation nuisances became major health epidemics. Cholera or typhoid outbreaks killed thousands in many cities, including London, New York City, New Orleans, and Tennessee (Melosi 2008). The diseases struck some cities multiple times.

The sanitary reform movement would allay the extent of these outbreaks. In Britain, Edwin Chadwick was among the earliest, most fervent, and most influential sanitary reformers. In the *Report on the Sanitary Condition of the Labouring Classes* (1843), he linked living conditions to the spread of disease. Poor populations needed improved sanitary conditions but, the report noted, bad housing and working conditions also caused destitution and ill health. The idea that environmental and social factors could prevent disease in these communities was radical for its time and stood in contrast to the work of evangelical and charity reformers, a financially strong and organized group in the United States. They linked disease to immorality: the poor – many of whom were immigrants and lived in slums – were more susceptible to disease because they were sinners (Taylor 2009). Evangelical and charity reformers also aimed to privatize the eradication of pauperism (Katz 1996). The sanitary reform movement operated on the principle that scientific and technical solutions could improve social problems (Corburn 2004).

The relationship between wastewater and health epidemics was elucidated by a new understanding of disease. The epidemics were originally explained by miasma theory, which attributed illness to pollutants that release matter into the air. British physician John Snow (1856) countered miasmatic explanations in “On the Mode of Communication of Cholera,” in which he made a case for the transmission of disease through drinking water. Snow would buttress his argument by using original survey techniques to map a cholera outbreak to its source: a water pump. This new insight on the water-borne nature of disease further propelled the sanitary reform movement; it gained momentum as part of a broader effort to create sanitation systems that reached all members of society to protect the public’s health.

This proclivity for technical solutions was manifest in the design of sanitation systems. Engineers designed and built two types of competing water-carriage systems: combined sewer systems, which carry both stormwater and sanitary sewage, and sanitary sewer systems that carry only sanitary sewage (Burian et al. 2000). Despite evidence suggesting that sanitary sewer systems were less susceptible to flooding and provided greater treatment capacity, combined sewers proliferated due to engineers’ claims that they were more efficient and cost less. Engineering models that projected urban sanitation needs were also used to justify the development of combined systems. The battle between combined and sanitary systems figured in the work of seminal planning figures. For example, Georges-Eugène Haussmann, a Parisian planning pioneer, was opposed to the construction of combined sewers (Gandy 1999), but this was a battle he ultimately lost as scientific and technical opinion shifted in favor of combined systems and officials felt pressured to meet new housing demands. Today, older Western cities continue to deal with the high levels of pollution created by combined systems.

The new sanitation planning methods elevated the role of engineers. The design and construction of sewers could only be done through the application of new technologies, something engineers were uniquely capable of doing. Their penchant for standardized fiscal techniques and centralized metropolitan administration earned them the reputation of ‘neutral experts’. They also emerged as an official profession that required specialized training. Schultz and McShane (1978) discuss the unique capabilities of engineers that

raised them to prominence: they embodied ‘efficiency, expertise, and an allegedly disinterested, incorruptible professionalism’ (402). A primary legacy that emerged from the work of sanitary engineers, and which would have a lasting effect on the planning profession, is the use of the survey (Peterson 1979). This tool was used to examine neighborhoods at the scale of the lot—below and above ground—to develop and plan for its use. It involved an assessment of environmental conditions and allowed for planning around those conditions.

Engineering problem-solving capabilities, however, did not always benefit marginalized residents. In San Francisco and elsewhere, the development of sanitation systems in poor and African American or immigrant communities did not keep pace with those built in other parts of the city. Moreover, Troesken (2004) shows that the equalizing intent behind the sanitation reform movement is an incomplete explanation for the widespread development of sanitation systems. Sanitation systems, rather, were extended to African American neighborhoods because that was the only real way to ensure epidemics would not break out in middle- and upper-class neighborhoods. Smaller and centralized sanitation systems in privileged neighborhoods could not sufficiently prevent health epidemics.

In the late 1800s, sanitary reform began to lose its centrality as the primary driver of urban change as two competing visions for the planning profession emerged. One was comprised of progressive reformers who extended the sanitary reform movement’s approach to shape the social dimensions of life through urban regulations. They called for a planning profession that was more concerned with inequality, drawing inspiration from the work of its leaders like Jane Adams of the settlement house Hull House and Benjamin Marsh, a social worker (Taylor 2009). Marsh authored the first book dedicated to the urban planning profession, *An Introduction to City Planning* (Marsh and Ford 1909). His writings and planning projects promoted regulation, such as zoning and land taxes. Marsh would carry out his vision by implementing the first zoning plan in the New York City. Some of Marsh’s ideas became standard practice but they were cast as too radical by proponents of a competing planning paradigm, the City Beautiful movement (Peterson 2009).

Proponents of the City Beautiful movement promoted an urban planning profession that was concerned with ordering the city through ‘scientific aesthetics’ based on neoclassical architectural design (Boyer 1986). The movement’s origins are located in the Chicago World Fair of 1893, where Fredrick Olmsted and his associates introduced the White City, a landscaped garden suburb. City Beautiful also drew inspiration from Ebenezer Howard’s “Tomorrow, a Peaceful Path to Reform” (Howard 1898), which described satellite self-reliant cities, with a central garden city. Economic rationales were proffered for Olmsted’s vision of the city, too. Daniel Burnham, an associate, argued that beautification would provide benefits that would trickle down to all members of society and create civic pride. Under this approach, waterways were incorporated in city beautification plans as streams, floodplains, and wetlands, and often as the central feature of a park. Many City Beautiful projects ultimately failed, however; despite the natural look, they were ‘constructions of nature,’ and their designers did not account for the social

and political processes needed to sustain them (Spirn 1995). The City Beautiful movement was influential through the 1920s but its lofty goals for urban improvement prompted planners to assume the role of guardians of administrative efficiency (Boyer 1986). Planners thus took on increasingly public roles as functionaries of city government and as members and heads of boards and commissions.

The rationale driving the selection of the suite of public works projects beginning in the 1930s was based on utilitarian principles or the idea of the “greatest good for the greatest number of people”. This idea judges an act or a decision based on whether its outcome benefits more people than those it does not benefit. The water supply projects built in this era represent what Graham and Marvin (S. Graham and Marvin 2001) call the “modern infrastructural ideal”: integrated and standardized services in and for cities were perceived as expressions of progress. Monopolistic forms of governance were at the helm of planning these large hydraulic projects that resulted in the provision of network services. For Bakker (2010), this “municipal hydraulic” era was a manifestation of the territorialization of government power, and it was markedly different from previous and subsequent water planning eras insofar as it upheld the notion of government provision of services. The federal agencies that sponsored this planning were connected to politically powerful urban elites that embraced water projects as conduits and safeguards for economic growth.

The scaling of wastewater planning within and across cities also involved new forms of metropolitan governance. Cities that grew or consolidated debated how to manage urban services, including wastewater. Local authorities undertook three different forms of coordinating the administration of sewer services: intermunicipal and interstate cooperation, annexation of or consolidation with suburban areas by a central city; and special district government (Tarr et al. 1984). Planning officials lent support to a model based on perceptions of fiscal efficiency and its implications for the provision of quality services.

Mullin (2009) juxtaposes two competing theories that emerged on the advantages and disadvantages of specialization in the provision of urban services. The first, metropolitan reform theory, is rooted in progressive era principles and argues for the benefits of centralized metropolitan governance. This tradition holds that special districts’ fragmentation makes service provision inefficient. Districts are also difficult to hold accountable because their election or appointment procedures are often controlled by local interest groups. But a centralized municipal government holds no guarantees for the equal provision of services across neighborhoods. Colten (2002), for example, discusses the exclusionary impacts of New Orleans’ drainage plan on African American neighborhoods. At the turn of the century, the city’s progressive reformers aimed to equitably serve all neighborhoods, but it failed to extend services to several African American neighborhoods that lacked the tax base to pay for them. Drainage also contributed to segregation by being built into new, improved areas that, through city ordinances and deed restrictions, were closed to African Americans.

A competing theory, associated with the Chicago School of economics, makes a

case for the benefits of specialized governance. It builds on Charles Tiebout's (1956) model of local governance which asserts that specialized government encourages competition between jurisdictions and allows residents to "vote with their feet," or move to the locations that offer them the best package of services. This rational model postulates that local officials are able to be more responsive to residents' preferences through specialization. Orfield (1997) and Rusk (1993) are among others to argue that fragmentation results in racial and economic polarization. They cite as examples suburbs that create their own special districts and exclude predominantly low-income communities and people of color. Hutson et al. (2012) point to the more deleterious consequences of these patterns of exclusion in finding a link between increased fragmentation and greater mortality rates for African Americans.

The wastewater planning technology used in 19th century and first half of the 20th century effectively gathered and conveyed wastewater but did not treat it. The quality of wastewater became an increasingly evident and grave problem in the first half of the twentieth century. Untreated domestic and industrial wastewater made urban waterways toxic and uninhabitable for plants and fish, which constrained downstream uses of water. Rachel Carson's *Silent Spring* (2002) raised public awareness about how various sources of pollution contaminated ground and surface waters. A mix of chemicals, she wrote, created "rivers of death" that harmed the natural environment and drinking water supply. The book served as ammunition for a growing movement of environmentalists and regulators concerned with the state of the country's natural environment.

The environmental movement reconfigured wastewater planning in the United States. Federal officials responded with the passage of landmark legislation to protect the quality of the nation's waterways by establishing water quality standards for urban waterways and streams (Layzer 2011). Today, the 1972 Water Pollution Control Act and its six amendments known as the Clean Water Act (Federal Water Pollution Control Amendments of 1972 (33 U.S.C. §1251)). This command-and-control system of governance changed environmental planning in several important ways: it created a permit system for discharges, funded new treatment plants (it required the secondary treatment for all publicly-owned sewage), and required environmental impact assessments (EIS), which established a review process of federal policies and projects that could affect environmental quality (Mazmanian and Kraft 1999; Fiorino 2009)(Mazmanian and Kraft 1999; Fiorino 2006). The system, based on prohibition and enforcement, is often viewed as the alternative to market-based solutions (Hahn and Stavins 1992). The new standards and protocols turned environmental planning into a subfield of the planning profession (Birch and Silver 2009).¹⁰

¹⁰ A command and control approach has also elicited other critiques, many of which question the measures and uniform standards imposed by the legislation. Andrews (1997) cites the EIS as an example of how a command and control approach increases accountability but also limits broad-based change by individualizing a problem. Golub (2013) offers that the development of minimum pollutant standards creates no incentive for companies to reach levels below those established. According to some, companies are also discouraged from innovating new, more capable technology to reduce pollutants when they are mandated to use particular technologies (characterized as the 'best available technology,' or BAT, in the CWA legislation). By establishing quantified maximums of pollutants (numbers based on subjective analyses), problems are narrowed and fragmented, and

Among the new CWA standards, utilities had to add a secondary treatment procedure, consisting of a biological process to improve the quality of wastewater release into local waterways. This treatment process dramatically improved the state of the country's rivers, streams and bays, reducing human exposure to contaminants. Since becoming law, approximately 16,000 secondary treatment plants have been developed to improve the water quality of the country's water bodies and waterways. Over thirty percent of those plans have gone beyond the CWA by instituting additional water treatment procedures. Despite their importance, many vulnerable communities across the United States bear the burden for the CWA's accomplishments. Large wastewater treatment plants are located in low-income communities of color in many cities. In the 1970s and 80s, two of those communities fought back and created agreements with the utilities to mitigate the impacts of the plants. Residents of West Harlem challenged the construction of the North River Sewage Treatment Plant, leading to a concession in form of a 28-acre park that was built on top of the plant. In San Francisco, Bayview Hunters Point residents also contested plans expand the SEP. In what follows, I chronicle this contestation and its outcome.

San Francisco Wastewater Planning

San Francisco's wastewater system reflects US planning trends and explains the infrastructure's adverse impacts on vulnerable residents. In the 1800s, San Francisco's wastewater system was built haphazardly. Its development would take on a more systematic form when population growth, fueled by the California Gold Rush, prompted the development of the city's first master plan in 1899 (Chiu et al. 2010). San Francisco's Civil Engineer in Charge, C.E. Grunsky (1899), authored a report that detailed the disorganized construction of the sewer system and illustrated how it did not consider aesthetic or sanitary conditions. With the report, he also proposed the centralization of sewage release at six outfalls, a major transition from the existing 125, and a large sewer infrastructure program that efficiently and economically collected wastewater:

In designing the system, one of the most important conditions to meet was the collection and discharge of the rainwater and sewage by gravity; that is, without pumping. The Engineers gave considerable study to obtain this object, and have succeeded in reducing to a reasonable minimum the areas from which it is necessary to artificially raise the sewage so that it can be discharged at proper outlets. To accomplish it they have studied; the best available gradient and the least expensive alignment of the interceptors which prevent the sewage of the higher territory from naturally reaching low territory, where it would thereafter require pumping... The alignment also of the main collecting sewers has been carefully studied with a view to economy and efficiency (Grunsky 1899, 111-112).

thus so are the strategies that respond to them (Fiorino 2006). Still others note the limitations of piecemeal litigation to address environmental problems (Sabatier, Weible, and Ficker 2005).

Citing fiscal and technical reasons, the 1899 master plan laid the groundwork for a sewer system that would channel wastewater downward and into select locations, where some of the city's most vulnerable residents would ultimately live.

In 1904, San Francisco commissioned Daniel Burnham to produce a City Beautiful plan for San Francisco. With his colleagues, he worked to create the first City Beautiful Movement project in the Bay Area. Much of the plan was not pursued due to the 1906 earthquake, although the proposed Civic Center—which included City hall, a plaza, and fountain—was built. The plan had also proposed to create a “New Oriental City” in Bayview Hunters Point, which involved relocating Chinatown to the neighborhood. This early idea for the neighborhood reflects an attempt to make of Bayview Hunters Point a marginal residential community. This negligence was further cemented in 1921, with a zoning ordinance that created both a residential and industrial district in the neighborhood.

The city's second wastewater master plan in 1935 advanced this trend. Advised by a Board of Consulting Engineers, it called for the centralization of the system by bringing the number of outfalls down to four, as well as building of treatment plants at those locations. Bayview Hunter's Point was on the list of four.

The Board advanced the conclusion that, with the completion of the recommended works and their faithful and efficient operation, the sewage of the city would be disposed of in as effective and economical manner... (Hyde 1943, 5)

System enhancements included three treatment plants—including the Southeast Treatment Plant¹¹—as well as 900 miles of combined sewers and 22 pump stations. Officials referenced the city's geography as the reason siting the SEP in Bayview Hunters Point. The low-lying location adjacent to the San Francisco Bay was a practical choice because water could be conveyed by gravity and then into the San Francisco Bay upon being treated. Furthermore, a large swath of the neighborhood was a designated industrial area. This plant was ultimately built across the street from 15 single-family and multi-family residences along Phelps Avenue and Jarrold Avenues. The early technical consideration of using gravity to convey wastewater was an enduring justification for inequities in the city. Bayview Hunters Point residents worked to change this pattern of exclusion with the city's third wastewater master plan.

Master plan of 1974

City officials issued a 1974 wastewater master plan to implement CWA requirements and guide system improvement projects for the following twenty-five years. By creating 197 million gallons of storage infrastructure and reducing the number of sewer overflow outfalls, the master plan proposed to clean up six billion gallons of raw sewage that were annually dumped into the Pacific Ocean and San Francisco Bay. A large, new treatment plant also formed part of the plan. City officials initially considered two options: to expand the existing

¹¹ Then called the Southeast Pollution Control Plant.

SEP or to build a new treatment plant in the southwestern part of the city, on the site of the current Oceanside Wastewater Treatment Plant (*San Francisco Chronicle* 1975).¹² City officials moved forward with the SEP expansion option in order to meet federal funding deadlines. Following the precedent of the past, officials cited technical reasons pertaining to topography and water flow patterns as a basis for SEP expansion. Don Birrer, the city's engineer at the time would later reflect, "Two of the city's largest sewer pipes had been constructed along former creekbeds -- along Army Street and Alemany Boulevard -- which converged near that spot, so it was a good place to put the plant" (Finnie and Sward 2002). The expansion plan would involve the purchase of surrounding land and the relocation of local businesses. The SEP would be upgraded to treat an average of 85 million gallons per day or 80% of the city's wastewater (Chiu et al. 2010).

The proposed SEP expansion added insult to injury for Bayview-Hunters Point residents. The Hunters Point Naval Shipyard, one of the country's biggest military dry docks at the time, was shuttered in the same year the master plan was issued (C. Johnson 1995). The closure led to the loss of 17,000 jobs and the neighborhood's unemployment rate skyrocketed. The residential areas of the shipyard were turned into public housing which, paired with federal programs that excluded African-Americans, intensified the concentration of poverty. Eloise Westbrook, neighborhood activist, pointed out "Out in the Bayview, we have for years been denied anything... Bayview, we want some open air or some jobs out here" (Liebert 1975b).

Upon learning of the project in 1975, many residents attended a planning commission meeting on the project's environmental review to demand more information (Liebert 1975a). At the meeting, Myrtle L. Spruell, a member of the local Shafter Avenue Community Club, noted that residents want "the same consideration you give to Pacific Heights, the Sunset, the Marina," more affluent San Francisco neighborhoods. City engineer Harold Levy admitted that his office had not given residents proper notification about the plan and agreed to hold a meeting in the Bayview Hunters Point. That day, commissioners sided with residents by voting to postpone taking action.

Bayview Hunters Point residents took additional steps to organize against plant expansion. Shafter Avenue Community Club president Harold Madison and then-State Assemblyman Art Agnos provided initial financial backing through the establishment of a community fund (*San Francisco Examiner* 2013). Madison also filed a lawsuit to prevent the expansion. In a *San Francisco Chronicle* series on the city's wastewater capital plan (Figure 9), Madison detailed the challenges of living adjacent to the treatment plant:

If you live where I live and you invite family from the Midwest or South and open your kitchen window in the morning, it does something to your self-esteem... It's psychological. It destroys the image of the community. The smell gets so bad that relatives tell me they can hardly eat.

¹² The plant was built in 1993.



Harold Madison brought suit against the city to clean up the sewage problem near his home between Hunters Point and Candlestick Park

Figure 9. Harold Madison, Bayview Hunters Point resident.
Source: Harris and Soiffer (1982)

City officials responded to the opposition in multiple ways. They emphasized, for example, that the plant would not cause the alleged damage. At a Commission meeting to vote on the environmental review, the city engineer, Robert Levy, argued that the plant would be “odorless, there will be no seepage, it will be absolutely safe” (Liebert 1975b). Mayor Joseph Alito also promised that the plant would not adversely impact the community due to its innovative technology to control odors. Another reason the plant would have limited impact on its surrounding area, officials argued, is that it would be built underground (SF Human Rights Commission 2003). Messaging on the innocuousness of the plant evolved to include the economic opportunities generated by construction. A few years into construction, 21 of 28 subcontracts totaling \$22.7 million had gone to minority business owners, and 2,000 construction jobs, about half of the total, went to Bayview Hunters Point residents (*San Francisco Chronicle* 1978).¹³ Mayor George Moscone, during a visit to the plant, pointed out the “unprecedented” minority participation in the expansion.

Public works officials also tried to address Bayview Hunters Point resident concerns by agreeing to build a crosstown tunnel to channel wastewater away Bayview Hunters Point and the San Francisco Bay and to a new westside facility (*San Francisco Chronicle* 1982) (Figure 10). The tunnel was a primary reason Mr. Madison agreed to drop his lawsuit against the city (Harris and Soiffer 1982). Finally, officials tried to gain favor by agreeing to create additional community amenities on the SEP site. They promised a concession in the form of an 8-acre park and football field that would be built on top of the plant (*San Francisco Examiner* 2013). The recreational facility would require elevators to access it. In 1975, the San Francisco Board of Supervisors adopted a resolution endorsing plans to undertake the expansion and build the recreation space (Roddy 2014).

¹³ News coverage of the construction project later indicated that only 30% were local workers (Reiterman 1981).

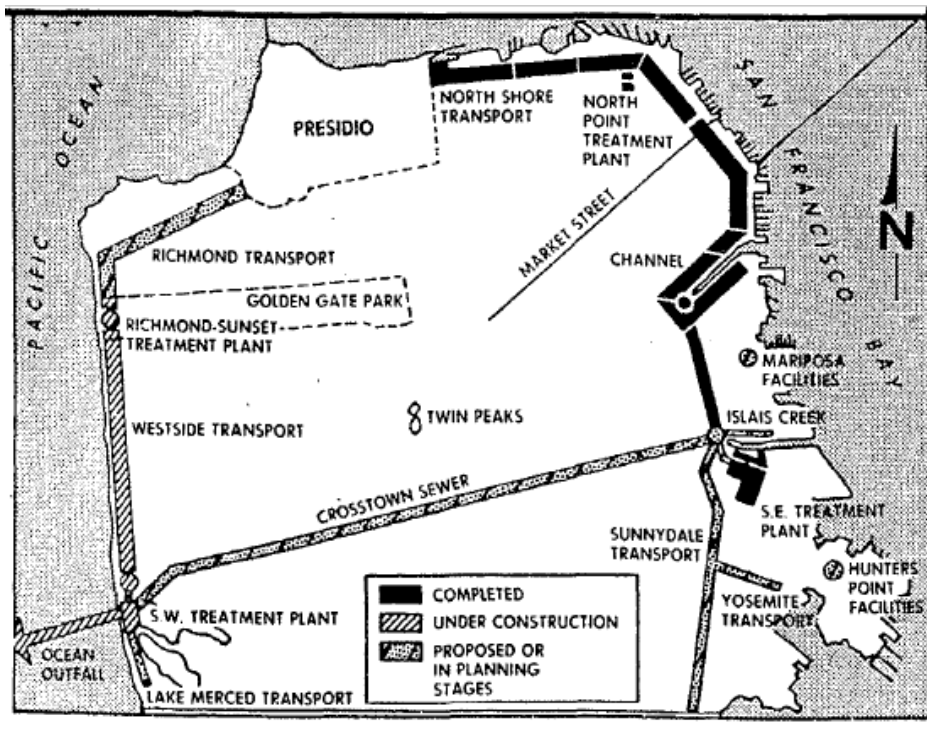


Figure 10. Proposed crosstown tunnel.

Source: Soiffer and Harris (1982)

Some of these promises were quickly broken. The plant, for example, was not built underground and it would be the source of odor and other nuisances residents had feared. The crosstown tunnel was also never built. It met quick disapproval by residents along its proposed route, and the wastewater program's growing fiscal concerns—including opposition to service charge increases and failed construction contracts—ultimately foreclosed it as an option. The decision to eliminate it as part of the master plan was supported by a panel of experts assembled by San Francisco Chief Administrative Officer Roger Boas. They determined that the tunnel was too expensive and that there were more effective ways of getting rid of the water in the city's eastern side. Harvey Rose, budget analyst for the Board of Supervisors, also consulted a group of experts who came to a similar conclusion, pointing out that if the tunnel would cost millions, it was unnecessary, and required too much in power costs (Harris and Soiffer 1982). Debate on master plan costs was fueled by evidence of fiscal mismanagement and rising construction costs (Soiffer and Harris 1982). The crosstown tunnel was ultimately scaled back in 1980, when public officials recognized that voters would need to approve a new bond to implement all components of the master plan.

City officials did attempt to deliver on the proposition to create a recreation space for residents. But even as residents engaged in negotiations regarding this potential amenity they continued to voice their opposition to plant expansion. For example, the construction site was temporarily shut down when residents protested unsafe working conditions at the site following the death of a construction worker (Champion 1979). At a meeting with Mayor Diane Feinstein, residents aired their concerns regarding unsafe working conditions.

They also pointed out constructions practices that adversely affected them, trucks dumping construction site dirt on a commercial street and traveling to fast. Residents simultaneously opposed and considered how they might benefit from the plant expansion. The Mitigation Agreement of 1984 was a culmination of these efforts.

The Mitigation Agreement of 1984

Resident disapproval shifted to discussions about how the public works agency might redress the plant's impacts on the neighborhood. Espanola Jackson, Jim Jefferson, Shirley Jones and Ethel Garlington, all leaders of the local movement, engaged in discussions with the city in the late 1970s. In the organizing meetings that took place in the neighborhood's Providence Baptist Church, residents coalesced around the idea of a community center that would serve the educational needs of residents, as well as seniors and children (Southeast Facility Commission, n.d.). They were opposed to the park on the basis that it would generate no economic value for the neighborhood. Organizers also discussed the center's design and operations. Among the skills training offerings conceptualized was a nurse pre-training program that would initially be housed at the community center. San Francisco Chief Administrative Officer Roger Boas observed, "At first, citizens of Bayview area were uncertain whether to accept the sewage treatment plant. Then they realized they would gain long-term benefits for an area that has had chronic unemployment" (Soiffer 1986).

The city's wastewater program commissioned a report on residents' concerns and preferences. In "Community Facility at the Southeast Treatment Plant" (Jefferson Associates, Inc., Curtis Associates, and Ishimaru, O'Neill and Simmons 1979, B4), Jefferson and Associates, Inc. a Black-owned consulting firm and two partner consultancies, described findings generated through extensive public outreach, including input from community organizations and individuals, an all-day community workshop, public notices, and a random sample household survey data of 300. Survey results indicated that residents overwhelmingly preferred a skills training facility (Table 3). A community recreation center, greenhouse facility, and recycling and reclamation facility ranked second, third, and fourth respectively.

Table 3. Preferred Community Facility (Figures in Percentages).

| Alternatives | Census Tracts | | | | | | Total |
|---|---------------|------|------|------|-------------|------|-------|
| | 230 | 231 | 232 | 233 | 234, 610 | 609 | |
| Commercial Greenhouse Facility | 12.5 | 8.7 | 8.0 | 25.0 | 2.8 | 0 | 9.3 |
| Skills Training Facility | 45.8 | 58.7 | 58.0 | 25.0 | 58.3 | 75.0 | 53.0 |
| Community Recreation | 13.9 | 11.5 | 14.0 | 12.5 | 19.4 | 10.0 | 14.2 |
| Recycling and Reclamation Facility | 27.8 | 21.2 | 20.0 | 37.5 | 19.4 | 15.0 | 23.5 |

Source: Jefferson Associates, Inc., Curtis Associates, and Ishimaru, O’Neill and Simmons (1979, B4)

San Francisco public works officials advanced plans to redress the community’s concerns by asking the California Water Resources Control Board for recreation space funding through its sewer construction grant program (Roddy 2014). The initial request was denied because it was not considered a qualifiable expense for the program, but the city insisted by appealing and then making the request of the full State board. The State Board agreed, citing among other reasons that “The EIR process had identified substantial social impacts associated with the project that should be mitigated to the extent reasonably possible.” The Board’s decisions prompted the EPA to change its own eligibility guidelines: the CWA was amended to enable to the use of grant funds for the community facility and greenhouses. President Ronald Reagan’s 1981 Clean Water Act bill included the funds (*San Francisco Chronicle* 1981). The change made history as the first time CWA funds would recompense a community sewage treatment expansion (*San Francisco Examiner* 2013; Soiffer 1986). Approximately \$13.5 million state and federal resources were used toward the \$20 million in project costs (Roddy 2014).

Public works officials came to the realization that the recreation space was not a good idea on their own accord. The environmental impact report showed it to be infeasible, and it incurred high building, maintenance, and operating costs (Southeast Facility Commission, n.d.). The high elevation of the structures also made it unfeasible. The city and residents began to move forward with plans to build a community center that would create education and workforce training opportunities. It would be built on a corner site of the plant and on land that would be acquired by the water agency, since, at the time, the spot was a car wrecking and salvage yard (Figure 11). Greenhouses adjacent to the facility would be used for skills-training and provide jobs to residents. Despite the city’s eventual acquiescence to the community’s concerns and priorities, the project was not perceived favorably by all. The project, for example, was criticized by Margerite Warren of a city watchdog group who argued against the \$15.8 million sole construction bid because it was higher than the original estimates of \$12.7 million (*San Francisco Chronicle* 1984). “This is going to be the most extravagant building in San Francisco,” she said.

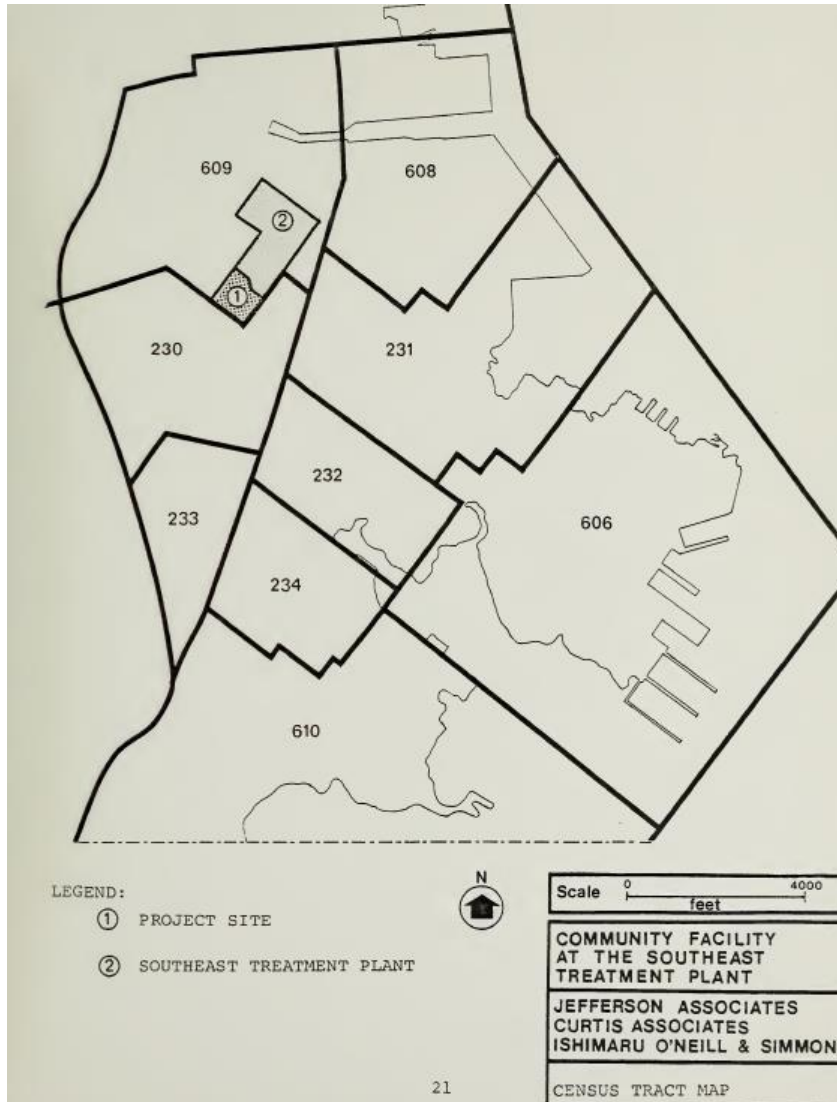


Figure 11. Proposed site of Southeast Community Facility.

Source: Jefferson Associates, Inc., Curtis Associates, and Ishimaru, O’Neill and Simmons (1979, 21)

Negotiations led to the creation of a Mitigation Agreement between community members and the city, signed on November 18, 1986. It read,

We agree that the newly proposed mitigation measures address the social and economic impact of the Southeast Plant expansion project... The Bayview-Hunters Point Community is already suffering from the cumulative effects of a series of governmental decisions to locate unwelcome public facilities, such as freeways and the existing Southeast Plant, in its neighborhood (California Water Resources Control Board 1986).

The space, named the Southeast Community Facility (SECF), consisted of 39,000 rentable square feet of classroom and office space, as well as approximately 125,000 rentable square feet for the greenhouses (SECF and SFPUC 2014) (Figure 12).



Figure 12. The Southeast Community Facility built under the 1986 Mitigation Agreement.

While residents insisted on the ongoing involvement of the city for the purposes of maintaining the building, they also requested that they have a role in the governance of the facility. The Jefferson and Associates et al. report included the recommendation to have a community organization serve as facility managers:

It is recommended that a non-profit corporation be established to lease the land and facilities from the City and then sublease them to operators of the greenhouse and skills center. The non-profit corporation would manage the facilities and administer the lease revenues.

This community's recommendation did not pan out. Instead, the Facility came to be owned by the City, managed by the Dept. of Public Works, and leased out by the City's Real Estate Division (SECFC and SFPUC 2014). Ongoing community participation was built into the organizational structure in the form of a Southeast Community Facility Commission, which was formalized by the County Board of Supervisors through ordinance. The Commission, comprised of Bayview Hunters Point residents, would work on the following:

- (A) The full and gainful employment of residents of the chronically economically depressed area of the City.
- (B) The progressive development of marketable job skills for untrained City residents.
- (C) The creation and expansion of opportunities for residents to participate in day and evening education programs.
- (D) The creation and expansion of opportunities for providing daycare services at a low and reasonable cost to parents.
- (E) The expansion of opportunities for special community services for senior citizens.
- (F) The overall improvement of the general [economic] prosperity, health, safety and welfare of economically depressed area City.

When the Commission was created in 1987, Ms. Jones was its president and Ms. Jackson served on its board. The building was dedicated to these community leaders, as well as Tom Ethel Garlington and Rev. John Lane (Southeast Facility Commission, n.d.). The Facility was off to a promising start when the DPW hired an executive director to help manage programming and the “master tenant” became the City College of San Francisco. When the building was dedicated in 1986, Ms. Jones commented on public works’ early proposals to build a recreation space: “We wanted something better, something we could be proud of... This is the story of how a community made a dream come true” (Soiffer 1986).

Discussion

The expansion of the treatment plant epitomized distributive injustice due to the failure of regulatory protection. The CWA was considered a feat for the environment and public health, yet Bayview Hunters Point residents were less protected under the law as a result of the expansion. Local officials played a role in targeting the neighborhood for additional treatment capacity through reliance on scientific and cost-efficiency reasons to expand the plant. And officials did not originally engage residents in the early stages of planning, prompting an adversarial response from residents. Public works officials subsequently misled residents to believe that the plant would not be a burden and that other planning measures would be taken to reduce the burden. Options to reduce the treatment of wastewater in Bayview Hunters Point such as the cross-town tunnel and a treatment plant in a different San Francisco neighborhood were ultimately rejected. A group of strongly organized residents worked to ensure that residents reaped some benefit from the plant expansion.

Through their activism, residents elucidated the consequences of planning-related decisions—in the area of wastewater planning and more broadly—that converged to further marginalize an African-American community. By getting the SECF funded under the CWA, residents’ call for environmental justice contributed to creating a more comprehensive regulatory framework, one that recognized the consequences of the burden. Officials’ decision to expand the plant was undertaken without consideration of prior or future impacts on a community already hard hit by growing unemployment and poverty rates, as well as other environmental burdens. The pursuit of environmental justice also prompted the formalization of a community advisory role under the Mitigation Agreement signed between community representatives and city officials. The SECF would be built on the site of the plant to address some of residents’ most pressing concerns, including education and workforce opportunities. Community members on the SECF Commission would help execute this programming. Ultimately, residents did not influence the relocation of the plant or how much wastewater it would treat, but in the SECF and its Commission residents were victorious in addressing other priorities.

All city residents benefited from the development of the SEP because it enhanced wastewater treatment quality and capacity. The plant, like the other environmental and industrial facilities in the neighborhood were essential to city development. As Dillon puts it, “These spaces are the products of industrial development which was facilitated by the state and which supported the urban and regional economy for a long time” (L. Dillon

2011). Community pressure illuminated how utility operations form part of the social and economic fabric of the community. This insight counters the long-held industry perspective that wastewater infrastructure and rebuilding programs are a universal good and that utilities' scope of work is limited to service provision. Activism also addressed what is today referred cumulative impacts, which the US Environmental Policy Act defines as the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions...." The expansion of the SEP enhanced an environmental stressor but residents used this an opportunity to respond to social and economic stressors they prioritized. In the next chapter, I chronicle some of the outcomes of this tradeoff and a more recent battle to redress the impacts of the plant's rebuilding.

4. Environmental Justice Capacity: Foundations for a Rebuilding Project

Introduction

“San Francisco exemplifies what it means to be a utility of the future,” claimed Harlan Kelly, General Manager of San Francisco’s Public Utilities Commission (SFPUC), at a hearing before members of the US Senate (US Senate 2014).¹⁴ “We are more than a service provider. We have a role to play in making our community a viable, sustainable and thriving place to live and work.” Kelly cited the agency’s renewable energy efforts as an example of its innovative approach, although other utility leaders discussed similar initiatives. Kelly’s testimony that day did stand out in one respect: the SFPUC, he said, was the first utility in the nation to adopt Environmental Justice and Community Benefits policies that are incorporated in all aspects of the agency’s work.

In the previous chapter, I queried how planners and engineers can engage historically marginalized communities to advance environmental justice. In this chapter, I ask, how are engineering and planning organizations equipped to engineer justice? I answer this question by exploring upstream and technical planning phases of capital improvement plans—project objectives and environmental review. I do so by situating the Environmental Justice and Community Benefits policies in a history of contestation over the siting and expansion of the Southeast Treatment Plan (SEP) in Bayview Hunters Point. This ongoing tension shaped efforts to address environmental justice concerns in the most recent plant upgrade, since any major change to the plant required support from Bayview Hunters Point residents. I show how incorporating environmental justice goals can benefit the planning process by creating organizational capacity. In this case, it also generated project by-in. Residents also benefitted from their enhanced role by activating representational governance and increased the possibility of synergizing local social justice efforts.

Planning Theories on Urban Justice

Conventional understandings of justice are deeply tied to the idea of the fair distribution of what is ‘good’. This Rawlsian (1999) perspective provided a normative goal in the field of planning, as well as a foundation for judging planning processes (Stein and Harper 2005). However, this view has also been critiqued for not putting to question the underlying conditions that dictate how the ‘good’ is distributed. Young (1990) characterizes this gap in social justice theory as the lack of recognition of social groups. Misrecognition based on social differences such as race, class, and gender, is both damaging and serves as the basis for this distributive injustice.

¹⁴ In 1996, Mayor Willie Brown transferred jurisdiction over the city’s Clean Water Program from the Department of Public Works to the San Francisco Public Utilities Commission. Oversight of the Southeast Community Facility, as well as the Clean Water Program, was also transferred (SECFC and SFPUC 2014).

Communicative rationality and the just city/spatial justice, two planning approaches that emerged in the 1990s, are often deployed as responses to this gap. Participatory approaches to planning are rooted in Habermas' (1989) work on communicative rationality which premised that reality is hidden in under socially constructed theories and concepts. Communication has the ability to articulate reality and new rationalities for action and power.¹⁵ Participatory processes that are well-designed and managed will yield a collaborative rationality that responds to actors' problems (Innes and Booher 2010; Scholz and Stiftel 2010). Individuals engage in collective learning to create effective and adaptive options rather than predetermine an optimal solution. This literature places importance on the planner's role to create processes that enable collaboration and dialogue; these individuals must reflect and think critically about the actions behind collaborative processes (Healey 1992, 2003), including the ability to create social networks that enable initiative implementation. An effective collaborative process, one contingent on local policy cultures, can increase local governance capacity: "constructing the institutional parameters of the 'game', and refashioning the institutional web of the city, to enable urban governance to act as a more effective and supportive 'container' of the economic, social and environmental relations which pass through it" (Healey 1998, 1535).

Work on spatial justice/the just city, largely influenced by Susan Fainstein (2010), argues for the values of democracy, equity, and diversity. When these conflict, equity concerns must predominate. This normative compass enables planners to identify which interventions are required and what they will consist of through a "capabilities approach." Subjects must be able to prioritize these, insofar as their planning context enables them: "Capabilities do not describe how people actually function (i.e., end state) but rather what they have the opportunity to do." (Fainstein 2017, 13). This body of scholarship involves predetermining a desired outcome and creating policies and planning interventions that achieve it.

Both theoretical frameworks hold that planning organizations must be equipped to achieve social justice. In the case of collaborative rationality, planners must have the wherewithal to work well with outside actors to pursue this goal. In the just city approach, planners are guided by a set of normative goals that advance equity. When it comes to racial justice, however, organizations may not be adequately equipped with either the staff or the conceptualization of racial problems to undertake this work. Indeed, addressing racial inequities "requires a specific policy focus on the broader community and institutional structures that reproduce racism rather than the communities who are the targets of racism" (Berman and Paradies 2010, 9). More specifically, Dominelli (2008) further urges that "anti-racist practice necessitates long-term scrutiny of the organization's internal culture" (Slocum 2006). Drawing on feminist organization studies, Holvino (2010) pushes for intersectional organization analyses that involve researching and publicizing the hidden stories at the intersections of race and other forms of difference; recognizing and altering the differential impact of organizational norms and cultures, and connecting internal organizational processes with external societal processes. These insights on internal organizational priorities and practices bring to question how public works agencies might

¹⁵¹⁵ The extent to which it can reorder power has been challenged by Tewdr-Jones, et al. (Tewdwr-Jones and Allmendinger 1998) and others.

better position themselves to support anti-racist planning projects. The passage of the SFPUC's Community Benefits and Environmental Justice policies provide some lessons on the matter.

Convergence of Water Planning Concerns

The SEP, first built in 1952 and then expanded in 1973, was due for improvements in the 1990s. The plant digesters, which treat wastewater sludge and are situated less than 100 feet away from homes, began nearing the end of their lifecycle.¹⁶ Signs of imminent failure included the breakdown and erosion of the digester covers. The SFPUC was also increasingly concerned that the SEP would not be able to withstand an earthquake and the agency sought to build a plant that consisted of more sustainable technologies. In so doing, the agency would improve the quality of the biosolids—from an Environmental Protection Agency (EPA) classification of B to A—which would reduce detectable pathogens. The SFPUC began to conceptualize an upgrade program to address potential wastewater system breakdowns. Unlike the city's previous three wastewater master plans, which were implemented to fulfill regulatory mandates, this new initiative was a proactive step.

The current [Sewer System Master Plan] was not carried out because of pressing specific regulatory concerns or significant public nuisances (as were the past master plans). Rather, the focus of this SSMP is with the issues related to the provision of reliable, resilient, sustainable, and environmentally acceptable operation and management of the sewer system through addressing both critical near-term needs and long-term issues (Chiu et al. 2010).

Before starting on the master plan, however, water officials' attempt to upgrade the SEP faced resistance from San Francisco residents. The plan came at the heels of the announcement of another large capital expense that affected ratepayers: the \$4.8 billion Water System Improvement Program (WSIP). Prior to WSIP, the rate-setting process had been somewhat vague and was managed by city leadership. In 1999, voters exercised their authority at the ballot box by passing Proposition H to institute a rate cap, a regulation that could only be overruled by voter approval. City officials worked to generate funding for water and sewer projects through a 2002 bond measure but sewer projects were eventually omitted due to the lack of public buy-in on the sewer upgrades. "Given that we haven't achieved community consensus," then-General Manager Patricia Martel noted, "It doesn't make sense to include the sewer funding which would raise rates by a significant amount" she said (Finnie and Sward 2002). In the same year, however, the agency was able to move forward on the planning of both water and sewer projects through the passage of two separate bonds. In addition, the SFPUC successfully promoted Proposition E in 2002, which authorized the agency to set rates through a more rigorous and transparent process involving independent review and a method deriving from the cost of service. The passage of the proposition also meant that the agency would not default on its loans. SFPUC staff alongside

¹⁶ The concrete structures of treatment plants last approximately 50 years, and their mechanical and electrical features only 15-25 (Keiser and Shapiro 2017).

a team of outside consultants moved forward with the master plan in 2005. They worked to identify infrastructural needs and held a series of public meetings and issued home mailings to further create public awareness and master plan support (Chiu et al. 2010).

The city turned its attention to generating support amongst Bayview Hunters Point residents, since a large part of the sewer system plan involved upgrading the SEP in their neighborhood. Bayview Hunters Point residents' reasons for not supporting treatment plant upgrades, however, differed from the citywide opposition that was settled through voter measures and bonds. Whereas the broader population had been concerned with rate increases, Bayview Hunters Point residents were galvanized by multiple environmental justice concerns: growing awareness of grave health disparities between Bayview Hunters Point and other parts of San Francisco, the environmental burdens generated by the SEP, and the unkept promises of the Mitigation Agreement of 1984.

Public Health Concerns

A series of studies in the 1990s and 2000s identified alarming public health disparities in Bayview Hunters Point. The high concentration of environmental burdens in the neighborhood were documented in reports by the US EPA, the Golden Gate Environmental Law & Justice Clinic and the San Francisco Department of Public Health (Rechtschaffen 1995). Their findings came after a study by the Department of Health Services which found that breast cancer rates for African American women under the age of 50 from Bayview Hunters Point were twice as high as they were for other groups in the San Francisco Bay Area (Rubenstein 1995). City officials and the media responded through additional studies that further underscored the stark health inequalities Bayview Hunters Point residents contended with (Koury 2001). These included:

- The City and County's Human Rights Commission's (2003) scathing review of the adverse impacts of the city's wastewater operations, shuttered shipyard, and energy plants, noting their nexus with neighborhood health.
- The San Francisco Chronicle's analysis of infant mortality revealed that babies from Bayview Hunters Point are 2.5 times more likely to die in their first year than those born in other parts of the city (McCormick 2003).
- The City's Department of Public Health and Department of Environmental Protection (2006) health profile of the neighborhood, with a focus on residents from its four public housing developments. The report correlated premature mortality with neighborhood poverty and pointed out that neighborhood residents live 14 years less than residents of Russian Hill, an affluent San Francisco neighborhood.

Advocates and residents used the information to generate awareness, mobilize residents, and further educate city officials about the dangers of siting a new, proposed energy plant.¹⁷ Organized groups included Literacy for Environmental Justice, Black Coalition on Aids Now, and Arc Ecology. Karen Patterson-Matthew, then-executive director of the Bayview Hunters Point Foundation for Community Improvement noted, 'When we talk about a community with a lot of asthma and cancer, we are concerned... 'We see the shipyard is still

¹⁷ Chapter 1 provides a brief overview of the history of energy plant siting in the neighborhood.

here. There is still a lot of cleanup that has to occur. We are at the center of a sewage system. There is pollution and odor. Our community needs a great deal” (Koury 2001).

The Bayview Hunters Point Mothers Environmental Health & Justice Committee was among the groups created to challenge environmental burdens in the neighborhood. The organization collaborated with Huntersview Tenants Association and Greenaction for Health & Environmental Justice to create the report, “Pollution, Health, Environmental Racism and Injustice: A Toxic Inventory of Bayview Hunters Point, San Francisco” (2004). It lists and maps multiple hazards in the neighborhood (Figure 13) and points to need for government accountability: “City, state and federal agencies should shoulder much of the blame” (28). The report identifies the SEP as one of the four worst air polluters in the neighborhood of 48 total facilities, based on USEPA 1999 National Emission Inventory data. Plant pollutants include nitrous oxides, volatile organic compounds, sulfur dioxide, carbon monoxide, and particulate matter.



Figure 13. Map of hazardous waste handlers in 94124 zip code.

Source: Bayview-Hunters Point Mothers Environmental Health and Justice Committee, Huntersview Tenants Association, and Greenaction for Health and Environmental Justice (2004)

The SEP Burden

That the SEP was a source of many environmental burdens in the neighborhood was not news to Bayview Hunters Point residents—they had to deal with its consequences on a daily basis. The plant’s odor, a particularly challenge, emanated from 10 digesters that have floating covers, rather than fixed roofs (L. Johnson 2015). In 1996, one of those covers deteriorated, leaving it inoperable. Since then, other covers have been damaged by corrosion

and rainwater intrusion (“Review of the Biosolids Digester Facility Project by the Southeast Digester Task Force for the San Francisco Public Utilities Commission” 2010). When the digesters are malfunctioning, the SEP relies on two flare stacks that also emit odors (Finnie and Sward 2002). Residents living near the plant often keep their windows closed due to the odors, and children attending programming at the SECF reported headaches (SF Human Rights Commission 2003). The prevalence of mosquitos from open, standing water in the vicinity spurred West Nile virus concerns. Neighborhood residents experienced dismissal from wastewater officials when they raised concerns about the plant. Resident John Allen was among others to be persistent about the issue, “The first thing the plant employees would throw in your face was ‘we don’t have any problems,’ like they were talking to a fool... I told them to build a structure and put themselves inside it with all the smells and see how long they’d last” (Finnie and Sward 2002).

The SEP created other problems. The plant contributed to truck traffic along two routes, thereby releasing particulate matter generated by diesel. During periods of heavy rain, raw sewage is released into the nearby San Francisco Bay, decreasing the overall water quality and directly exposing residents who continued to fish in the waters (despite local warnings) to contaminants (J. B. Johnson 2005). Some toxic conditions were caused by accidents. For example, in 1987, fumes which contained harmful levels of sulfur dioxide emanated from the plant due to a human error. Four police officers had to be checked into and treated at a hospital (*San Francisco Chronicle* 1987).

Discontent surrounding the SEP was aggravated by the city’s other wastewater planning efforts. The new Oceanside Treatment Plant was built on the city’s southwest side 1993. It dramatically differed from the SEP: it was not built adjacent to residential homes, most of it was built underground, and it used new technology to capture odors. The Oceanside Treatment Plant, however, only treated 20% of the city’s wastewater, compared to SEP’s 80%. It was built to treat more sewage but using the plant to its full capacity would have involved creating a new sewage tunnel across the Westside of town. Residents from the Bernal Height’s neighborhood vehemently opposed this idea in the 1990s due to concerns about malodorous sewer vents (R. Gordon 2006). The stark differences between the Southeast and the Oceanside plants, as well as the city’s responsiveness to another neighborhood’s resistance, creating a glaring injustice.

Neglected Promises

Residents also expressed concerns regarding the SEP rebuilding on the basis that the Mitigation Agreement between the utility and the community—signed in 1986 to recompense residents for the SEP’s expansion—had been broken. Under the agreement, the Southeast Community Facility (SECF) was created to offer residents education and workforce development programming. Greenhouses adjacent to the plant and the SECF would create jobs for residents. Over time, the SECF had been neglected; among its problems were underutilization, lack of building maintenance, a short-supply of parking, and unusable space (Citizen’s Advisory Committee, n.d.). Meanwhile, the greenhouses were being run by private businesses that had not been held accountable for local hire efforts. Programming also took a hit when the City College of San Francisco, the SECF’s primary

tenant, began to have budget and management problems. The city's failure to manage and oversee the SECF was worsened by the lack of influence held by the SECF Commission, a community governing board that advised on programming. Residents' concerns about the broken promises of the SECF were often met with skepticism from city officials. An SFPUC official noted:

From the city's perspective, I've talked to people who've said we did what we said we were going to do. We built [the Southeast Community Facility], we built [the greenhouses]. It was handed over to the community and it failed... It's on the lack of community involvement and empowerment to make those things successful. From the community's perspective, some feel like, you built it, and then you kinda of just walked away. There were never any performance metrics associated with the building, there was never adequate staffing and management of that staff to ensure that there were results that were actually benefiting people.

Left on their own, residents felt limited in their ability to create opportunities for local residents due to insufficient resources and staffing.

In 2003, SECF Commission members learned new information that deepened opposition to plant expansion. Espinola Jackson and Shirley Jones, two community leaders and participants of the 1980s organizing efforts, spoke at a meeting celebrating the SECF's 20 anniversary. They conveyed that when the Mitigation Agreement was signed, community leaders believed that the city would subsidize the SECF, as well as fund the work of community organizations, scholarships, and other opportunities. Members of the SECF Commission, however, were unaware of this expectation. They were also unaware that the amount of sewage treated at the plant had increased a result of conveying wastewater from neighboring San Mateo County. Residents were "not aware of the additional funds the City is collecting at their expense" (Southeast Facility Commission, n.d.).

The new SEP plans were also an affront to recent electoral victories, particularly that of African American Mayor Willie Brown. Bayview resident and community organizer Marie Harrison stated:

For African Americans, one of the most prideful things we had going is we helped put a black mayor in office. He promised two main things -- that we be allowed to sit at the table when decisions were made about Bayview-Hunters Point and that there would be no more sewage being sent here to the southeast plant. Now we are going to get all the new s--- from all over the city, and if Mayor Brown is going to be supportive of some new approach, we'd like to see it in action with our own eyes (Finnie and Sward 2002).

Bayview Hunters Point residents found an ally in Mayor Willie Brown. They enhanced their electoral representation when in 2000—the first time the city held district elections—Sophie Maxwell, a longtime neighborhood advocate, was voted onto the County Board of Supervisors.

Bayview Hunters Point residents were prepared to challenge a plant rebuild. A respondent explained their reasoning:

The approval to rebuild, it would have never happened, because the community, again feeling like they had been lied to for the last thirty years, was not going to allow any improvements. Their thinking was that just let the whole thing fall apart and we'll win because they will have to move it... Let that whole thing fall apart and then let's have the real battle around creating smaller ones all over the city, instead of bringing 80% to Bayview.

This opposition to a much-needed wastewater improvement project put pressure on city officials to respond. Among the new considerations officials began to make was whether to change the treatment formula across the city. Then-PUC General Manager Patricia Martel noted, "I want to analyze the entire program to see if there are some options to take some of the burden off the southeast plant and redistribute it elsewhere to address some of the environmental justice issues that have been raised by the Bayview-Hunters Point community and elsewhere" (Finnie and Sward 2002).

Upon earning citywide voter approval to move forward with the wastewater master plan, city officials also began to take steps that signified their commitment to addressing Bayview Hunters Point residents' concerns. Wastewater planning efforts resulted in a 2010 master plan that provided an overview of the various aspects of the sewer system and its needed areas of repair. The plan noted that it was taking steps to address inequities concerns associated to the city's wastewater planning efforts:

The issue of environmental justice is especially important in the development of an SSMP that is responsive to the citizens of San Francisco. For this reason, the SFPUC ensured that the public had extensive opportunities to become involved in the development of both the overall SSMP and its recommendations through the vigorous public outreach process... (1-4)

In addition to public outreach efforts, Bayview Hunters Point advocates and city officials made several policy changes to address inequities in the city's wastewater planning. These changes would influence the incorporation of environmental justice goals in the city's Sewer System Improvement Program (SSIP), set to begin in 2012.

Environmental Justice and SSIP

In response to residents' concerns about the rebuilding of the SEP, city officials incorporated environmental justice goals in the city's water and wastewater operations through three formal policy changes. First, the San Francisco Board of Supervisors amended the city charter to state that the agency's goals and objectives must "develop and implement a comprehensive set of environmental justice guidelines for use in connection with its operations and projects in the City" (SEC. 8B.122). Although no specific mandate was attached to this change, it created the expectation that the agency would undertake a more

equitable approach. As I show below, advocates and officials would also use it as a point of reference to create more actionable environmental justice goals.

Second, the Board of Supervisors passed an ordinance to create a Citizen's Advisory Committee (CAC) in 2004. The 17-member committee from each of San Francisco's eleven districts would provide recommendations to the agency's General Manager. CAC members would be city residents who track what the agency is doing, are responsive to other residents' concerns, and weigh in on issues the agency is working on. The representation of an environmental justice organization was also among the requirements of the new committee (Lei and Aragon 2017).¹⁸ This work would involve a set of environmental justice guidelines, best practices, and pilot projects. According to a CAC member, the committee was a long-awaited outcome of community activism because it created an influential voice in wastewater planning matters:

From a community perspective, it's a huge win to say we not only identified the target, which people have since the expansion in the 70s, but we finally got to this place where we have an official role and seat at the table with the agency.... I'd like to say that that's an example of how the community built up momentum to be able to institutionalize [environmental justice] at the agency.

CAC members followed through on their civic leader roles through passage of an environmental justice resolution in 2007, which pointed out that the agency had failed to comply with the 2002 environmental justice requirements (Citizen's Advisory Committee, n.d.). The resolution advised the agency to adopt a formal definition of environmental justice and an environmental justice policy.

Third, in 2008, a city proposition assigned criteria to each of the SFPUC's five governing board seats. Board members are appointed by the Mayor and Board of Supervisors and oversee agency operations. The Charter was amended to include that "Seat 1 on the Commission shall be a member with experience in environmental policy and an understanding of environmental justice issues" (SEC. 4.112). Other new areas of representation included ratepayer advocacy and utility management experience. This policy change formalized the role of representatives who make the nexus between water infrastructure planning and other areas that contribute to quality of life. Juliet Ellis, appointed to represent environmental justice issues, joined the commission in 2008 in pursuit of three goals: achieving stronger local hire outcomes; adopting an environmental justice policy; and creating an agency-wide Community Benefits Program (Ellis 2010)

¹⁸ A survey of CAC members (Lei and Aragon 2017) indicated that members represent 31 environmental, leadership, direct service, advocacy, civic education, and community groups. 86% of members took back what they've learned from the CAC back to their work, community, and networks. 64% were women, and 12% black, 18% Latino and 23% East Asian, and 47% white. 79% felt supported, recognized, and respected by SFPUC leadership.

These changes to city and agency policy had immediate impact. The CAC worked with agency leadership to formally adopt the CAC’s environmental justice resolution at the agency. The Environmental Justice Policy of 2009—the first of its kind for a utility in the country—required the agency to reduce environmental burdens and share benefits across communities. The policy’s mandates included staff training on environmental justice issues, the expansion of employment opportunities in SFPUC service areas that are disadvantaged, and to better engage diverse stakeholders. The agency’s Environmental Justice Policy Implementation Framework consists of creating principles, guidelines, and checklists for several pilots, including SSIP (Figure 14).

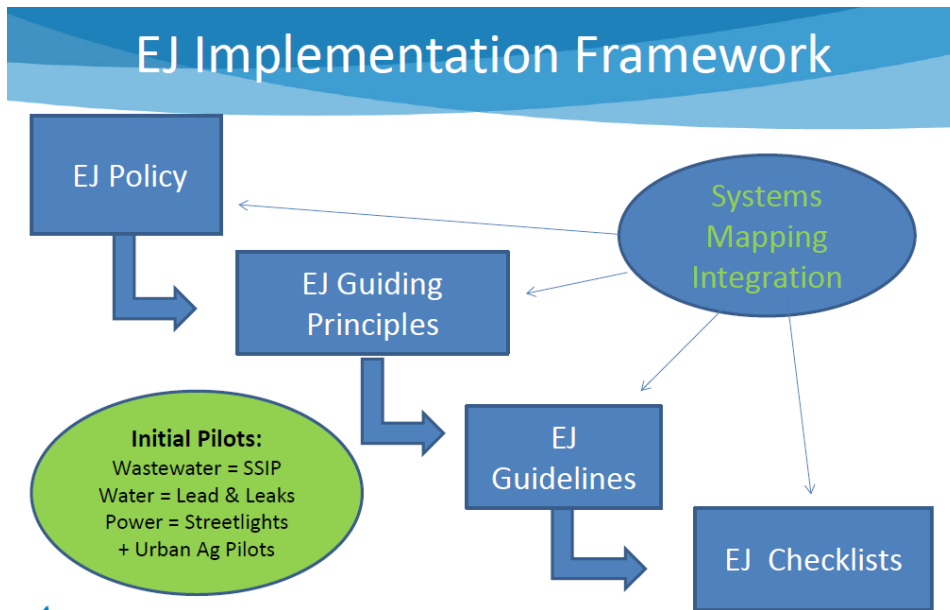


Figure 14. SFPUC environmental justice implementation framework.
Source: Manzone (2013)

In order to operationalize environmental justice goals, the agency formally adopted a 2011 Community Benefits Policy to “provide tools to implement as well as offer insights into how, when, and in what ways to engage with the impacted communities” (SFPUC 2011). Stated policy goals included the development and use of the triple bottom line tool, the quantification and measurement of progress, and the identification of community benefits options and impacts. Perhaps most importantly, the Community Benefits Policy dedicated agency resources to specific bodies of work, such as workforce and economic development. The policy also formalized other program areas that could be leveraged to create opportunities for adversely impacted residents, including environmental education and support for arts and culture. This directive meant that the agency would create a new Community Benefits team to carry out the mandates of each foci indicated in the Community Benefits policy.

The new team members’ professional backgrounds were unique for a water utility. Conventionally, utilities are made up of professionals with backgrounds in technical,

communications, or administrative fields. But among the members of the new Community Benefits team, one had worked for the Greenlining Institute, an Oakland-based public policy, research, and advocacy non-profit organization. Another came from PolicyLink, a research and action institute dedicated to advancing economic and social equity. They brought this experience, knowledge, and skills in working on the issues most impacted disadvantaged communities. A respondent commented on the importance of the team members' professional backgrounds:

They've run non-profit organizations, worked in community foundations. They cut their teeth deep in the community, so [the agency] gets the benefit of first-hand knowledge. It's not as though the demand or requests of the community have changed over the last 30 or 40 years. It's the same set of requests, so to come to the table knowing what that request is—it takes 15 years off the learning curve alone—and now all you really have to focus on is the sequence of priorities that is being requested by that community, because you know what they want. Less crime, better education, better housing.

The hiring of professionals with prior experience in working on promoting equity enabled the agency to more efficiently carry out its goals. Their particular contributions included bringing outside of the box thinking on community concerns, implementation, the ability to build and maintain relationships with community members, and messaging.

Other organizational dynamics also enabled this policy change. For example, support from the SFPUC General Managers, the agency's Chief Executive, was instrumental in advancing Community Benefits Program goals. From 2008 to 2012, Ed Harrington supported the passage of the Environmental Justice and Community Benefits policies. His successor, Harlan Kelley, built ties with community leaders as a long-time engineer for the agency. In this time, he established an internship program for the city's youth, which reflected his belief that water infrastructure and operations could be leveraged to create career pipelines. And as one of the few African American leaders of a large water utility in the country, his leadership was symbolically aligned with agency's attempt to enter a new era of equity and inclusion.

Policy changes and staff additions created a foundation for the SSIP environmental justice interventions to come. These structural changes occurred in different arenas (Table 4): the city/county, within the agency, and at the advisory committee level. These changes were also advanced through various mechanisms. Citywide elections designated a Commission seat for a person with a background in environmental justice, but the passage of an environmental justice resolution occurred at the CAC level. Residents thus voiced their concerns, or these concerns were voiced by representatives, to create a robust basis from which to pursue SSIP environmental justice goals.

Table 4. Governance of Environmental Justice at the SFPUC.

| Entity | Action |
|---------------------------|--|
| City/County | - Environmental justice made a goal of agency operations (2002) - Citizen’s Advisory Committee created (2004) - Agency Commission seat designated for someone who has an understanding of environmental justice (2008) |
| Agency | - Environmental Justice Policy (2009) - Community Benefits Policy (2011) |
| Advisory Committee | - Environmental Justice resolution (2007) |

Several respondents conceded that social and environmental justice goals still often face internal resistance. This is because some staff believe the agency’s mission to be strictly about providing water, sewer, and energy services; initiatives that fall outside of that purview are thus questions. One city official expressed skepticism of the new agency policies:

I struggle with those mandates that to me are a reach to the mission of what we should be doing. Sure, we have impact, but it’s a side-benefit. It shouldn’t be a mandate. The mandate should be, we need to protect water quality.... We’re having major issues with the drought, with sea level rise, so we cannot provide sufficient secondary treatment. Those to me are real issues. Those are preventing us from meeting permit requirements to achieve water quality. So that’s my frustration.

Staff thus support the agency’s commitment to community benefits and environmental justice to different extents. This resistance can also apply to inter-organizational relations, wherein entities stick to what is in “their lane”/viewed as stepping on the toes of others. Even so, the Community Benefits team has had notable impact on the SSIP, as I show next.

Rebuilding Infrastructure Foundations

Engineering and planning experts use routine technical tools and procedures in capital improvement planning. Because public infrastructure serves the general population, it is often assumed that these practices positively benefit all city residents. But the Community Benefits and Environmental Justice policies require that utility specify their impacts—positive and negative—on vulnerable communities. The Levels of Services (LOS)¹⁹ and environmental review are two steps of the SEP rebuilding project where the agency took these measures.

Levels of Service

The agency’s EJ Implementation Framework (above) identified SSIP as a “pilot,” a body of work where the policy would be implemented. This is a primary reason SSIP’s

¹⁹ This refers to the required minimum level of performance.

overall objectives addressed some of the long-held burdens experienced by Bayview Hunters Point residents. This is illustrated by the program's Levels of Service (LOS), a procedure to define "those characteristics or attributes of a product or service that describe its required minimum level of performance" (WERF 2008). LOS are used by service delivery and infrastructure sectors to: (1) focus management efforts and resources on agreed upon service levels; (2) communicate service expectations and choices to customers/stakeholders to manage expectations; and (3) discuss/"negotiate" service level expectations with respect to budget capabilities. For example, the San Francisco's water supply capital improvement program, WSIP, had service goals in the areas of seismic reliability, delivery, reliability, water quality, and water supply. Like LOS typically adopted by other capital improvement programs, these reflect technical and operational goals.

SSIP's thirteen LOS, approved on August 28, 2012, include elements conventional for a wastewater utility, including redundancy and storm water management (Appendix B). But they also go beyond conventional technical considerations that respond to longstanding concerns by Bayview Hunters Point residents: "limit odors to within the treatment facility's fence line" and "be a good neighbor... adhere to the Environmental Justice and Community Benefits policies." SSIP will use six strategies to meet these LOS:

- Construct state-of-the art odor control systems at facilities where treatment occurs.
- Make visual improvements at the Treatment Plants and Pump Stations.
- Use operational controls to minimize Collection System Odor.
- Provide community benefits including job creation, workforce development, contracting opportunities, and greening
- Work with other City and County agencies to coordinate capital projects to maximize multiple benefits.
- Engage residents in locating green infrastructure where multiple benefits can be optimized using the Triple Bottom Line

The incorporation of these LOS prompts engineers and planners to consider not just the infrastructure's technical reliability and service delivery but also how the infrastructure's benefits can be optimized. Strategies include improving the aesthetic quality of the infrastructure, economic development, and inter-agency coordination. If adhered to, these LOS will improve the standard of living of Bayview Hunters Point as well as create new planning competences more generally. Indeed, the incorporation of equity goals into the overarching mission of the program has enabled the pursuit of environmental justice goals in the subsequent phases of SSIP, including the Triple Bottom Line, which is further discussed in Chapter 5.

These equity-oriented LOS represent a major achievement in addressing the wastewater system's history of racial injustice but can still face some challenges to implementation. For example, these were a capital improvement program decision that residents are not necessarily familiar with, so there is no clear mechanism on how to hold the agency accountable to meet these LOS. There is also an implicit hierarchy amongst them, since some of the levels are more in line with the agency's mission of delivering water, power, and sewer services. An agency official expressed concern about the possibility

of future cost-constraints affecting focus on the community benefits LOS or other LOS that are a little more “on the fringe” and less understood by engineering and planning experts.

Environmental Review

In accordance with the Community Benefits and Environmental Justice policies, as well as the LOS, environmental review of the SEP also took an equity approach. The California Environmental Quality Act (CEQA) is an environmental review process similar to the federal National Environmental Review Policy Act. It requires state and local government agencies to conduct and disclose analyses of projects that will have “significant environmental impacts.” CEQA, however, does not consider a project’s social and economic implications for the communities. To address this, and following SSIP’s LOS, agency officials undertook a parallel review process for the rebuilding of the SEP that examined Bayview Hunters Point’s social, economic, and health indicators. This environmental justice analysis, as it is known in San Francisco, used secondary data to identify inequities in the SEP’s vicinity and how these inequities would be impacted by the plant rebuilding. At a public meeting and before agency Commissioners, Yolanda Manzone, the agency’s Environmental Justice manager, explained the purpose of the analysis:

We wanted to proactively pick up where CEQA leaves off and do a parallel or companion analysis to look at those socio-economic issues facing that community and be able to say how well our normal capital programmatic investments that we’re planning to make going to be able to address those issues that are within our lane as water, power, sewer provider.... Through all of this, the goal is really to understand what is the lay of the land... From there were able to drill down to, and where are those potential areas of opportunity for the PUC to have a positive impact (San Francisco Government TV 2015).

The environmental justice analysis involved resident participation. In 2014 and 2015, agency officials met with the Southeast Working Group, an SSIP advisory committee, and members of the CAC for feedback on indicators and data sources. The indicators used in CalEnviroScreen 2.0 were presented as an initial list of measures to work from. From that list, residents identified the indicators that were most significant areas of concern: unemployment, poverty, cost of living, displacement/gentrification, educational attainment, DPM concentration, cancer risk, toxic releases from facilities, and groundwater threats. Some of the measures were parsed out for further specificity and review. For example, cost of living measures included housing affordability and childcare costs. Community representatives suggested additional indicators that should be added to the list, including climate change resilience, homelessness, and transit access. Some suggested measures were not included for various reasons. For example, one suggestion was the timely implementation of sustainable development projects, a measure that would require additional research and collection of primary data. In total, 33 indicators made it to the final list of measures; two “may be indicators.” (Appendix C).

The environmental justice analysis included four steps. First, officials screened out indicators that did not find a “disproportionate environmental or social burden” relative to other San Francisco neighborhoods. For example, the percentage of households living in proximity to truck routes was not deemed an environmental injustice, since other San Francisco neighborhoods have higher rates of proximity than residents in Bayview Hunters Point. Second, they examined indicators of environmental injustice to determine whether the rebuilding of the SEP would affect them; 17 were found to have a “nexus” with the infrastructure project. Displacement and pre-natal care are examples of indicators that did not fit this criterion. Third, the final list of indicators was examined to determine whether and the extent to which they might be adversely or positively affected by the plant rebuild. Finally, researchers assessed how Community Benefits programming is addressing these areas, and whether the agency can better align future programming with these environmental injustice areas.

Resident participation the development of environmental justice indicators will enable the Community Benefits Program to focus its efforts in more meaningful ways. For example, final report recommendations include addressing the neighborhood’s high child care burden by doubling the child care capacity of the SECF. It also calls for addressing poverty and unemployment through internship, labor agreement, and recruitment efforts. In other words, the analysis goes beyond conventional environmental reviews by identifying social and economic impacts that are ignored.²⁰ This work represents a step toward creating transparency in infrastructure planning, as well as identifying and acting upon the positive impact that projects might bring to a community.

Even so, the environmental justice analysis contains some limitations, including the omission of several indicators due to the lack of secondary data. Insufficient or deficient data—particularly on race—can be a vexing problem for many jurisdictions including San Francisco. In order to say that analysis findings will affect racial injustice, for example, observers have to assume that the community participation process accurately incorporated the priorities and experiences of residents of color. Finally, the environmental justice analysis was conducted parallel to a required environmental review process. In many instances of infrastructure rebuilding, EIRs are not conducted because infrastructure that is

²⁰ There was some debate as to what should constitute and community benefit, the circumstances under which they should be prioritized, and who should have access to them (“Review of the Biosolids Digester Facility Project by the Southeast Digester Task Force for the San Francisco Public Utilities Commission” 2010). Some of these differences were expressed by members of the Southeast Digester Task Force, comprised to residents, to inform the master planning effort. Mark Klaiman, a local business owner, for example, argued that “Local job creation should be a priority of the project; however, such priority should be balanced against any increased costs, delays or other inefficiencies created by making such job creation a priority.” He also argued that the agency did not need to enter into agreements with local CBOs to meet job creation goals. Another member argued that he supported local hire targets “but a duty to hire a minimum number irrespective of availability or capability is simply not a good practice for critical infrastructure that requires specialized skills, whether in construction or operation.” Fhatima Holmes, a representative from the workforce preparedness organization Young Community Developers, disagreed, pointing out that any references to “Specialized skills” have long ago been rejected by the community as excuses not to train or hire San Francisco residents. Therefore, no changes to the “mandatory local hiring” paragraph of page 18 are required or should be contemplated.”

underground and/or being replaced is perceived to not present new, significant impacts. In these cases, there is little incentive to further examine a project's impact.

Discussion

Long-standing and worsening environmental conditions in Bayview Hunters Point spurred resident action that subsequently brought about policy change. This included the adoption of the Environmental Justice and Community Benefits policies to govern all agency actions, including SSIP. The policies' impact on project objectives and environmental review—phases of planning that typically do not prioritize equity—illustrates how the engineering of justice requires accounting for the racialized impact of the upstream and technical phases of planning.

In this chapter, I also draw attention to the institutionalization of Environmental Justice and Community Benefits policies. The equity orientation resulted in the stronger organizational capacity in the utility, as evidenced by the creation of professional positions to implement these goals. The team individuals also designed and implemented an enhanced environmental review process. These organization changes suggest that agencies may not be equipped to pursue environmental justice. The notion of “capacity building,” as commonly used in community and economic development literature and practice, is helpful here. The phrase is typically used by the private, public, and philanthropic sectors to encourage CBOs to provide better programming and direct services. It is “...Something disadvantaged communities are burdened with, ascribing them further responsibilities, while neglecting the structural challenges they face” (Mitchell 2011). My findings suggest that, in the pursuit of engineering justice, interventions are not just external-facing; they require enhanced capacity within planning organizations themselves.

The Environmental Justice and Community Benefits policies—and these policies' impacts on the LOS and environmental review—benefited wastewater infrastructure planning in several ways. For example, they generated SSIP support amongst Bayview Hunters Point residents who felt that their concerns would be addressed in the rebuilding of the plant. This resident support enabled the city to move forward on a sorely needed project. The pursuit of environmental justice also resulted in the activation of representational governance. Elected officials and advisory board representatives held critical roles in advocating on behalf of residents. When combined, these procedural mechanisms reinforced the expectation for the incorporation of environmental justice goals in future wastewater planning. They also synergized social justice efforts. For example, it identifies other issues residents have long understood but that hadn't been formally substantiated. Now, traffic density, bicycle network, unemployment could all potentially be impacted by the SEP upgrade, and these are all areas the new Community Benefits Program plans to address.

5. Reconsidering a Tool of the Trade: Using the Triple Bottom Line to Create 'Just Sustainabilities'

Introduction

Planners are commonly tasked with prioritizing the often-conflicting interests of economic development, protecting the environment, and being socially responsible. This set of goals is often referred to as balancing the three Ps, “people, planet, profit,” or the three Es, “economy, environment, equity.” General Plans and Specific Plans increasingly apply sustainability as a guiding principle for their land use strategies (Wheeler 2008). In other cases, jurisdictions have opted to select and track progress for a set of indicators. Still others are using sustainability frameworks to assess and compare project alternatives. This has involved the development of analytical methodologies; among them, the Triple Bottom Line (TBL). As will be explained in more detail below, TBL is an accounting framework that considers social, environmental, and economic priorities. Planners are creating analytical tools based on the TBL framework to compare how projects fare when evaluated under each goal. TBL tools, their users maintain, have the potential to fairly and transparently put an agency’s sustainability priorities into practice.

The previous chapter showed how environmental justice concerns were incorporated in two phases of San Francisco Public Utility’s (SFPUC) Sewer System Improvement Program (SSIP): project objectives and environmental review. This chapter asks, how can planners and engineers use sustainability initiatives to advance environmental justice? I focus on the process, potential, and limitations of the agency’s use of its TBL tool. I engage scholarship that is concerned with the social justice implications of sustainability, as well as critiques of standardization and quantification in analytical planning tools, to query how TBL was used to advance environmental justice. I argue that the SFPUC’s approach to incorporating environmental justice concerns aided infrastructure planning because it led to the development of a more thorough TBL methodology. The effort to create an environmentally just tool also defined disadvantage and specific which people and places to prioritize.

Although the TBL tool does include criteria that has long concerned Bayview Hunters Point residents, this chapter does not exclusively focus on the neighborhood. This is because only collection system improvements like green infrastructure were analyzed using the tool; infrastructure like the SEP were not. The selective use of TBL means that, on the one hand, other neighborhoods will benefit from environmental justice legacy forged by Bayview Hunters Point residents. On the other, this selective use is an example of how the obduracy of infrastructure can perpetuate on legacies of inequity.

What Is the TBL And Why Do Utilities Use It?

At the heart of debates surrounding the concept and potential of sustainability is the question: what is being sustained and for whom? The development and adoption of TBL tools to deliver sustainability is of concern for planning education and research, because

sustainability planning initiatives often fall short in their pursuit of social justice (Saha and Paterson 2008). This shortcoming raises questions about the extent to which related tools mitigate adverse impacts on low-income communities and communities of color. Furthermore, users of TBL often quantify and standardize tool criteria to objectively and consistently assess the merits of different planning projects. Yet quantification and standardization can mask the political and contextual nature of planning, leading to the creation or compounding of social and economic inequalities.

Water utilities are among those adopting TBL tools (Kenway, Howe, and Maheepala 2008). These agencies have significant environmental impacts. Their infrastructure networks are comprised of large facilities, as well as subterranean and above-ground fixtures located throughout cities. As revenue-generating agencies, utilities' economic priorities are often defined by their obligation to balance large budgets with operations and maintenance costs. Their social impact is large in scope and scale: the provision of water and wastewater services is a tremendous public service. But utilities have also been known to create or compound public health and safety hazards in low-income communities of color. Such disastrous consequences made headlines in early 2016, when the drinking water supply of the predominantly African-American city of Flint, Michigan, was found to contain lead and other toxins.

TBL builds on the business accounting concept of the “bottom line,” or the net income. A bottom line is typically a numerical figure—located at the end of an extensive calculation—that accounts for expenditures and revenues. The TBL is often applied as an elaborated version of cost-benefit analysis, a policy and planning decision-making aid formalized by US government agencies to select infrastructure projects (Porter 1996). Ascribing numbers to activities allowed professionals to compare the costs and benefits of projects; those with the best cost-to-benefit ratio were selected. Today, cost-benefit analysis is used by many planning organizations, including those in the areas of energy, transportation, and water.

The TBL is similar to cost-benefit analysis in that it ascribes value to different parts of a planning project to deduce an overall assessment.

The TBL is an accounting framework that incorporates three dimensions of performance: social, environmental and financial. This differs from traditional reporting frameworks as it includes ecological (or environmental) and social measures that can be difficult to assign appropriate means of measurement (Slaper and Hall 2011).

Organizations adapt the TBL framework to create analytical tools that guide decision-making. This involves identifying the criteria or indicators that form the basis for analysis in each of the TBL's three priority areas. Some organizations might use criteria or indicators that are widely established in their industry or professional fields; others might incorporate elements that are specific to the operations of the organization. These contextual elements might include local priorities or concerns, or a particular organizational initiative. The

criteria or indicators are then ascribed a certain value. The values for all the priority areas are combined to generate an assessment of the options available to the organization.

The Triple Bottom Line framework emerged as part of corporations’ move toward self-regulation. The 1990s saw heightened environmental activism that challenged processes of globalization and the lack of government regulation. Businesses adopted TBL as a pledge to balance the environmental and social impacts of their operations with desired levels of revenue. Elkington (1997) coined and popularized the TBL through his consulting firm and book, *Cannibals with Forks*. He argued that in addition to contributing to greater harmony in the latest evolution of capitalism, the TBL allows for greater transparency in the pursuit of competing interests: it’s a “win-win-win” approach and allows for the development of better decisions.

Water utilities are among those organizations that are turning the TBL framework into an analytical tool. The trade organization Water Research Foundation encouraged water utilities to use the TBL with its 2008 report, “TBL Reporting of Water Utility Performance” (Kenway, Howe, and Maheepala 2008) The report indicated that the TBL provides a means by which to achieve greater sustainability or, more specifically, to “balance water management and the environment” (1). It also upheld TBL as a vehicle to improve public disclosure processes, a critical function in the highly regulated industry. Liner and Monsabert (2011) discuss the TBL’s unique potential to balance interests and generate alternative solutions for water utilities. The TBL, they note, reflects a shift away from the influential role that economics had in the field. Utilities have adopted their own criteria for each of the three priority areas. For example, San Francisco has financial criteria that takes into account capital costs, while odor is considered social criteria (Table 5).

Table 5. The "Triple Bottom Line" of Benefits for San Francisco's SSIP.

| Triple Bottom Line Evaluation Criteria in San Francisco | | |
|--|--|---|
| Financial | Environmental | Social |
| <ul style="list-style-type: none"> • Capital Costs • Other costs* <p>*Includes operations and maintenance, replacement and renewal, avoided costs, and new revenues.</p> | <ul style="list-style-type: none"> • Climate • Air Quality • Water Quality • Water Use • Habitat • Natural Resources Inputs | <ul style="list-style-type: none"> • System Resilience • Ratepayer Affordability • Employment • Bicycle and Pedestrian Environment • Recreation and Open Space • Cultural Resources • Odor • Noise • Land Use Adjacency • Construction Impacts • Worker Safety |

Source: Kubick (2015)

Utilities are developing and appropriating TBL methodologies to select the best project alternative for a wide range of water planning needs. Northwest Washington’s King

County TBL tool was used to compare alternatives for its Combined Sewer Overflow Control Program, as well as those it collaborated on with Seattle Public Utilities (Hadler and Pecha 2010). The agency applied the “value modeling” technique for social and environmental criteria. The criteria were scored and weighed. The El Paso Desalination and Reuse Agency used the TBL to examine water supply options – water reuse and desalination, and importation (Piper 2014). The agency’s approach involved quantifying and monetizing financial, environmental, and social outcomes of four alternatives. The analysis, which projected 50 years into the future, showed a savings of nearly \$1 billion through reuse and desalination. Social benefits were expected to exceed \$2.4 million (Raucher, Archuleta, and Reinert 2014). The Philadelphia Water Department has also used the TBL to examine alternatives for controlling Combined Sewer Overflows (Stratus Consulting 2009). The tool consisted of a benefit-costs assessment of traditional and green infrastructure. These utilities maintain that their TBL approach forms part of their commitment to sustainability, and that it reflects a shift away from pursuing simply economic interests.

Debating the TBL

Concerns over climate change, demographic change, and the deteriorating condition of natural resources have ushered in a new era of environmental planning. Sustainability is now a dominant *modus operandi* (Daniels 2009). The concept was first introduced by the Brundtland Commission (1987), in their report, *Our Common Future*, and its definition has since been highly contested. Some argue that ‘sustainability’ is all-encompassing to the point of being empty (Campbell 1996). Wilbanks (1994) contends that it is in fact the ambiguous and integrative nature of ‘sustainability’ that has given the concept so much power. Despite this, the concept is fundamentally political, as it is used to set agendas, establish rules of the game, and allocate resources.

The tools used by planning agencies to operationalize sustainability are an important and debated site for understanding how social justice features in sustainability initiatives. Frost, Adams and Weber (2004) point out the dearth of research in accounting for social issues, compared to environmental ones. More specifically, Henriques (2004) notes, has been the challenge of how to quantify and monetize these bottom lines, since they are often comprised of “intangibles.” A similarly critical view is offered by Norman and MacDonald (2004) who maintain that TBL deters users from achieving actual corporate social responsibility; it is a “smokescreen, and about “as far as you could get from the paradigm of the accountant performing calculations on the basis of verifiable figures and widely accepted accounting principles.” (Norman and MacDonald 2004, 10). These critiques are reminiscent of those that challenged cost-benefit analysis. The institutionalization of cost-benefit analysis allegedly allowed for technical uniformity, thus projecting fairness. But the variables entered in cost-benefit analyses, and whether they are categorized as a ‘cost’ or ‘benefit’, are a reflection of a set of values and preferences (Sagoff 2007). Dryzek (2005) noted that cost-benefit analysis is a practice of “administrative rationalism,” or “the problem-solving discourse which emphasizes the role of the expert rather than the citizen or producer/consumer in social problem solving, and which stresses social relationships of hierarchy, rather than equality or competition” (Dryzek 2005, 63).

Even if quantifying social standards was possible, others explain, using the same indicators or criteria across time and in different places presents grave concerns. The goal of standardization for the TBL is informed by the accounting profession, where external professional standards dictate the configuration of analytical tools. For TBL proponents, standards are desired because they allow users to understand contextual differences, and they allow for time series analysis, professionalization, and transferability (Baxter, Bebbington, and Cutteridge 2004, 131). But standardization presents a conflict for stakeholder groups that want to hold an entity accountable for particular environmental and social concerns and histories. In other words, there may be “a tension between stakeholder engagement for TBL reporting and the comparability and consistency opportunities that come with standardization of reporting (Adams, Frost, and Webber 2004, 24). Specific stakeholder interests that might be debated include community outreach, workforce opportunities, and climate change adaptation. Since introducing the concept, Elkington (2004) has acknowledged that the TBL is in its nascent stages; a more through approach that considers context, multiple priorities, and involves a wider range of stakeholders is needed.

Nonetheless, how equity features in sustainability initiatives warrants inquiry, because studies show that these plans tend to fall short in their pursuit of social justice. Saha and Paterson’s (2008) survey of 216 cities in the United States shows that local governments tended to define sustainability in terms of their environmental and ecological priorities and that they rarely connected these to social justice. Haughton (1999) cautions against “policy myopia.” He points out that core principles of sustainable development – e.g., geographical and social justice – are missing from sustainable development planning. Others ascribe this “equity deficit” (Agyeman 2005) to the environmental movement’s assumption that, by helping the environment, they are helping everyone (Agyeman 2013). For Gunder (2006), the lack of social justice goals in sustainability plans is a reflection of the emptiness of the concept: its all-encompassing nature has been co-opted to promote a status quo that maintains systems of inequality.

Scholars have challenged the separation of “green” and social justice agendas by arguing that alternative economic and social models are required for a greener world (Harvey 1996; Langhelle 2000). As a result, many remain optimistic about the potential of drawing on the ideas and practices of both sustainability and environmental justice to forge a more transformative and normative framework in planning. Agyeman and Evans (2004) bring together key ideas of environmental justice and sustainability in their concept “just sustainabilities.” The practices and policies of these traditions, they point out, have grown in parallel and must now be brought together to spur action. Schrock, Bassett, and Green (2015) are both critical and optimistic about sustainability. They found that most cities they surveyed did not make social justice a prominent goal of their climate action plans, but that, in some cases, community-based actors were able to exert pressure on planning actors to use sustainability plans as a strategic opportunity to pursue social justice goals.

TBL: A Tool for Environmental Justice?

The SFPUC’s TBL approach presents an opportunity to understand how the agency is addressing environmental justice concerns. It adopted the tool for the purposes of

informing and supporting the process for developing project alternatives, decision-making, project selection transparency, and reporting to the public (Quinn 2014b). The agency began to design the tool in 2011, and agency consultants began to train staff how to use it in 2015. The tool is applied after a needs assessment has been conducted—in the alternatives analysis phase, which produces the various options to address the infrastructure need (Figure 15). The TBL tool assists in the selection of the best alternative. A conceptual engineering report then details the technical specifications of the best alternative.

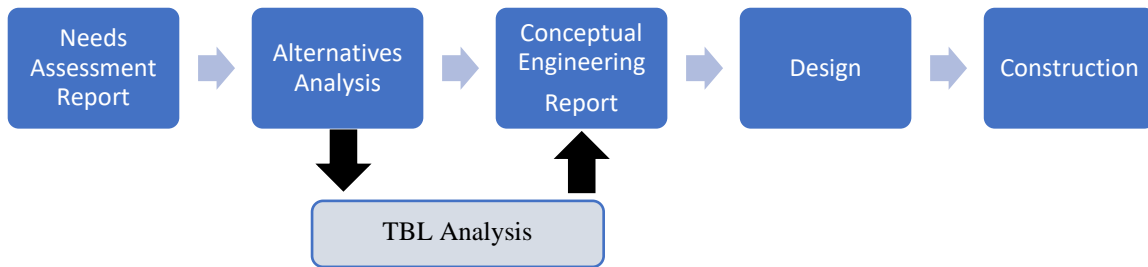


Figure 15. Where TBL is applied for the Sewer System Improvement Program.
Source: Adapted from Quinn (2014a)

TBL is used by approximately 15 SSIP project managers who upload information about the details and features of each alternative onto a TBL software program. The interface basis its analyses on an assessment about how each alternative rates under 17 social, environmental, and financial criteria. For example, the TBL output for San Francisco’s Lake Merced Watershed, three alternatives are analyzed (Figure 16). A pie chart for each alternative shows the color-coded results for 17 criteria; they measured significantly positive, positive, neutral, negative, significantly negative, or not applicable. For example, Project Alternative 2, Holloway Blvd, had three social criteria ranked as “significantly positive”: recreation and open space, bicycle and pedestrian environment, and employment. Alternatives 1 and 3 only had two criteria that met the “significantly positive” threshold; holding all other values equal, this would mean that in the area of the social bottom line, the Holloway Blvd Alternative had the best marks. This TBL analyses and interface “[Helps] project managers decide which alternative they should really select and explain how they arrived at this alternative” (SFPUC Citizens’ Advisory Committee Wastewater Subcommittee 2012). As of the summer of 2016, project managers and consultants had run approximately 700 projects through TBL, each containing at least three alternatives.

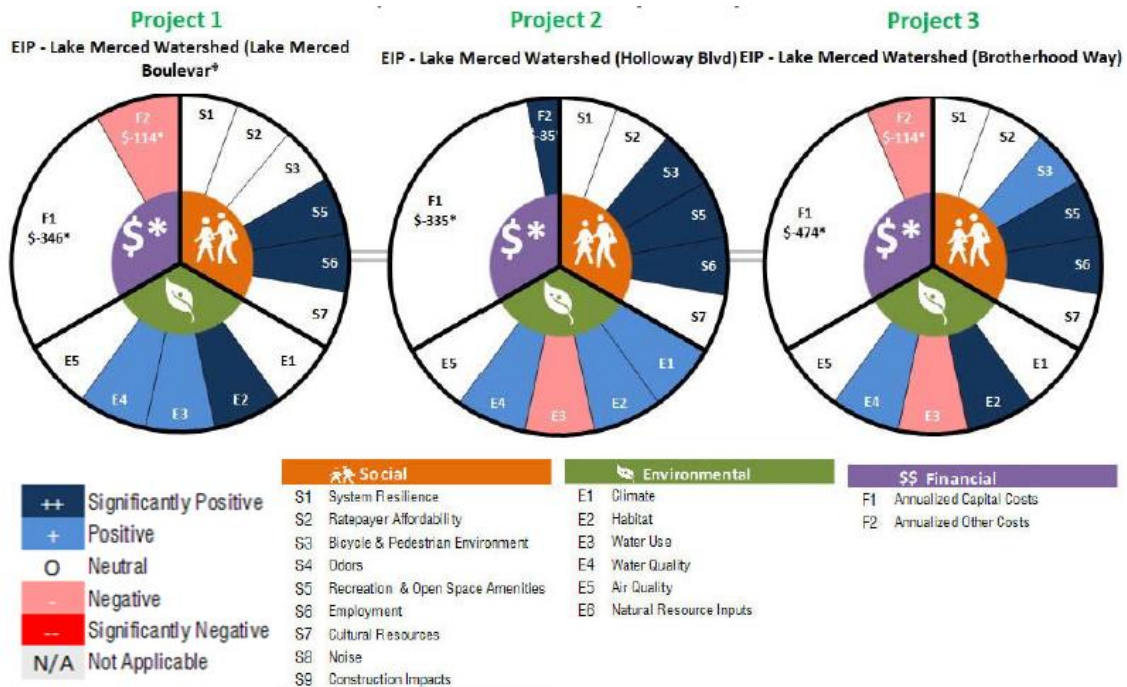


Figure 16. TBL output of Lake Merced watershed.
Source: Wood and Wilson (2013)

The SFPUC enhanced the TBL in two ways that incorporated environmental justice concerns, all of which aided in the decision to site the Holloway Green Street in the Ingleside neighborhood, a historically Asian and Latino, as well as low-income, neighborhood. These approaches contain important lessons for sustainability.

Contextualized Criteria

TBL design reflects officials' attempt to account for the social and contextual implications of planning. The TBL is not used to generate the output of a single score, nor does it rank the evaluated projects. SFPUC officials noted that the various traditional uses of TBL, such as financial cost-benefit analysis and monetization, resulted in "false precision," or high standard error when Project Managers estimated key performance indicators of infrastructure investments. Instead, the officials opted to apply a rating system for the criteria evaluated for each project. SFPUC project managers and their consultants debated which social criteria and related metrics to use. At the onset, they planned to use quantifiable criteria that they selected. But they were pushed by former General Manager Ed Harrington to use a method that did not try to dictate San Franciscans' values. A TBL consultant noted this shift in approach:

We recognized that nothing that the staff said was of really that importance, nothing that I said was of that importance, what mattered was the policies that were already established by adopted bodies in city government or the state level. So we hung our hat on all the things that were already established,

and that really enabled us to have some credence, weight, relevance.

SFPUC officials and their consultants subsequently engaged in a twelve-step process to develop the criteria (Kubick 2015). This included the development of draft criteria and related metrics for TBL that were reviewed by an internal agency working group; criteria were then reviewed by sub-working groups and were revised based on this feedback. The working groups included officials from other city agencies to ensure that the criteria were aligned with their respective priorities, including the Departments of Public Health, Environment, Parks and Recreation, and Economic and Workforce Development. SFPUC Community Benefits team members were part of the working group.

The SFPUC's Environmental Justice and Community Benefits policies informed which criteria and metrics were selected. SSIP's overarching mission—known as the Levels of Service—was decided on in 2010 and reflect these priorities: to “provide benefits to impacted communities,” by providing “both economic and job benefits to the communities it serves.” A Community Benefits Manager noted that Assistant General Manager Juliet Ellis ensured this goal was made explicit in the mission and that the policies gave team members the leverage necessary to pursue environmental justice considerations in the discussion pertaining to the TBL. An SFPUC official noted, “There were anchors very, very high at the upstream—the EJ policy and these Levels of Service goals – and so we wanted to complete the spectrum of where those decision-making points and levers are. The specific Level of Service goal related to this was really important.”

TBL evaluation criteria and metrics that reflect agency and citywide policies thus include odor, noise, and employment. Odor has been a major point of contestation for several decades because it is a problem associated with the treatment plant in Bayview Hunters Point. Residents in the neighborhood have contested the utilities' operations since the 1970s, when the plant was built. Moreover, the jobs made available through water infrastructure planning are highly desirable, because they can provide career pathways for “middle-skilled” workers, including low-income people and people of color (E. Gordon et al. 2011). Air quality is also measured in the TBL, as well as recreational and social space, which is of crucial importance to low-income communities.

A consultant made the case for how the agency's use of the TBL differs from conventional uses:

This model is unique to San Francisco. There are other models out there and a lot of them deal with monetizing the environmental and social costs. The application was brought up to San Francisco.... This is an SFPUC model”
(SFPUC Citizens' Advisory Committee Wastewater Subcommittee 2012)

The SFPUC's TBL method is uniquely contextual. Its social criteria and metric development method incorporates the local codified priorities, and the rating system enables Project Managers to choose a preferred alternative. The agency was able to do this because it pulled expertise from various city agencies, as well as different parts of the SFPUC, including the

Community Benefits team. Project managers did not have the kind of leading role that they have had in TBL development teams in other cities.

The TBL criteria and metrics, however, are not examined in relation to the conditions of low-income communities of color. As discussed above, that analysis occurs prior to the use of TBL. One project manager noted, “EJ considerations are secondary to system considerations. That does provide good to everybody, but it’s unclear how much choice there would be for disadvantaged or environmental justice areas.” Another interviewee noted, “equity metrics are not in the tool. You could put EJ and disadvantaged communities in there and spend time [developing] equity metrics.”

Even as the criteria and metrics reflect environmental justice concerns, factors such as place, race, and income are not considered in the tool. Although the SFPUC did factor these in to some extent prior to using the tool, the TBL tool endorses a logic of equality, not equity. This is an important distinction. Equality is a notable normative goal, but it does not address existing disparities. An equitable goal would involve addressing “avoidable or remediable differences among groups of people, whether those groups are defined socially, economically, demographically, or geographically” (“WHO | Equity” n.d.). In American cities, not taking disparities into account results in ignoring existing marginalization at best or compounding it at worst. The SFPUC factored in these to some extent *prior* to using the tool.

Spatial Analysis

In 2013, the agency’s Environmental Justice and Land Use Manager Yolanda Manzone authored a memo in which she proposed a method for incorporating environmental justice priorities in the alternatives selection process. The recommendations included a spatial analysis and tiered approach to prioritize the alternatives that benefit low-income communities and communities of color. The spatial analysis consisted of locating the various alternatives on maps of San Francisco’s “disadvantaged communities,” defined by places that meet four out of eight factors, such as poverty levels and unemployment (Figure 17). “Environmental justice areas of concern” account for similar socio-economic characteristics, as well as whether residents are disproportionately burdened by environmental health hazards. The spatial overlay of disadvantaged and environmental justice areas covers swaths of San Francisco, particularly in the city’s east and southeast neighborhoods. The memo recommended that program managers flag which projects fall within or outside of the relevant areas. The proposed next step was to use a tiered approach to decide which projects to prioritize and run in the TBL tool.

Tier 1: Address needs in EJ and disadvantaged communities first.

Tier 2: Develop project concepts that provide health and safety improvements and support interagency/citywide goals.

Tier 3: Consider additional benefits supported by community input (Manzone 2013).

The approach prioritized the potential advantages and disadvantages created by the

projects in environmental justice and disadvantaged communities. The recommendations were adopted in planning for SSIP’s collection system. Project managers, in consultation with members of the Community Benefits team, used the spatial analysis and tiered approaches to prioritize which alternatives were ultimately run in TBL. This is significant, because the collection system includes new green infrastructure, which is considered a community asset; its aesthetic and recreational qualities are improvements from conventional gray infrastructure.

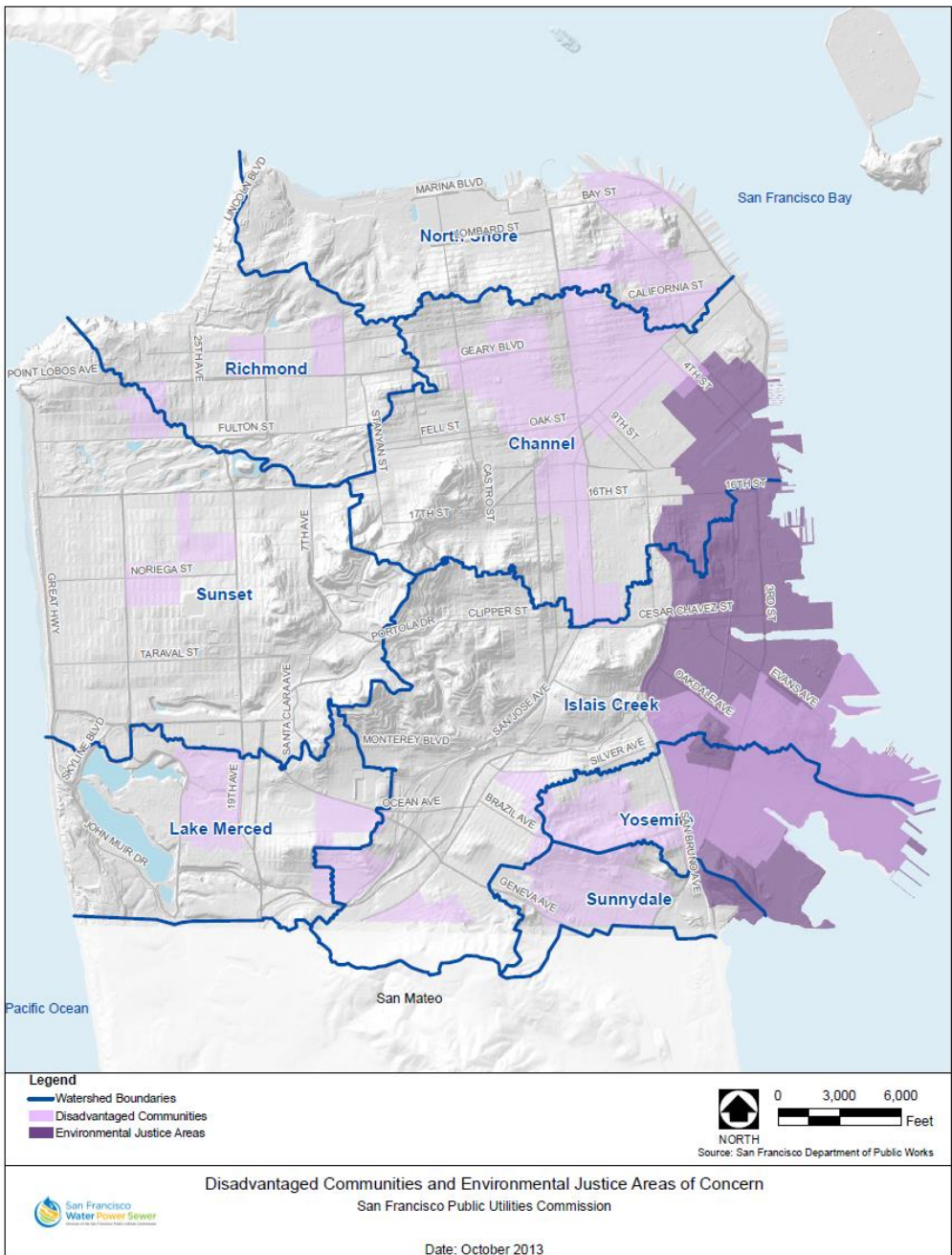


Figure 17. “Disadvantaged communities” and “environmental justice areas of concern” in the TBL process.
Source: Manzone (2013)

Members of the Community Benefits team enabled the process to incorporate the spatial analysis and tiered approach. An agency official emphasized their crucial role in ensuring that the projects selected reflect social justice priorities:

If there was no one with an explicit charge to implement the EJ policy and make sure it was tangibly integrated into our decision-making processes... a lot of things would be really different. There would be no geographic spatial awareness. We wouldn't have moved the needle to educate our own staff about the issues... The maps and talking about it, that's the beginning of education.

Here, the project manager refers to differences in roles and professional background within the agency, further pointing out that the maps made the consideration of community impacts "tangible" for the engineers and consultants.

Holloway Green Street

The planning and development of the Holloway Green Street Project, in the city's Lake Merced watershed area, is an example of the agency's use of social and spatial analysis, as well as a tiered approach, to generate a more equitable outcome in the city's storm water management. The project, under construction at the time of writing, spans eight blocks along Holloway Boulevard in the city's Ingleside neighborhood. Residents there are predominantly Asian and Latino, and many are low-income. A consultant noted the value of the project to the community:

Part of the benefit of doing a green street, is that, while it is serving a technical, functional purpose in benefitting the sewer system, it is also hopefully a public amenity, it's a street beautification and ancillary benefit in putting in vegetation.

Indeed, the Holloway Green Street includes permeable pavement and rain gardens, features that are expected to improve the traffic safety and aesthetic quality of the corridor.

In the early stages of planning, agency officials and consultants identified seven street corridors that were "candidate locations" for a green infrastructure project in the local watershed (Wood and Wilson 2013). These candidates were identified through an analysis that concluded that the project were physically feasible and that they addressed system needs. At this point, project managers applied four social and environmental indicators, in a tiered approach, to determine which projects to run in the TBL tool: environmental justice areas, disadvantaged communities, open space need areas, and injury corridors (Figure 5). They determined that none of the projects were located in environmental justice areas, but two were located in disadvantaged communities: the projects on Holloway Avenue and Lake Merced Boulevard/Sunset Boulevard. Both projects, and a third, became those ultimately run in the TBL tool (Figure 18). The project on Holloway Avenue emerged as the preferred project from a TBL perspective. A consultant called the incorporation of the spatial analysis

and tiered approach in the selection of the Holloway Green Street a “desktop gut check.” He explained:

The disadvantage to a tool like [the TBL] is that if you haven’t put some thought in ahead of time, we could have just picked a project that didn’t hit any of [the disadvantaged] areas at all, and then running it through TBL there wouldn’t have been any value gained to a disadvantage community or an environmental justice community, because we hadn’t been there to start.

Residents were not involved in the technical design of the TBL but they did have a say in what the final project would consist of.

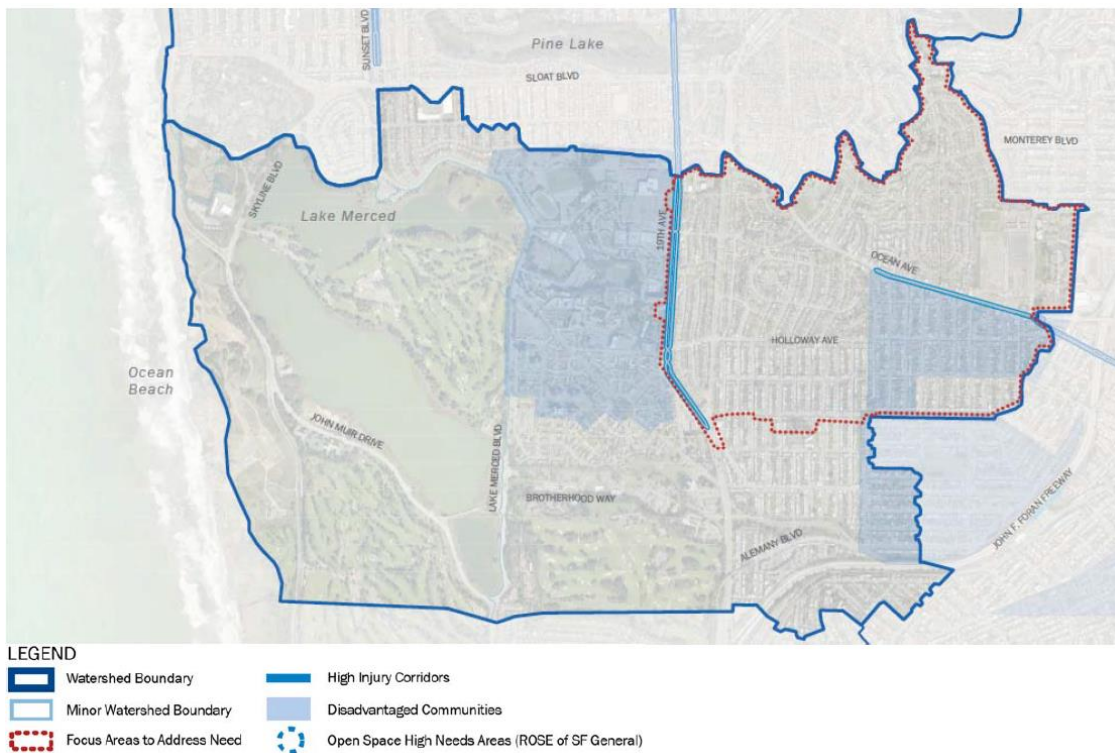


Figure 18. Social and environmental assessment for Lake Merced Watershed.

Source: Wood and Wilson (2013)

Upon selecting the location, agency officials undertook a community engagement process to incorporate resident feedback on the design. This included a community open house attended by 26 people and an interactive online survey taken by 43 area residents. The engagement process revealed that nature space and traffic calming and pedestrian improvements were the project priorities for residents. Participants also preferred bulb outs and trees. Residents, however, did express a concern over the potential reduction of parking space as a result of the project.

Tool Limitations

Despite the spatial analysis on disadvantaged communities, officials and consultants

raised some significant drawbacks to the tool's ability to achieve racial justice. The spatial analysis, for example, was not conducted for all SSIP alternatives that were ultimately run in the TBL tool; the spatial analysis was mainly applied to the collection system improvements. This is because other types of infrastructure, such as treatment plants, were already slated for improvements and their site location is not necessarily a choice. A consultant pointed out:

It's not like you can choose to do that project in that location or not, at that point, because the location is already chosen. And because the policy was written and started to be implemented for [the collection system], versus projects...

They lamented this project pre-determination, expressing interest in the possibility of using TBL for all projects, not just those that form part of the collection system.

Another challenge raised is that many decisions about projects have already been made by the time alternatives are run through the tool. The SSIP's \$6.9 billion budget, for example, had been approved by agency commissioners in July 2012. A city official explained the significance of this sequencing:

The decision to even undertake the SSIP was one macro-level decision. And then they had to decide what SSIP going to be made up of, and then they had to decide, conceptually, we're going to have capital projects that address the Southeast Plant and then the other half are all those collection systems. That's already a decision-making point. Then, the next is how much is our budget, and how much of that budget is going to be allocated to the two components – the plant versus the collection system. And then the other decision-making points were... Of those collection system, how much is going to green infrastructure versus grey.... All these points happen before TBL.

These pre-determinations are influential in shaping which projects and alternatives are run in TBL. The decision to choose the most socially just project is a very downstream decision.

Spatial Analysis Implications

The SFPUC's TBL does not, on its own, advance environmental justice. The criteria used to analyze different project alternatives include noise, odor, and employment. These are longstanding concerns raised by Bayview Hunters Point residents. However, these criteria are analyzed very generally, without regard to existing problems and needs. For example, one alternative may create more recreation space than another alternative but that determination is made according to the specifications of the project and not relative to recreation space disparities. In other words, the TBL tool does not account for how a project contributes to a location's cumulative impacts. The additional step of conducting spatial analysis informed project managers where the projects are located in relation to disadvantaged communities. This information was then used to aid in the decision-making process. An agency official pointed out that this parallel process occurs because, when it came to the achieving equity goals, "the TBL tool wasn't going to get us there... It'd be too

late by the time projects got there.” The analysis is thus an additional step in the planning process, not a technical method intrinsic to the TBL.

The SFPUC’s methods for incorporating environmental justice in the TBL methodology contain several important implications. This chapter supports existing research which has found that sustainability presents a strategic opportunity to pursue social justice goals. The SFPUC’s alternatives selection process does include criteria that has concerned residents but the ancillary spatial analysis is what ultimately allowed for a clearer understanding of a project’s potential to address disparate impacts. The supplementary nature of this step also points to potential limitations of TBL tools for social justice efforts.

How the SFPUC got the point of incorporating an environmental justice analysis supports understanding of the conditions that enable the incorporation of social justice goals in sustainability. The expertise to design the spatial analysis and tiered approaches came from the Community Benefits division in the agency, or those with an explicit mandate to ensure that the agency meets its environmental justice and community benefits goals. The Community Benefits program managers provided a working definition for environmental justice and disadvantaged communities; they also advised and made recommendations about how to prioritize projects that would benefit low-income communities of color. The SFPUC’s development and use of the TBL thus points to the important role of internal capacity in structuring the social justice goals of a water utility. This included the role of the utility’s Community Benefits and Environmental Justice policies and leadership. But in-house and citywide expertise on environmental justice is lacking in the work of most utilities, given their strong engineering orientation. Developing internal capacity is at once a challenge and a clear way forward.

Moreover, the limited use of the TBL tool relative to the larger infrastructure program is illustrative of its selective impact. The distribution of green infrastructure – an amenity – was decided using the socio-spatial analysis and tiered approach. However, this analysis was not applied to other forms of infrastructure that cannot be relocated, such as treatment plants. Thus, while the Holloway Green Street neighborhood will benefit from the green infrastructure, the TBL tool will do little for neighborhoods like Bayview Hunters Point, where the relocation of a burden is not an option. And despite some of the promising features of the SFPUC’s TBL tool, there is no guarantee that officials will select and build the projects that fall in environmental justice or disadvantaged areas, even if TBL analysis illustrates these projects’ positive impact. The alternatives recommended after the TBL analysis are precisely that – recommendations. It is ultimately up to the Commission and other agency leadership to decide which projects will be pursued.

Discussion

Sustainability is often referred to as the balancing of the three E’s or three Ps: “economy, environment, and equity” or “planet, profit, people.” Neither readily captures utilities’ sustainability efforts. In the first, “equity” is not always pursued, oftentimes because addressing disparate impacts is considered outside of utility’s work scope. But nor do utilities “profit,” as suggested by the second phrase, since these organizations provide a

public service. This role makes them a critical site to understand the role of public institutions in preventing and mitigating inequities generated by environmental burdens and amenities, particularly in cities with increasingly stark levels of inequality. As evidenced by this chapter, acting on this goal will require enacting more substantive forms of sustainability—or “just sustainabilities.”

The pursuit of sustainability with a strong environmental justice orientation presented benefits to the planning process and to communities. In this case, the incorporation of diverse criteria in the TBL was a way to more methodically understand the implications of a project and how to choose one. This included coordinating with other city agencies in the areas of jobs and open space. Furthermore, while residents were not involved in the TBL design process, the analysis brought in by the environmental justice manager revealed the potential disparate impacts of the project selection process. More specifically, it located and defined for TBL project managers “disadvantage,” drawing on well-established definitions from other government agencies. This coordinated the various parties’ understanding of which people and places to prioritize.

In sum, TBL tool use does not necessarily suggest a step toward, or even a commitment to, achieving social justice. Ongoing wariness about how planners use the TBL is thus merited. Wastewater agencies are developing methodologies to determine whether, and by how much, sustainability is achieved by different project alternatives. The history of wastewater planning points to how decision-making tools can adversely impact low-income communities of color. As utilities move toward adopting new sustainability strategies like TBL, they will need to determine the potential, as well as the limitations, of these new practices for social justice.

6. Community Benefits Commitments in Contracts: Lessons on Private Sector Involvement in Infrastructure Rebuilding

Introduction

“I have been waiting ten long years, you hear me?... I want you to pass this today. I want them to get to work now, not next week,” stated long-time activist Espinola Jackson at a public meeting held by the San Francisco Public Utilities Commission (SFPUC) in May 2013. She was speaking of the plan to rebuild the Southeast Treatment Plant (SEP) in the Bayview Hunters Point neighborhood. It was an incredible, uncharacteristic statement. Since the early 1980s, Ms. Jackson had been a vocal critic of the plant for the environmental burdens it created in the neighborhood. She frequently attended SFPUC meetings to voice her concerns about the plant and other agency operations. But a change in SFPUC contracting procedures prompted her to call for its rebuilding—firms on large contracts would be making monetary, in-kind, and volunteer contributions to various neighborhood efforts. The new practice of “commitments in contracts” generated new levels of resident support for the agency’s Sewer System Improvement Program (SSIP).

In this chapter, I continue to probe how planners and engineers engage with low-income communities of color to promote greater justice. In particular, I ask, what is the role of the private sector in this process? Planning scholarship has drawn attention to the equity implications of the privatization of infrastructure, but minimal attention has been paid to the temporary involvement of the sector. But contracting is a critical part in the engineering of justice during the project implementation/construction phase of planning. In this chapter, I show how large firms can advance social justice. I draw lessons from an examination of the SFPUC’s community benefits commitments in contracts program.

The community benefits commitments in contracts program is the outcome of two landmark policies—the Environmental Justice Policy (2009) and the Community Benefits Policy (2011)—to reduce adverse impacts on communities, as well as to create opportunities where they exist. The policies themselves are the product of a long history of contestation surrounding San Francisco wastewater planning, demonstrating that private sector actors operate in a social and political context. In the case of San Francisco, firms’ contractual relationships reflect this dynamic. The role of the SFPUC in instituting these changes illustrates the potential impact of a strong public sector. I conclude with a reflection of the relevancy of an anchor institution approach to reconceptualizing the role of utilities in communities.

Communities, Corporations, and Commitments

Planning scholarship has deliberated the role of the private sector governance in infrastructure. Harvey’s (2003) concept of “accumulation by dispossession” identifies privatization as a primary practice of neoliberal globalization. Public-private partnerships are a version of this trend (Miraftab 2004). Bakker (2010) introduces the concept of ‘governance failure’ to characterize the consequences of this liberalization for urban

residents engaged in debates on water services: they are politically disenfranchised, the culture of decision-making is expert-driven, and they prohibit the possibility of consumer entitlements to basic services. She further points out that recent strategies for the management of common pool resources are often a reflection of the devolution of state responsibility. This “hollowing out” of the state (Jessop 1994) is offset by an enhanced role of nongovernment actors – or from government to governance (Rhodes 1997). Furthermore, the primary modes of accumulation and regulation, which occurred at the national scale, now primarily manifest at the sub-national and supranational scales (Brenner 2004). Marvin and Graham’s (2001) ‘splintering urbanism’ thesis posits that, under these structural and scalar shifts, urban networked services have become fragmented, perpetuating social divides and creating new ones. Researchers have cited the privatization of water services and infrastructure as a key consequence of these changes in water governance.

Yet water utilities in the United States have historically been, and remain, public organizations. This distinction among other types of utilities dates back to the late 19th century and early 20th century, when local jurisdictions’ concerns about water supply and problems stemming from water pollution prompted them to create special purpose districts (Mullin 2009). In some cases, local authorities also created organizations for inter-municipal and interstate cooperation, or central cities annexed or consolidated with suburban areas (Tarr et al. 1984). The environmental movement spurred the adoption of new federal legislation – namely, the 1972 Water Pollution Control Act and its six amendments – that congealed a robust system of controls in the area of water planning.

Yet private actors are a central part of water infrastructure’s development and maintenance. Technical services firms have a long record in the field of water infrastructure and, through this work, have influenced the field of planning more broadly. Savas and Savas (2000) explain the public ownership but private function in government services by pointing out that privatization can take one of three forms: delegation, divestment, and displacement. The first occurs through sale, donation, or liquidation. The second happens by contract, franchise, grant, voucher, or mandate. And the third, displacement, occurs through default, withdrawal, and deregulation. While any of these scenarios is possible in wastewater planning, divestment most directly applies to waster infrastructure rebuilding efforts in large US cities, including San Francisco’s SSIP. Utilities like San Francisco’s typically enter in public-private partnerships for water maintenance and operations.

The construction and maintenance of urban infrastructure, such as transportation, airports, energy, and water and wastewater all involve private parties that bid for and win public contracts. In wastewater planning, for example, firms are contracted to manage projects or to build or rebuild certain aspects of a wastewater system, such as a treatment plant. Some work is conducted by small, local firms but the industry is largely led by large, multinational firms with a global footprint. They often operate in multiple countries, and in multiple cities within a country, at once (Swyngedouw, Kaika, and Castro 2002) and are considered specialists in environmental design, engineering, and/or environmental services. The largest water infrastructure firms earn annual revenues in the hundreds of thousands to design, plan, construct, and install water and sewer projects in the United States (Figure 19). These companies often have full-time administrative and technical staff assigned to a

project, and they call upon in-house subject experts when necessary. Several of the firms that earn the highest revenues in the area of design and planning have contracts to work on San Francisco’s SSIP. For example, SSIP’s project management contract with AECOM consists of over 60 tasks with varied foci. The contract requires 30-40 full-time staff, as well as hundreds of other company employees who are approved to work on SSIP to fill a particular technical need.

| Design & Planning | | | Construction & Installation | | |
|--------------------|--|--|-------------------------------|--|--|
| Lead Firm | Revenue from Sewer and Water Projects (USD millions) | % of Total Revenue from Sewer and Water Projects | Lead Firm | Revenue from Sewer and Water Projects (USD millions) | % of Total Revenue from Sewer and Water Projects |
| CH2M Hill | \$502 | 14% | Layne Christensen | \$395 | 47% |
| MWH Global | \$367 | 39% | Kiewit Corp | \$324 | 3% |
| AECOM | \$290 | 4% | Garney Holding | \$188 | 30% |
| CDM Smith | \$196 | 26% | The Walsh Group | \$161 | 4% |
| Tetra Tech | \$178 | 7% | Balfour Beatty | \$138 | 3% |
| HDR | \$176 | 10% | Skanska | \$134 | 2% |
| Brown and Caldwell | \$160 | 52% | Tutor Perini | \$125 | 3% |
| URS Corp. | \$158 | 3% | Granite Construction | \$113 | 5% |
| Black & Veatch | \$156 | 12% | American Infrastructure | \$86 | 17% |
| Hazen and Sawyer | \$113 | 70% | Primoris Services Corporation | \$78 | 4% |

Source: Tulacz 2014a; Tulacz 2014b

Figure 19. Companies that earn highest revenue from sewer and water infrastructure budgets. Source: Daly, Brun, and Guinn (2015, 22)

Market conditions created by large firms are at odds with local equitable development. They have greater technical capacity than small firms, enabling them to compete for larger projects. Small firms that offer a more limited scope of services and fewer projects means that they often do not have the capital to retain staff through bidding and payment processes. Conversely, large firms are able to front overhead costs during bidding processes or before a firm is first paid for a deliverable. The contracting process thus presents a market opportunity that disadvantages small and minority-owned businesses. Moreover, these large firms contribute an expertise that is generalizable across contexts, but this also means that firms have less of a connection to the places or the communities where they work. These dynamics are manifestations of critiques of private sector involvement in infrastructure services.

Evidence of environmental justice would provide a counter narrative to dominant planning literature on the negative consequences of private sector involvement. One instance of contestation surrounding infrastructure is evident in Community Benefits Agreements (CBA), a push against the “back to the city” phenomenon that excludes low-income communities of color (Gross, LeRoy, and Janis-Aparicio 2005). These contractually binding agreements between private or public entities and a group of community groups aim to mitigate the marginalizing effects of development projects such as an airport or rail station. The provisions of the CBA are agreed upon between both parties and typically address a kind of community priority, such as affordable housing or jobs. They also sometimes affect

aspects of the development project. Been notes that the emergence of CBAs signals that neighborhoods “do not believe that current land use processes are adequately protecting their interests” (Been 2010, 35) and that local governments should use CBAs under particular circumstances, including legitimate representation and guaranteed enforceability. The lack of enforcement the agreements are subject to and, more generally, the absent role of local government is a chief critique of CBAs. As Gross (2005) puts it, “Attempts by developers and public officials to control public participation, occupying political space that might have been used for a more inclusive CBA effort, constitutes a misuse of the CBA approach and should not be taken as a valid indication of community support for a proposed project” (225).

In the case that follows, I examine the SFPUC’s community benefits commitments in contracts program, or what a respondent described as “Community Benefits 2.0.” The SFPUC’s version of the program is similar insofar as residents have legitimate concerns pertaining to the rebuilding project. A significant difference, however, is that the commitments are not negotiated between community and public or private representatives. Instead, the utility asserted a strong regulatory role. I show how this role reshapes the implications of large firms in SSIP for equitable development efforts.

Firm Commitments in San Francisco’s SSIP

The SFPUC is relying on large technical services firms to carry out many infrastructure rebuilding duties. Under the SFPUC’s Community Benefits policy of 2011, a new program was created to reflect the agency’s goal to “partner with contractors who have a strong commitment to community benefits and corporate social responsibility” (“Community Benefits Program Appendices” 2016). Firms bidding for large contracts—those worth over \$5 million—are invited to participate in the community benefits commitments in contracts program for additional points. The contractual value threshold was set to work with larger firms that have the capacity to undertake corporate social responsibility efforts. As part of their bid, participating firms submit a proposal to give back to communities that are impacted by the city’s wastewater operations in the form of financial, volunteer hours, and in-kind contributions. Despite the formalization of the program, firms are not required to participate; firms that choose not to, however, forgo points that might contribute to a higher bid score.

The community benefits portion of the proposal is worth 5% of the entire proposal score. A panel of community benefits experts generate a score based on five criteria, each weighed by a percent: work approach (20%), project team and organization (10%), community benefits commitments (60%), accountability and deliverables (5%), and statements of understanding (5%). The five community benefits criteria differ from the technical criteria for which firms are typically assessed. For example, firms’ work approach and task description of tunnel engineering, as well as hydrological and hydraulic modeling and analysis, were among the most heavily weighted areas for SSIP’s Central Bayside improvement project (San Francisco Public Utilities Commission 2011). A panel of technical experts reviews the technical aspects of the proposal, while a panel of individuals from foundations, other city agencies, community members review the community benefits

portion. To discourage any conflict of interest, panelists are prohibited from having affiliations with the community organizations that stand to benefit from a winning proposal. The community benefits panels are also designed to reflect gender and racial diversity. Most firm commitments are made in the areas of workforce development, economic development, environmental justice, and education.

The amount committed by the firms—typically worth at least 1% of the contract—was set through precedent since this is what the first community benefits firm committed. At the writing of this dissertation, 57 contracts worth over \$5 million had participated in the program; nine of those were issued under the city’s plan to rebuild the sewer system. A list of seven of those contracts and their commitments indicated that the contract duration ranged from 6 to 15 years, and they totaled \$1.3 billion dollars, or 19% of the entire SSIP budget. The total amount dedicated to community organizations and schools totaled nearly more than \$21 million. The firms participating in the program are among the largest in their areas of expertise, and several are multinational. For example, AECOM has approximately 95,000 employees and had an annual revenue of \$19.2 billion in 2014. Most of those who work for the firms are formally trained in technical programs, requiring high levels of formal education. And although there is no demographic data available on the firms, they are visibly predominantly white and male. The firms’ composition and largess create new opportunities the community organizations that are the recipients of the commitments.

Table 6. Sample list of community benefits commitments in contracts in SSIP.

| Firm or Joint Venture | Contract Name | Contract Duration (Years) | Total CB Commitment | Contract Amount |
|-------------------------------|--|----------------------------------|----------------------------|------------------------|
| Emerson | Distributed Control System (DCS) Upgrades | 15 | \$612,750 | \$20,400,000 |
| HDR | New Headworks Facility Construction Management (CM) Staff Augmentation Services | 6 | \$288,500 | \$20,000,000 |
| Webcor/MWH | Biosolids Digester Facilities | 15 | \$16,000,200 | \$939,000,000 |
| AECOM/Parsons JV | Program Management Services, SSIP | 15 | \$1,500,000 | \$150,000,000 |
| MWH/URS JV | Planning and Engineering Services CBSIP | 9 | \$1,050,000 | \$30,000,000 |
| Brown and Caldwell | Planning and Engineering Services, Southeast Plant Biosolids Digester Facilities Project | 12 | \$1,725,000 | \$153,500,000 |
| Carollo Engineers Inc. | Southeast Plant New 250 MGD Headworks Facility Project SSIP | 9 | \$231,200 | \$33,500,000 |
| | | 11.6 (avg.) | \$21,407,650 | \$1,346,400,000 |

Source: Fleer (2017)

Community Benefits Commitments in Bayview

Under the program, firms partner with community-based organizations (CBOs) and schools to make their commitment over the life of each contract. CityWorks, a paid summer internship program for high school students in the neighborhood, is one of several programs firms support. The program is run by the agency in partnership with Young Community Developers (YDC), a Bayview Hunters Point workforce development organization. As part of their summer opportunity, youth participate in a two-week job readiness training to expose students to professionalism and public speaking. Youth participants, ages 15-19, work at the SFPUC or at a partner engineering firm—e.g., Brown and Caldwell, AECOM-Parsons, CH2M—in the areas of engineering, architecture, government, and communications. As part of their community benefit commitment, firm engineers mentor program participants and provide them with a stipend. At least several CityWorks participants work at the site of the SEP every year. “It’s really our community, it’s our neighborhood, and I want to see people from my neighborhood get involved,” said CityWorks intern Elisha Andoniah (San Francisco Public Utilities Commission 2016a). Between 2012 and 2017, 132 youth participated in the program.

Under community benefits commitments, firms also support small-, minority-, and women- owned businesses through the agency’s Contractors Assistance Center. The center provides support to local and small businesses to compete for public contracts through technical assistance and counseling services. These businesses are also able to consult with agency staff regarding businesses development; access a database of city-wide contracting opportunities; and take classes that address challenges pertaining to capital and regulatory compliance. At the Center, firms mentor the small businesses in pursuit of agency opportunities. In some instances, the small businesses have the opportunity to become subcontractors of the larger contract. This relationship with the small business also benefits the large firms. In a promotional brochure, a contractor notes, “The new way of organizing has led to the increased role of subcontractors and small firms. They are a vital part of the way we do business, providing valuable goods and services and local knowledge.” Through relationships with these small and minority-owned businesses, large firms are better able to understand the local context.

These examples of community benefits commitments under SSIP have important implications for the businesses and organizations firms partner with. In most cases, firms will approach businesses or organizations that are working in areas that the firms would like to commit resources to. In other instances, agency officials will facilitate particular investment opportunities, such as the mentoring that takes place through the agency’s CAC. The commitments program has thus enhanced small business and CBOs access to firms. In a conventional scenario, for example, any engagement between CBOs and technical services firms would have to go through the city. A leader of a local community-based organization pointed out that communications were a challenge in previous attempts to identify workforce development opportunities for residents: “[The firms] all go through the city, so they would rather deal with city infrastructure and then have the city infrastructure deal with the CBO. There was a lot of lag time... it just didn’t work out.” As part of carrying out their commitment, some firm employees have become a consistent presence in the community

through deeper involvement. For example, a firm engineer interviewed for this research sits on a Bayview Hunters Point committee dedicated education issues to fulfill his company's commitment to investing in the area of middle school education. He explained that his involvement is partially due to an interest in wanting to know and assess the impact of his company's investment.

Perhaps most important, the funds have enabled CBOs to engage in more innovative work. Non-profit leaders in Bayview Hunters Point, like many others in underprivileged communities, largely rely on restricted government funding. Individual and philanthropic sources of funding comprise much smaller sources of revenue. This means that the CBOs primary source of funding is for pre-determined initiatives over a finite period of time. But the commitments from firms changes what community organizations can do with their funds. A respondent pointed out:

For me, it's a game-changer because it changes the expectation of the Executive Director and it changes the expectation of the community in terms of what the outcome should be and the timeline that these things take to get there. And so, for me, it has been the biggest trust-builder... which is huge in terms of moving projects forward and having real buy-in.

Unlike conventional government funding processes, CBOs do not have to submit proposals or jump through other administrative hoops to obtain funding. Under the community benefits commitments model, firms support CBOs on the basis of what the organizations identify as priorities, enabling community leadership to pursue bolder endeavors. This is especially the case when the CBOs and the firms have agreed to a multi-year partnership.

In some cases, the partnership between firms and CBOs can have a lasting organizational impact. A leader of a CBO told of how they were approached by a firm when the company was bidding for an SSIP contract:

It was just like any good relationship. They gave us a project, a small one to work on, to see what it was like to work with us. Had a lot of fun.... And as they applied for the RFP, they included us as a partner, and then when they got the gig, they made good on their promise. We've been able to work with them. To me it's sharing a collective vision...

As they worked together, the firm commissioned several services from the organization. This led to including the organization as a subcontractor in their bid for the large SSIP contract, which the firm eventually won. In the course of working together, the firm also mentored the organization to become a certified local owned business and to be a vendor for services solicited by the city. The organization's partnership with the firm resulted in multiple new opportunities for the organization, advancing its mission to create educational and workforce opportunities for Bayview Hunters Point residents.

Implications for the Firms

Although the Community Benefits Program is now considered convention for the SFPUC's large contracts, it faced some resistance from firms that bid for projects. HDR/Jacobs, a joint venture team, unsuccessfully bid for the project to upgrade the city's Channel Force Main that transports water in San Francisco's eastern half and formally protested the program. In December 2011, the team principals sent agency officials a letter where they claimed that the agency's community benefits policy violated a California Law that governs the selection of design professionals (Talbot and Klein 2011). Firms shall be selected "On the basis of demonstrated competence and on the professional qualifications necessary for the satisfactory performance of the services required." Notwithstanding the criteria under the new program, HDR/Jacobs is the "best technically qualified firm." The SFPUC countered the notion that the firm should have won the contract based solely on technical reasons—other, project-specific considerations must also be made. In a response letter, agency officials point out that the California law "Does not, on its face, limit selection criteria only to technical, engineering matters. Rather, appropriate selection criteria must be analyzed based on the 'services required'" (Fine 2012). The agency letter goes on to cite other relevant regulations which allow for selection criteria, including a state law that addresses the particular aspects of a project: "the needs 'of the state and complexity and special requirements of the specific project."

Some internal resistance to the Community Benefits Program also exists among those firms participating in the program. A respondent from a participating firm grouped their colleagues' willingness to participate in the program in three camps:

[One] camp that understands it and goes with it and enjoys it and see the value. [Second,] there's the camp that goes with it but kinda sees it as a 'price of admission,' and then there's the camp that thinks it's a horrible extortion and that takes a lot of work.... I have found that the people in the middle are easier to talk to and bring along. Those that think it's extortion tend to be the older generations, the people who have been around for 30 or 40 years, and this is just so new that they can't wrap their head around it. A lot of them, just going through years in the firm, they see profit is what you need to do and community benefits really takes away the profit.

The differences in opinion within the firm are at times shaped by how long they have worked in the industry. Those who have been there longer see community benefits work as taking away from the return on the projects. Conversely, those who are newer to the field seem are more open to participating in the program.

Despite some resistance to the program, participating firms have benefited from the program in several ways. For example, the program defines the up-front costs of fulfilling community relations obligations, enabling firm staff to manage executives' expectations and ensure profitability. Since many professionals in mid- to large-sized firms often engage in community projects as part of corporate giving events, some firms have folded their contract commitments into this preexisting programming—giving is thus redirected from other more

affluent places to Bayview Hunters Point. A respondent from a participating firm noted how his company previously ran a science, technology, engineering and math middle school program in Lafayette, an affluent and predominantly white suburb of the San Francisco Bay Area: “We’ve stopped doing that... We’ve aligned and diverted our resources and time and energy into something that aligns with public private and community partnerships, like what falls into the PUC. As we align that, we’re kinda moving it from other things.” In other words, the firms are not necessarily “giving” more than prior to their participation in the program. They are instead strategically investing in San Francisco. This information challenges the perception that participation in the community benefits program affects profit margins, which firms unfamiliar with the SFPUC may be concerned about.

Community benefits commitments also help firms by facilitating their involvement in the community, since these pre-established relationships do not exist. Engaging in local politics on their own accord can be unhelpful or backfire on firms. A firm consultant explained:

We’re not always sure what are the right places to give in certain cities because politics gets involved. So, you’re trying to give to the right thing, and also trying make sure that you do make a charitable contribution it’s not going to aggravate somebody who wanted you to go somewhere else. So that’s a dilemma I’ve gotten caught in. So, what this does here, it’s right up front, there’s a plan, there’s a plan that’s not negotiated per se, because we can control to who we give, but it’s done with feedback from the community and the PUC. So, we’re contributing where the need is most and everybody kind of agrees with that. That’s why I like this program, because I’ve been burned in the past...

In this respect, the program is methodical in prompting firms to have a plan for community engagement that is aligned with the challenges residents face. The agency is also able to facilitate this engagement. The support firms receive in this process is a significant advantage because the lack of clarity pertaining to communities’ hopes for deeper accountability can result in missteps.

The program also reflects the values of firm employees who were at times referred to as “enlightened engineers.” These individuals who tended to be active in their firm’s community benefits program were described as understanding the social and political history of the wastewater planning program, the agency’s equity goals, and the importance of giving back to the community as a result of their large, long-term contracts. For some of these engineers, community benefits commitments were a reflection of their values and “the right thing to do.” A consultant, for example, attributed this outlook to his formal education. His technical training required him to do a capstone project that had a positive social impact, prompting him to work on a water broad in the Global South. Another respondent also expressed that work abroad exposed him to extreme disadvantage in water quality and access. These experiences have enabled him to understand and take an interest in working in places that are disadvantaged.

The presence of “enlightened engineers” is one way firms demonstrated receptiveness to the social and political context of the sewer system rebuild. In addition to creating teams of engineers who enjoy engaging residents, some of the participating firms also create more demographically diverse teams. A respondent pointed out the intentionality behind this approach:

It’s interesting to watch what they are willing to do to compete. They are smart enough and strategic enough to know that... if the General Manager is of color or female, then they will restructure their bid team to reflect the demographics of what they see in that city of the staff where they are proposing. And so it tells me that they’re not clueless about these things... I’ve come to understand how important it is to have people of color and women in primary roles within public sector because that’s how you change the makeup of the private sector, particularly if those private sector companies are attempting to do public work.

The respondent, a person of color, partially attributed their role on a large contract to the history of contestation surrounding the SEP as well as the racial diversity that exists in the agency’s highest levels. The view that firms aim to reflect the demographic makeup of the agencies was supported by a consultant who reflected that firms often struggle to do as well as they should with regard to diversity:

There’s no question that on these programs, ourselves and our competitors, we try to be like our clients and look like our clients. I mean right, that to me is the right thing to do. And we don’t always get there.... You don’t always get it right. Diversity and hiring is definitely one of the things I’m constantly looking at, and sometimes you’re balanced and sometimes you’re not, but can always work towards getting to that proper balance.

Firms adapt to the expectations of the public sector. At times, this can consist of regulatory mandates, but adaptation also happens in less institutionalized ways such as improving demographic diversity. Efforts to enhance diversity create a more representative firm, one that is better able to effectively engage to the agency officials and residents.

Discussion

The World Health Organization famously said, that “social justice is a matter of life and death.” The lack of infrastructure or existing, burdensome infrastructure can make people sick but building practices can also have this effect. Infrastructure hurts people when it bars low-income communities and communities of color from the economic opportunities it generates. Private sector planners and engineers are implicated in perpetuating this distributive injustice. They hold crucial roles in cities undertaking expansive infrastructure rebuilding programs, yet often fail to build rapport with the communities that are most directly impacted by their work. Community benefits in contracts presents an important intervention because it reconfigures this temporary private sector role to one that is more engaged and supports the priorities of residents. The protest letter issued by two firms to city

officials signifies that some resistance exists, especially based on what is considered “relevant”—i.e., technical—to an infrastructure project. But this chapter highlights how they adapt to the circumstances and can be willing if enthusiastic partners.

Under either scenario, firms and residents benefit from the program. The infrastructure building processes gained from the added transparency and direction with regard to firms’ community involvement efforts. When working on infrastructure projects, some cities may have unstated expectations or community opposition can arise in the course of planning and building. The commitments in contracts program establishes the scope and terms of their community engagement. The extent of involvement beyond what is contractually agreed upon is ultimately up to the firm. Despite the program’s benefits and feasibility, the program has faced some resistance from the firms. Hiring professionals with a commitment to corporate social responsibility as well as professionals of color can improve firms’ likelihood of success and ability to meaningfully engage residents.

At the same time, the SFPUC is able to facilitate introductions to firms that CBOs are keen to meet. The organizations are then able to pursue initiatives that they might otherwise not be able to, since CBOs are often constrained in their ability to pursue new, innovative projects due to funding limitations. The resources committed by firms, particularly monetary ones, free them of these constraints. This latter point represents a key difference from traditional CBA agreements, insofar as what is negotiated is largely about what can be derived from the planning project, such as jobs and affordable housing.

This chapter focused on how to enhance the private sector role in environmental justice efforts, but it also holds lessons for the regulatory role of public agencies. It illustrates how utilities might rethink their role in the communities they operate. One model that reflects this strong regulatory role, as well as thinking about utilities as more than service providers, is that of the anchor institution. Anchors leverage their place-based role to generate opportunities for local residents. Using employment figures from the 1990s, Porter (ICIC 2002) shows the significance of large institutions like hospitals and universities to create a competitive inner city. Since then, “anchor institution” has been used to characterize public and private entities’ equitable community and economic development efforts. Anchor institutions have extensive operations—this can make them large employers, developers, and purchasers, oftentimes some of the largest in a given region (CEOs for Cities 2010). These institutions are also “rooted in place,” meaning that they are not likely to relocate, and they engage the residents where they are located.

Officials often cite regional competitiveness as a primary justification for infrastructure rebuilding. This chapter illustrates that infrastructure rebuilding provides opportunities to ensure that economic benefits of projects are more equitably distributed. Inequality hinders economic growth and threatens prosperity (Treuhaft, Blackwell, and Pastor 2011). The prioritization of social justice in contracts procedures in way to undertake rebuilding projects that benefit our cities’ most marginalized residents. These insights are not meant to promote further privatization, but rather to serve as a counteracting example of how some communities are working to challenge the consequences of decades of state retrenchment and the dominant forces of development.

7. Racialized Rebuilding: Revisiting the Impacts of Gray Infrastructure

Introduction

Across the country, utilities are transforming wastewater treatment plants. In 2011, Washington State’s King County opened the Brightwater Education Center on the site of their plant. It includes a community center, as well as indoor and outdoor programming areas geared toward children, teens, and educators. Two years later, the city of Los Angeles opened the Environmental Learning Center at the Hyperion Water Reclamation Plant. The center features environment-themed exhibits and community space to promote public education. Boise, Idaho has its own WaterShed Environmental Education Center equipped with a library and theatre. In 2017, it opened the adjacent, two-acre Boise Watershed River Campus, which features the largest concentration of public art in Idaho. The San Francisco Public Utilities Commission (SFPUC) is also on the verge of making significant improvements to its wastewater system under its Sewer System Improvement Program (SSIP). The program includes a major overhaul of its Southeast Treatment Plant (SEP), which treats 80% of wastewater in a historically African American neighborhood.

In this paper, I ask, how can infrastructure rebuilding reduce community vulnerabilities? I find that, despite its rising popularity in planning practice and scholarship, green infrastructure is being built to a limited extent, meaning that gray infrastructure will continue to primarily constitute cities’ urban wastewater systems. Yet gray infrastructure is also going through a transition—it is being redesigned for greater appeal, suggesting that infrastructure nodes that were once burdens can become neighborhood amenities. I use the rebuilding of the SEP to show how the incorporation of environmental justice in the upgrade has resulted in an increase in value of the plant to residents citywide as well as those in Bayview Hunters Point. But long-time neighborhood residents have expressed concerns about whether they will benefit from the new plant due to citywide gentrification and displacement trends, thus forecasting new inequities implicated in infrastructure rebuilding. These current discussions pertaining to gray infrastructure demonstrate the need to reevaluate its impact on neighborhoods and consider how the projects might link up to anti-displacement efforts. I conclude that the potential benefit that gray infrastructure can bring to a community needs to be understood in relation to greater neighborhood trends, and as part of ongoing monitoring and evaluation work.

Green and Gray Infrastructure

19th and 20th wastewater infrastructure is largely characterized as “gray,” in reference to the concrete and metal they consist of. In most cities, this infrastructure includes a vast network of underground and aboveground tunnels, storage basins, pipes, pump stations, and treatment plants. Gray infrastructure represents a great 20th feat that improved public health and protected the environment. Despite this, some features—particularly wastewater treatment plants—have created environmental burdens in the

communities they are sited. These have been described as Locally Unwanted Land Uses (LULUs) that create externalities in the communities where they are sited (Popper 1985). Consequences of LULUs include nuisances, hazards, and they negative impacts on property values. Environmental justice movements, including the one documented in Chapter 3, have protested the construction of these LULUs in their communities.

For many water scholars, green infrastructure is a promising departure from gray infrastructure. The American Society of Landscape Architects defines it as instances where “nature is harnessed by people and used as an infrastructural system.” In wastewater planning, green infrastructure includes rain gardens, planter boxes, bio-swales, permeable pavement, green roofs, and retention ponds. It is developed at all scales—from that of the home or bulb-out, to that of the region. It can also consist of public spaces, such as playgrounds and greenways. In addition to providing environmental benefits, it serves as an amenity that improves the physical quality and aesthetics of a community. It can also generate economic development opportunities, particularly through the creation of jobs, such as construction and landscaping. Green infrastructure contains health and safety benefits (Kondo et al. 2015) through the reduction of pollution, the provision of recreational space, and, in some instances, greater access to healthy foods. As such, it is often a central strategy of sustainability and climate adaptation plans.

For all their benefits, many have documented how green infrastructure can compound inequities, both in how it is distributed and as a facilitator of gentrification and displacement. For example, in Tampa, FL, disparities exist in the quality and size of green space located in affluent communities compared to those in poor communities (Wendel, Downs, and Mihelcic 2011). Observers are also concerned about what is happening in places where high-quality green infrastructure is built. Gould and Lewis (Gould and Lewis 2012) coined the phrase “green gentrification,” or a process that richens and whitens, to describe its exclusionary effects: “Without a clearly focused policy intervention,” they note, “in situ environmental improvements will tend to increase racial and class inequality, and decrease environmental justice” (114). To stem these adverse impacts, professions on the built environment need to create projects that are “just green enough” and contextual to the needs of low-income communities of color to ensure social equity and ecological improvement (Sister, Wolch, and Wilson 2010). For example, a network of small park sites, rather than a large, central park, has greater potential to reduce racial disparities in park access (Sister, Wolch, and Wilson 2010). This is achievable by repurposing vacant lots, utility rights-of-way, and underutilized facilities.

According to the literature, green infrastructure is considered an important way forward in the next wave of infrastructure planning, but it can compound inequities. Conversely, gray infrastructure is undesirable, both for its environmental effects and the burdens that it creates for residents. But gentrification and displacement in Bayview Hunters Point are turning common hopes and associations of green and gray infrastructure on their head. In what follows, I show the limited extent of green infrastructure investment in relation to gray infrastructure. I then discuss how gray infrastructure rebuilding is implicated in gentrification.

San Francisco’s New Green Infrastructure

Green infrastructure is a celebrated feature of many cities’ wastewater planning programs and San Francisco is no different. This aspect of SSIP is partially a reflection of the city’s commitment to reduce impacts on the environment. A respondent from a firm attributed the mix of green and gray infrastructure in SSIP to resident involvement: “There was a strong interest in making sure that it had elements of green infrastructure, in light of the city’s and large community interests in sustainability and in using new approaches to stormwater management.” The city’s green infrastructure projects under SSIP are called Early Implementation Projects. Eight projects are being built in each of San Francisco’s watersheds; each project is being monitored evaluated to assess their stormwater capture potential. The Holloway Greenstreet project described in Chapter 5 is one of the eight projects.

San Francisco, however, is investing little on green infrastructure relative to spending on gray infrastructure. Of the \$6.933 billion budget for the program, only \$57 million, or .6% percent, will go to green infrastructure (Daly, Brun, and Guinn 2015) . The remainder will go to treatment plants or other collection system improvements, project management, and land acquisition. Furthermore, none of the eight green infrastructure projects were built in Bayview Hunters Point, the community that has been most adversely impacted by the wastewater system. San Francisco is not alone in spending little on green infrastructure relative to gray infrastructure (Table 7). The cities of Cleveland, Louisville, Omaha, and Seattle all dedicated less than five percent of their wastewater capital improvement plan to green infrastructure. In dedicating nearly 70% of its infrastructure rebuilding plan to green infrastructure, Philadelphia is a strong exception.

Table 7. Green Infrastructure Spending in Select Cities.

| | Name | Years | Cost | Spending on GI | \$ of Total Spending on GI |
|----------------------|-------------------------------|-----------|----------|----------------|----------------------------|
| Cleveland | Project Clean Lake | 2011-2036 | \$3,000m | \$100m | 3.3% |
| Louisville | Project WIN | 2004-2024 | \$850m | \$47m | 5.5% |
| Omaha | CSO Omaha | 2009-2027 | \$2,081m | \$50m | 2.4% |
| Philadelphia | Green City, Clean Waters | 2011-2036 | \$2,400m | \$1,670m | 69.6% |
| San Francisco | Sewer System Improvement Plan | 2012-2032 | \$6,933m | \$57m | .8% |
| Seattle | Brightwater Treatment Plant | 2000-2014 | \$1,859m | \$31m | 1.7% |

Source: Adapted from Daly, Brun, and Guinn (2015, 8)

Several challenges inhibit green infrastructure development. In San Francisco, for example, physical limitations include limited water infiltration possibilities and the city’s topography (Kubick, Garcia, and Jencks 2012). The sewer system’s rate structure and bond constraints create financial challenges for green infrastructure building. San Francisco’s high rental rate and impacts on parking are also among the social issues utility officials have had to contend with. And for many engineers, technical and costs concerns predominate. An agency official described their reservations with green infrastructure accordingly:

At the end of the day, I'm practical. And I believe in cost-benefit. I live in the city, I'm a ratepayer. So, from my perspective, I'm all for green if it's cost-effective. I'm going to have a hard time if, let's say, it costs \$1 [to rebuild a pipe] but then you tell me it's going to cost \$100 [for green infrastructure]. I live in SF and would love to see my street be green and to have plants but does it make sense for the PUC to maintain it and own it forever? I'm not sure I would agree with that.

Green infrastructure will likely only hold a minimal place in a larger wastewater treatment system in San Francisco wastewater planning for decades to come. For this reason, it is important to understand the effects of gray infrastructure on the surrounding community, particularly in light of its large-scale renovation.

San Francisco's Gray Rebuilding

The SEP rebuilding is one of several large public and private redevelopment projects changing Bayview Hunters Point. In 2007, bus lines that previously ran down the neighborhood's 3rd street corridor were replaced by a light-rail system. The project included 18 new stations, as well as new street lamps, landscaping, reconstructed sidewalks and a repaved street. In a separate development project, Lennar Inc., one of the country's largest homebuilders, initiated a project to build an expansive project on the former sites of the San Francisco Giants' baseball stadium and the Naval Shipyard. The 750-acre development includes 12,000 residential units and 500,000 square feet of retail space. In 2002, Sophie Maxwell characterized these and other redevelopment projects across the city as a "huge opportunity" to create jobs for Bayview Hunters Point residents, particularly for young people to assume jobs in the areas of engineering, city planning, and construction, noting that "The city should be about planning for people" (R. Gordon 2002). The upgraded SEP will also form part of this neighborhood change.

The plant's redesign incorporated neighborhood feedback. As part of the 2010 master plan to upgrade the sewer system, the agency consulted with advisory bodies, including Southeast Community Facility Commissioners—a community advisory committee—the San Francisco Planning and Urban Research Association, and the Sustainable Watershed Alliance (Chiu et al. 2010). Resident feedback was collected through civic entities such as the San Francisco Arts Commission Design Review and the Planning Department's Better Streets Plan (San Francisco Planning Department 2015). A Southeast Digester Task Force also advised the agency on the biosolids digester facility project at the SEP. A project engineer pointed out the importance of community input on the SEP design:

We always say that we're not necessarily looking for input on technical work—that's why you hire a whole bunch of engineers from around the world to do it. But what we do look for [is] what are your concerns about the plans? What do you want to see? Architecture is a huge one. How is the plant going to interface with your neighborhood in the future? A lot of it is reassuring the community that we are designing the plan to get rid of odors from the digesters.... There is not a lot of room for input on the technical

stuff, because it is very technical and complex, but when it comes to how things will look we do like going out and showing images of what we're proposing and coming back a couple months later and saying, here's what we did do.

New plant features will consist of “state-of-the-art technology” that creates a robust system of controls—fans, pipes, filters, etc.—to capture air around the plant. The digesters, which historically had floating covers, will have fixed roofs. These new features address some of local residents' longstanding concerns.

The plant's layout has also been reconfigured to reflect community concerns. The digesters, which are currently located less than 100 feet away and across the street from residences, will be relocated 1,000 feet from the closest home (L. Johnson 2015). The renovation will also include new vehicular routes and entrances to decrease resident exposure to traffic and diesel particulate matter. The plant's office buildings will have windows that are going to line the street, rather than be located inside the plant as they currently are. The perimeter wall will be moved back, to be replaced by a “passive security system,” or features that create a subliminal barrier. This change will reduce the need for walls and fences that, according to a respondent, makes it look like a prison and shrouds the plan in mystery.

The new SEP designs also place emphasis on improving how residents directly engage the Facility. Under the 1969 Art Enrichment Ordinance, 2% of the gross construction cost of civic buildings and infrastructure must be dedicated to funding and acquiring artwork for new civic facilities or spaces.²¹ Several locations for the art have been scoped in the design plans, including installations that are inside the plant and on its outside perimeter (Figure 20). Architectural guidelines of the plant will guide the design of a new visitor center for tours, as well as sidewalk and street improvements. Green space will collect stormwater in the plant's vicinity. The new plant will provide better working space for employees, too, who will enjoy a campus quad. And the intersection of Jerrold and Phelps will be designed to serve as the hub for interfacing with the community. It will also include a One Water Visitor's Pavilion, a place where community can learn about the SEP, neighborhood impact. The One Water theme aims to capture the idea that water, sewer, and energy come together at the SEP.

²¹ San Francisco is one of many cities to adhere to an arts requirement, including Raleigh, Seattle, and New York.

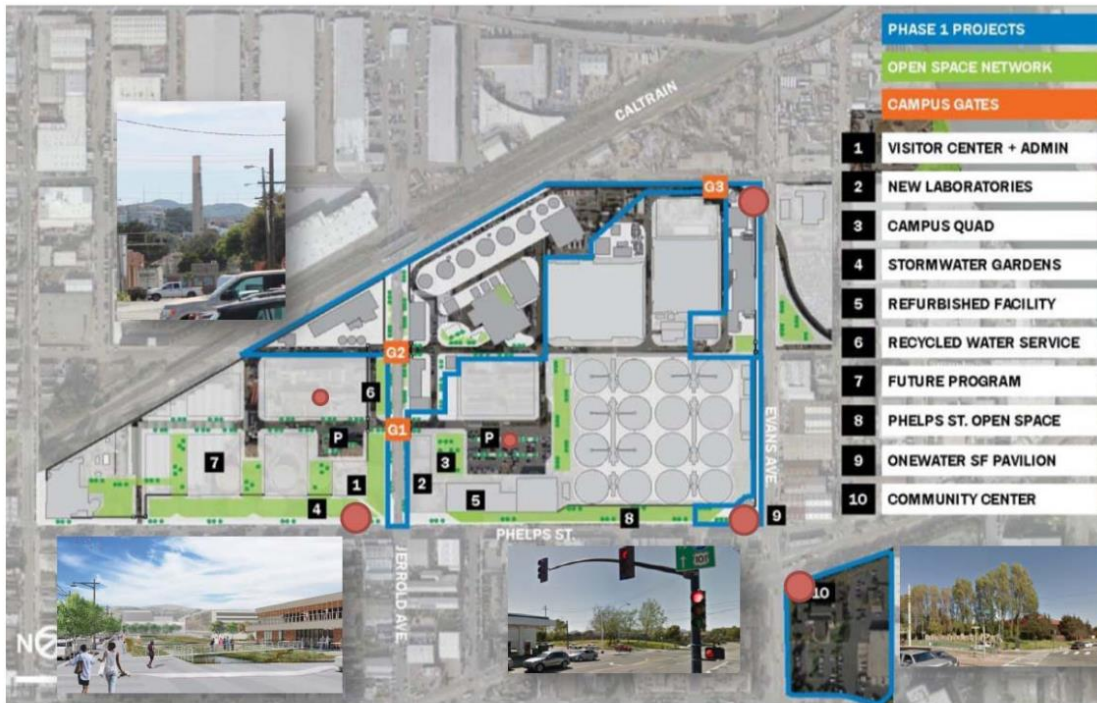


Figure 20. Potential locations of public art on the site of the new Southeast Treatment Plant.
Source: Colwick (2017)

Combined, these changes aim to create a treatment plant that residents appreciate and visit rather than avoid. Public information materials characterize the new plant accordingly; the rebuilt SEP will be “a start of the art resource recovery facility, a City destination, a proud neighborhood asset and an attractive workplace” (SFPUC 2018). Officials are reframing the plant in Bayview Hunters Point from a facility that burdens to one that is purposeful and engaging. A consultant explained that considering it a resource recovery facility—in reference to its ability to turn dirty water into clean water—is something that residents can appreciate: “I’d like to think it’s possible for the community to be proud of what they host, there’s a responsibility so the facility doesn’t negatively impact the community.”

The SECF: Fulfilling the Mitigation of 1986

In addition to creating a better plant, officials have recommitted the agency to meeting the goals set forth under the Mitigation Agreement of 1986. Under the Agreement, the SFPUC built the Southeast Community Facility (SECF), a community center, to compensate for the siting of the treatment plant in the neighborhood. Community members and agency officials acknowledge that the original goals set forth under the Agreement were not fulfilled and are now working to remediate the shortcomings. In 2014, the SECF underwent renovations. This included building repairs in 2014 on a newly opened part of the building, called the “Phelps Wing,” which included a conference room, classrooms, and education technology (*San Francisco Examiner* 2014). It also welcomed new tenants, Five Keys Charter School, which works with youth and adults to obtain their GEDs and high

school diplomas. But after building assessments, the agency found that the building would need additional, extensive repairs. It undertook an extensive community engagement effort to identify residents' preferences for remodeling the existing SECF or building a new community center one mile away from the existing SECF (Citizen's Advisory Committee, n.d.).²²

Community engagement efforts included a survey taken by more than 1,000 residents, two thirds of whom live within the zip code where the SECF is located. Forty-five percent of those surveyed identified as African American and 40% had lived in the neighborhood for more than 20 years. Seventy one percent of respondents preferred a new facility. When it opens its doors in 2021, the new facility will include large meeting and event space, workforce development and education programming, increased child care capacity, and 3-acres of recreation space (Figure 21). It will be accessible via public transit, addressing the longstanding critique of inaccessibility of the original SECF.



Figure 21. Rendering of proposed Southeast Community Facility.

Source: San Francisco Public Utilities Commission (San Francisco Public Utilities Commission 2016b)

The agency has also committed itself to improving its relationship with the SECF Commission, the center's community advisory committee, as well building operations and maintenance. In an MOU, SECF Commissioners and the SFPUC officials asserted their commitment to work together and in service of the neighborhood. Recognition of the mission, common goals for building maintenance and commission work, and staffing are among the key elements of the MOU. Two new SECF subcommittees were created to support SECF renovation and programming moving forward: the Community Innovation and the Facilities and Design committee (Ellis and Manzone 2017).

²² The engagement effort included 2,400 doors surveys, 45 public meetings, as well as 27,000 website impressions.

Combined, the technological and design improvements to the SEP, as well as the recommitment to the Mitigation Agreement of 1986, will create a facility that does not burden residents as it did in the past. These changes will blend in with other redevelopment projects taking place across the neighborhood. Carolyn Chiu, an SFPUC official noted, "We are in a neighborhood that could use some improvement... I think [SSIP] could be a catalyst for that. There's a lot of change happening with new businesses and homes coming in. We just want to be sure that we blend in with it" (L. Johnson 2015). The improved plant thus requires a reconsideration of the impact of gray infrastructure on historically marginalized residents.

The Neighborhood Impacts of Rebuilding

Rebuilding as Burden

Bayview Hunters Point residents articulate the potential negative consequences of redevelopment in two ways: as a burden and as an opportunity. When described as a burden, residents have taken account of the additional sewage that is sent to a broken-down treatment plant. They voiced concerns about increases in flows from across the city and from new development in the neighborhood. Loretta Hickman, a resident of Bayview Hunters Point, was critical of what the sewage meant in relation to redevelopment happening in the neighborhood: "I want to understand how they're going to fix up Third Street so spectacular and they got this s-- house over here and people can't be breathing. You got to give people a chance and not put sewage in the middle of a neighborhood and think everything will be all right" (Finnie and Sward 2002).

Residents also have been critical of the burden created by the construction process, which will create noise, pollutants, and inconveniences. The new biodigesters will require a 12-acre construction staging area on both on-site and off-site properties (San Francisco Planning Department 2015). Five hundred workers are expected at the SEP for a duration of 17 months at the height of the construction period; 200-250 truck trips per day are expected for the excavation portion of the rebuild; and 50 truck trips will be taken during non-peak construction times. During the transition from the current biosolids treatment system to the new one, both the new and older treatment systems will be in operation for two to three years. The construction plan also involves the demolition of approximately 110,000 square feet of structures (San Francisco Planning Department 2015). The Central Shops lot, which provided fleet services for city agencies, has three buildings that will be demolished to create room for the rebuilt plant, and the site of a San Francisco Department of Public Works asphalt plant (non-operational at the time) has also been transferred to the SFPUC. This will make room for a new biosolids digester facilities that totals approximately 200,000 square feet.²³ A neighborhood resident pointed out the additive consequences of construction, since other redevelopment projects will be simultaneously taking place in the neighborhood:

²³ In some respects, SSIP is another expansion. The footprint and treatment capacity of the plant will increase upon program completion (Appendix D).

The time to do this construction is going to put such a strain on this community... Because of construction, because of the diesel trucks. It's not just the plant. Hunters Point Shipyard [development] is happening, there's going to be construction throughout the neighborhood. So, the community is feeling impact before they feel the benefit. And a lot of people are worried that folks won't even be around anymore, because of gentrification, to experience the benefit.

The respondent raises an additional critique: although long-time residents will experience the consequences of additional sewage treated at the plant and the burden of construction, they may not experience the benefit.

SSIP Engineers and planners have worked to change the relationship between the redesigned SEP and the community but residents are now concerned about who that community will consist of. Citywide gentrification and displacement trends are encroaching in a long-neglected area. What had been known as an African American community is currently a neighborhood with an approximately equal mix of Latino and Asian residents. The new residents to the neighborhood tended to be first-time homebuyers. These were often mixed-status immigrant families with a primary language other than English. But class composition of the neighborhood is changing once again. San Francisco's status as a "strong-market city" that is fueled by knowledge economy has spurred a highly racialized and classed "return to the city" movement (Hutson 2015). White people are moving into the neighborhood at exponential rates and housing prices have soared. Derrald Etheley, vice president of the local NAACP, pointed out the lack of discussion around African-American out-migration: "You can't say that the majority of people here is black - that's not the case anymore. It hasn't been the case in some time, but nobody really wants to own up to it." (Knight 2011). Figure 21 is a map of San Francisco's displacement and gentrification trends. The SEP is located at the edge of a tract with "unreliable or unavailable" data. The tract adjacent to it has "ongoing gentrification/displacement," suggesting that the area surrounding the plant is being affected by citywide trends that exclude African Americans.²⁴

²⁴ The proportion of African-Americans in San Francisco has been declining since the 1970s. It peaked in 1970, at around 88,000 residents. By 2010, it had declined by 35.7 percent, down to 50,768 and comprised just 6.31 percent of the city's population (San Francisco Department of Public Health 2014). This displacement has contributed to creating what some officials and residents call "African-American outmigration." A taskforce comprised of city officials, residents, and issue experts issued a call to action in a 2009 report indicating that the city must take proactive measures in the areas of education, housing, and jobs and education development, among others (Mayors Office of Community Development 2009). The report's key findings included: The number of African-American families in San Francisco has declined at a disproportionately greater rate than non-family African-American households; In 2000, one quarter of African-Americans lived in poverty, more than twice the number of non-African-Americans; and the unemployment rate among African-Americans in the labor force from 1990 to 2005 was consistently over twice that of non-African-Americans.

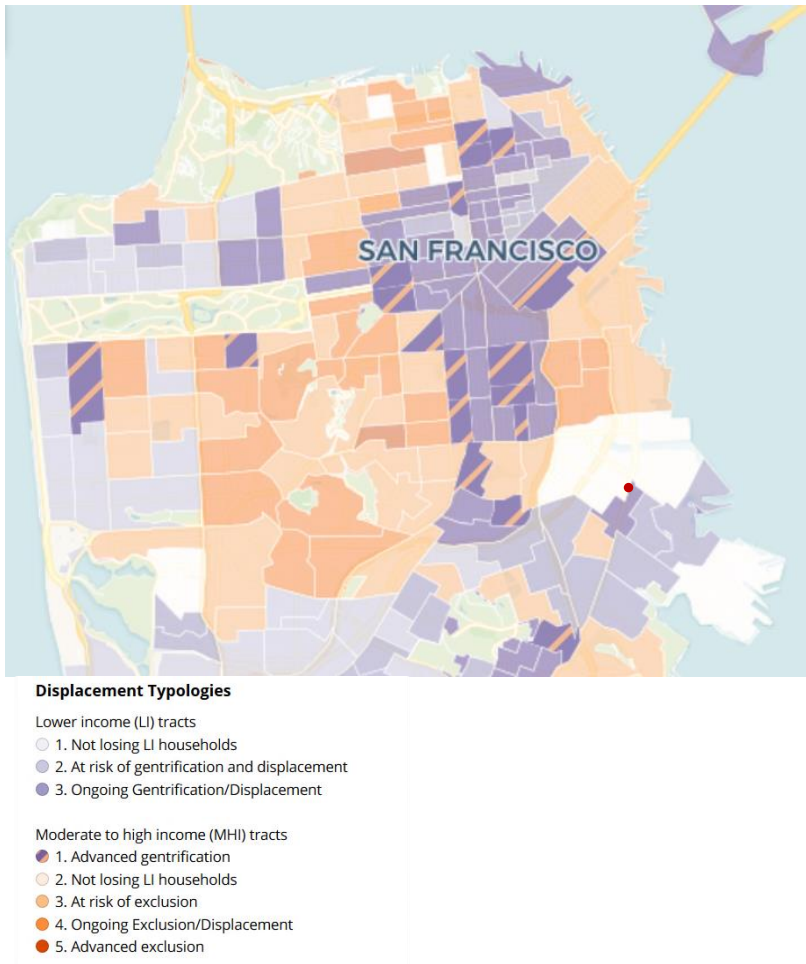


Figure 22. Displacement and gentrification in Bayview Hunters Point. The census tract adjacent to the Southeast Plant is undergoing “advanced gentrification.”

Source: Chapple and Zuk (2015)

(Red dot, added by author, indicates location of the Southeast Treatment Plant.)

The plant renovation is thus implicated in gentrification and displacement trends, raising questions about the role of the rebuilding process for the neighborhood’s future. A local small business owner describes how the problem of gentrification and displacement creates two groups of people in relation to the plant:

There is a language that I use about preexisting communities. These are the folks who have endured the disproportionate impacts for decades. For that subset of folks, they are in my mind the first-person beneficiaries, they are my priority. There’s a next tier of folks who are now just getting there. Ok, they’re realizing, your burden is at a minimum because the thing that’s being constructed there now is a community benefit in and of itself.

This respondent points out that, in the future, the new plant will not be considered a burden. In fact, the opposite will be the case: the SEP’s new open space, art installations, and technology that will reduce the plant’s odors will create a community asset. The new

community center will enhance the redevelopment project's value. For this reason, those invested in the plant's rebuilding are approaching it as an opportunity to create economic opportunities for Bayview Hunters Point residents.

Rebuilding as Targeted Opportunity

Even as upgrades to the SEP are forming part of larger course of gentrification and displacement, some officials and residents conceive of the upgrade as a vehicle to create opportunities for Bayview Hunters Point longtime residents. An agency official pointed out that this can happen through community efforts and, in particular, programming at the new SECF:

There are people who fear this as a gentrification project. And they don't want to any change or improvements... But I think you have an equal sized population saying that this is an opportunity to shape how this community center and greenhouses are developed, to shape who gets access to this space, to ensure that targeted populations have services there... Talking about it, having some intentionality around it, naming it, and doing that in partnership with the community can hopefully create some mechanism to ensure that people who really need the services are getting the services.

A targeted approach can help ensure that the most vulnerable residents benefit from the upgrades. This intentionality can also be built around the agency's parallel community benefits and environmental justice effort, such as use of its Triple Bottom Line tool. One way respondents discussed the possibility of leveraging the redevelopment project to create opportunities for local residents is through the development of career pathways for local youth. A neighborhood resident noted that, given the extent of gentrification and displacement, jobs and other economic opportunities are a critical way to respond to the problem:

Building that infrastructure doesn't match the speed of displacement... The most practical, real-time solution to addressing inequality is economic investment and development [through SSIP]... It's still a little behind the eight-ball but if we think about how quickly the private sector moves, that might be our only way to address a fast-moving problem like displacement.

Residents and officials will need to work together to ensure that those who benefit from its new policies and programs are among the most marginalized. Targeted inclusion will require the ongoing participation and empowerment of the agency's citizen engagement committees—including the agency's Citizen's Advisory Board and the SECF—which themselves are legacies of neighborhood organizing efforts. If this intentionality is not built in SFPUC's community work, the project risks further marginalizing African Americans and benefitting the growing influx of more privileged residents.

Workforce pipelines

One way in which officials might create long-term opportunity for local residents is through its workforce training and development programs. This strategy is a reflection of Gordon et al.'s (2011) “high road” approach in the utility sector, which involves promoting new training programs that offer career pathways and, ultimately, family-sustaining jobs for workers. It also means creating a work environment that supports employees of color and at all professional levels in the sector. The jobs created in the construction of water infrastructure are good jobs for several reasons. They tend to be well-paid, stable jobs, in part due to their high unionization rates. In 2017, 10.7% of wage and salary workers were members of unions in the United States, compared to a rate of 34.4% for public sector workers (Bureau of Labor Statistics, U.S. Department of Labor 2018). Unions often have formal apprenticeship programs and they enable workers to participate in labor management programs. The highly-regulated water industry also imposes requirements for good working conditions through contracts that adhere to local, state, and federal labor standards such as local hire ordinances or minimum wage requirements. Unfortunately, people of color are very underrepresented in the water infrastructure sector (E. Gordon et al. 2011). The wide range of jobs requiring middle-skilled workers presents an opportunity to incorporate these members of our communities.

To undertake this approach, the SFPUC commissioned a value-chain study to identify opportunity for “targeted businesses,” defined as minority, women, disabled, small and local businesses. The study called for a strong, proactive role of local government to develop robust targeted business programs with monitoring and outreach activities. It also listed the various career opportunities that are created through wastewater infrastructure operations and maintenance and across levels of educational attainment (Figure 23). Careers are grouped in four areas: design, materials and components, construction and installation, and maintenance and operations. The type of education needed for jobs in these areas vary from less than high school to a master’s degree. The report indicates that all jobs in the design area require an Associate’s degree or higher, while those in other there are employment opportunity areas for individuals who have a high school or less than high school education.

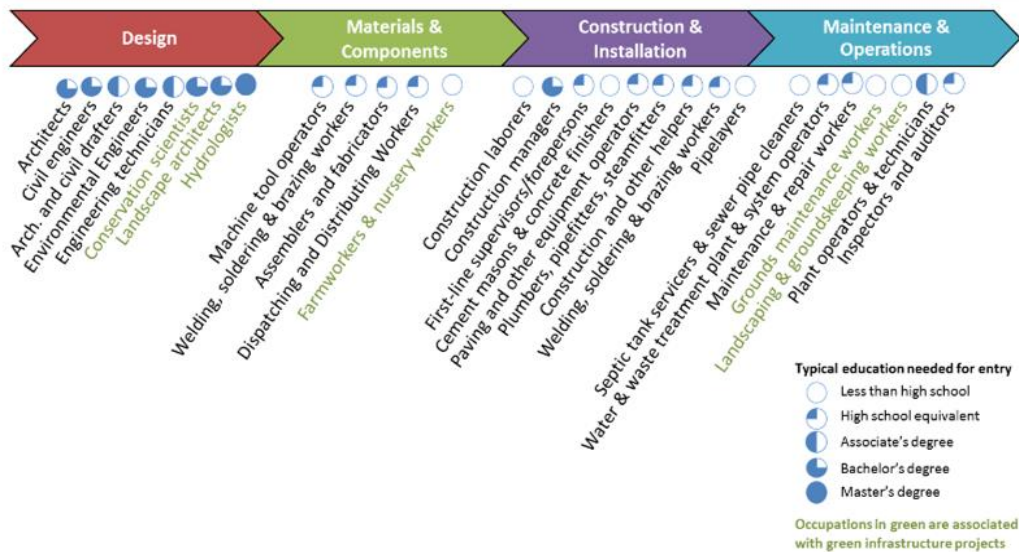


Figure 23. Career pathways in wastewater infrastructure.
Source: Daly, Brun, and Guinn (2015, 34)

Even though educational attainment barriers may not exist, however, other factors can prevent local residents from accessing these jobs. Many residents do not have access to information about prospective jobs. For example, some respondents noted the role that nepotism plays in city government jobs—family members or friends already within the sector inform prospective applicants when opportunities come up and, at times, even influence hiring decisions. Other challenges can arise, too, including lacking the structural support to successfully complete training programs. To respond to these challenges, officials have taken a lead role in BAYWORK, a regional collaborative of 77 water and wastewater utilities working together on workforce development efforts. Their convenings include educational institutions—particularly community colleges—that can provide students with support to participate in training programs. The collaborative also developed a website that lists resources and events for prospective applicants.

The agency has also focused on recruiting for skilled trades through internships, apprenticeships, and pre-apprenticeship programs (Figure 24). In the summer of 2016, more than 1,000 youth participated in internship or other workforce development programs. Thirty-seven percent were from Bayview Hunters Point, 45% were over the age of 18, and 35% were African American/Black. The agency’s workforce development approach has precedent. Under the Mitigation Agreement of 1986, 9916, a training program, was created for Bayview Hunters Point residents to work at the SEP. It was initially established in the 1980s, but it became defunct. Agency officials brought it back in the 2000s. A separate four-year apprenticeship program exists at the SEP. For those jobs that require specialized training, the agency signed a Project Labor Agreement with the San Francisco Building and Construction Trades Council.²⁵ This involves partnering with unions and contractors to

²⁵ The PLA was an extension of a previous PLA under the SFPUC’s Water System Improvement Program signed in 2007.

create training opportunities for workers. Unions include Carpenters Local 22, Operating Engineers Local 3, and Laborers Local 261. Skills jobs include piping, concrete form construction and minder tender training, cement masonry, and ironworkers. They also partner with CityBuild, a city construction apprenticeship program, for training. "I love it," Alfonza Merritt, a program participant, said. "I have steady work. I am always telling people in my neighborhood to go to CityBuild and the Mission Hiring Hall. In construction, you can make a decent wage and support your family" (Burton 2017).

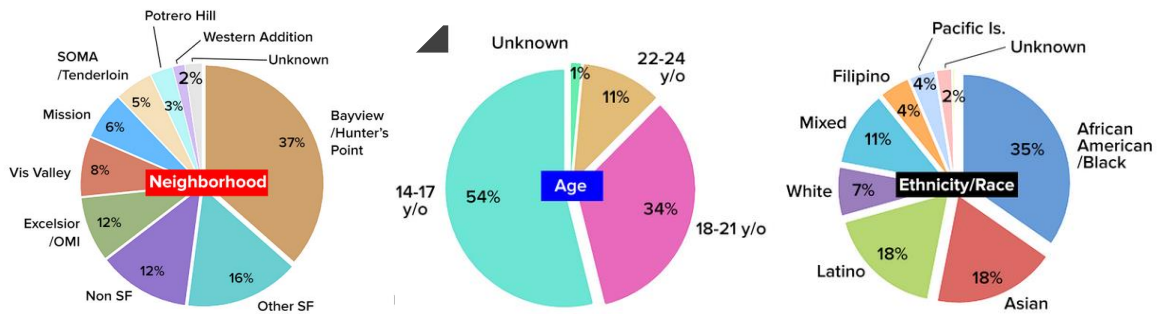


Figure 24. Neighborhood and demographic data of workforce development program participants.

Source: San Francisco Public Utilities Commission (San Francisco Public Utilities Commission n.d.)

The workforce development efforts will not just benefit future workers and their families—it is essential to utility’s future operations. In 2009, the BAYWORK consortium undertook a survey of participating organizations that found that it would will need a combined 677 workers in the following five years in “mission critical occupations.” (BAYWORK and Centers of Excellence 2009). Six hundred of those positions will need to be filled due the retirement of current employees. More than half of the organizations indicate that they struggle to identify qualified applicants for these positions.

Discussion

Green infrastructure is all the rage in many wastewater plans for its potential to reduce environmental impacts and create other amenities such as recreation space. Yet green infrastructure can also harm residents by contributing to gentrification and displacement. This chapter illustrates that gray infrastructure is also implicated in these neighborhood trends. The extensive improvements to the plant and incorporation of environmental justice principles in its new design hold important implications for the infrastructure planning process and for residents.

The next iteration of the SEP is expected to augment the facility’s value for residents citywide and in Bayview Hunters Point. This is due to the improved technology, layout, and design that will lessen the adverse impacts Bayview Hunters Point residents have historically struggled with. The renovated plant will create new amenities for neighborhood residents, such as a pavilion, visitor’s center, and green space. Officials are also setting the stage for a changing, more dynamic relationship between the plant and local residents by reframing the facility as a destination, resources recovery facility, and campus. It is

important to consider here that similar promises of an innocuous plant were made to residents when it was expanded in the 1970s. The big difference between the two eras, however, is that the neighborhood was being distressed in multiple ways during the first expansion. Discriminatory zoning, racist housing laws, and the shuttering of the Naval Shipyard converged to have disastrous consequences. Conversely, the present day rebuild forms part of a larger suite of redevelopment projects and rising property values.

The future holds no guarantees on the extent to which local residents will benefit from these plant improvements. The historic decline in the city's African American population and accelerated gentrification and displacement trends in Bayview Hunters Point have prompted residents and officials to consider—who will the improved plant benefit? If longtime residents are unable to experience this positive change, then the plant may be implicated in new patterns of urban exclusion.

One way to mitigate this potential impact is through career pathways for long-time, low-income residents. Yet legitimate questions are to be asked here about the extent to which targeted workforce programming can effectively help these residents withstand the effects of gentrification and displacement. Surely, the rebuilding project will not create career pathways for all Bayview Hunters Point residents that need them. And even if some residents do benefit, there are no guarantees that this employment opportunity will suffice to keep them in the neighborhood. Thus, in addition to developing career pathways, public works officials should monitor the effects of the plant, as well as create greater synergy between workforce development and anti-displacement strategies that are more capable of directly addressing the housing problem. Plans and policies that keep neighborhoods affordable, such as inclusionary zoning, affordable housing, as well as impact fees and set asides, are all relevant.

8. Advancing Engineering Justice

As cities work to improve the next generation of water infrastructure, they will have a role in undermining or promoting environmental justice. “Water 4.0” and a “soft approach” are among other frameworks that emphasize the need to decentralize water infrastructure and governance. My project shows the centrality of equity in building better 21st century wastewater infrastructure systems. This chapter describes how responses to claims of injustice aided the planning process and benefitted the community. I move on to a discussion of the conditions that enabled or challenged this progress, and I conclude with a synthesis of my contributions.

Learning from Engineering Justice

Several lessons can be drawn from efforts to confront structural racism through infrastructure rebuilding in San Francisco. Chief among them is the San Francisco Public Utilities Commission’s institutionalization of the Community Benefits and Environmental Justice policies. These were responses to community activism over the burdens created by the expansion of the Southeast Treatment Plant (SEP) in the Bayview Hunters Point neighborhood. Residents’ hard-fought battle against environmental injustices led to the institutionalization of interventions that address their concerns, including the Levels of Service (LOS), commitments in contracts, and a nicer SEP. An environmental justice analysis was also done to optimize how the agency prioritizes its environmental justice work.

Importantly, the policies carried on the legacy of change to neighborhoods across San Francisco. Only two interventions were specific to the SEP and Bayview Hunters Point—the environmental justice analysis and the redesigned plant. But other San Francisco residents will benefit from having a utility that aims to “be a good neighbor”—all neighborhoods win, for example, when SSIP is adhering to optimizing benefits to communities, as laid out by the LOS (Table 8). The spatial analysis conducted under the triple bottom line called attention to citywide disparities in green infrastructure. All San Francisco residents, organizations, schools, and small businesses are eligible to work with firms under the commitments in contracts program.

Table 8. Environmental justice interventions in five phases of planning.

| Phase | Environmental Justice Intervention | Specific to Bayview Hunters Point? |
|----------------------------------|---|---|
| Project Objectives | Levels of Service | No |
| Environmental Review | Environmental justice analysis | Yes |
| Project Selection | Triple Bottom Line | No |
| Project Implementation | Commitments in contracts | No |
| Monitoring and Evaluation | Redesigned plant | Yes |

Second, the efforts in San Francisco provide insight into the opportunities to promote distributive and procedural justice over the course of a capital improvement plan. Most environmental justice cases studies provide a discussion of only one or two aspects of a given project. An examination of five phases of SSIP shows how participatory justice is relevant to each phase, even as there can be great variation in the extent to which residents are engaged in the different phases of planning. The case also demonstrates that each phase can address one or both claims of distributive injustice—i.e., costs and benefits. For example, the phases of environmental review and project objectives were designed to equitably distribute costs and benefits, but the commitments in contracts in the project implementation phase was about redistributing a benefit. Which phases, as well as which costs, benefits, or participatory justice issues are addressed will be contextual and largely based on the priorities of residents and cities willingness to respond to these concerns.

Third, the findings from the case study chapters illustrate how an engineering justice approach differs from conventional approaches to engineering (Table 9). For example, in conventional engineering approaches, breakdown and regulatory mandates serve as the basis for infrastructure improvement. But the racism promoted by wastewater systems requires a response to the infrastructure’s historical legacy. The infrastructure impacts reviewed in conventional engineering are largely environmental and economic. When engineering justice, social, economic, and health impacts are also importance. Engineering justice is thus a way to engage infrastructure’s social and political context in a way that does not reproduce patterns of exclusion. Additional research can explore how conventional and justice approaches to engineering can coexist.

Table 9. Conventional Engineering vs. Engineering Justice Approaches.

| | Conventional Engineering | Engineering Justice |
|---|--|--|
| What is the basis for infrastructure improvement? | Breakdown, regulatory mandates | Historical legacy |
| What is being improved? | The infrastructure | The neighborhood |
| Who are the experts? | Engineers, designers, and planners | Community and economic development professionals |
| When do residents participate? | Siting | All stages of rebuilding and maintenance |
| What are the performance goals? | Technical reliability and service delivery | Optimization of infrastructure benefits |
| What infrastructure impacts are reviewed? | Environmental | Social, economic, health |
| What is the relationship between infrastructure and community? | Residents are ratepayers/users | Residents are engaged in infrastructure operations and success |
| What are the project’s economic benefits? | Regional competitiveness, jobs | Career pathways |

Finally, the pursuit of engineering justice achieved more than environmental justice outcomes—it also improved the planning process (Table 10). For example, the community benefits commitments in contracts program enhanced transparency and clarity in the roles and expectations for firms. At the same time, the program benefited the community through new resources that enabled CBOs to undertake projects that were previously hamstrung by conventional funding sources. The redesign of the SEP, which addressed residents’ longstanding concerns, will augment the plant’s overall value. The potential disparate impacts of plant resident on longstanding Bayview Hunters Point residents will need to be monitored over time.

Table 10. How Pursuit of Engineering Justice Benefitted the Planning Process and the Community.

| Planning Phase | How it benefitted the planning process | How it benefitted the community |
|----------------------------------|--|---|
| Siting/Expansion (1970s) | Better representation of capital costs | More comprehensive regulation |
| Project Objectives | Enhance organizational capacity | Activate representational governance |
| Environmental Review | Project buy-in | Synergize social justice efforts |
| Project Selection | Enhance methodology | Define group disadvantage |
| Project Implementation | Transparency and clarity in roles and expectations | Pursuit of priorities and innovative projects |
| Monitoring and Evaluation | Augment project value | Forecast impacts |

The ongoing implementation of SSIP presented a unique opportunity and some challenges to this research. The headway the utility has made in its rebuilding program meant that a great amount of empirical data was available for analysis. However, I am not able to make claims about the eventual impact of these social justice interventions. Rather, I cover what they consist of and what they aim to achieve. It is also important to note that, while I may have characterized these efforts as being justice-oriented, it is possible that local actors do not explicitly or consistently use the word “justice.”

Enabling Conditions

Forms of Participation

Participatory justice looked differently across the various phases of planning. For example, organizers and advocates were crucial to the creation of a Mitigation Agreement in 1986. But during the SFPUC’s efforts to upgrade the plant in the 2000s, advisory board members were influential in institutionalizing environmental justice at the agency. These accomplishments led to the creation of insider roles that led the environmental justice analysis. And community-based organizations and individuals have partnered with the agency through its community benefits commitments in contracts program. Table 11

provides a list of the various ways environmental justice concerns were raised and addressed throughout the dissertation.

Table 11. Ways Environmental Justice Concerns Were Represented.

| Examples | |
|-----------------|--|
| Outsider | Advocates Organizers |
| Advisory | Permanent advisory committees Ad-hoc advisory committees Review panels |
| Insider | Agency/firm staff whose role is to carry out environmental justice mandates Agency/firm staff who support and help advance environmental justice mandates Elected/appointed officials with community backing |
| Partner | Program participants |

The basis for change came from the work of advocates and organizers that pressured officials to mitigate and prevent environmental injustices. The institutionalization of interventions that aimed to respond to their concerns enabled the creation of influential roles of non-technical experts in the wastewater planning process. The role of advisors, insiders, and partners thus became critical to shaping latter interventions. These four forms of community participation and representation ultimately converged to create a project that promotes environmental justice. Other, more traditional forms of community engagement also form part of SSIP, although these were not closely examined. These include public education strategies and the solicitation of input. On their own, these methods can lead to tokenism or nonparticipation (Arnstein 1969).

There was fluidity in how individuals traversed these roles in relation to SSIP. For example, several people interviewed for this research once held the role of advocates or partner and became agency employees. Ascribing a fixed identify to individuals—particularly non-insider ones—limits how agencies and firms perceive the contributions of members of the community. Moreover, not all individuals who advanced environmental justice goals from outsider, advisory, insider, or partner roles were originally from Bayview Hunters Point. Some became involved in the issue through environmental justice efforts in neighboring cities of held advocacy posts elsewhere. All of these roles have been crucial to institutionalizing the environmental justice interventions but they do raise important questions about the potential tension and differences between direct resident participation how their priorities are represented by advisory board members and insiders.

This nexus of community participation challenges current characterizations of participatory justice as an apposition between the planning institutions and the communities affected by projects. The distinction often implicitly or explicitly reflects dualisms, such as white/of color, rich/poor, and professional/non-professional. The significance of these oppositional frames cannot be overstated: they enable us to identify intersectional oppressions, as well as the distinct contributions of, and impacts on, specific marginalized groups. But my analysis reveals that participatory justice must be more broadly conceived to

account for the multiples ways in which communities can shape planning processes either through direct or representational governance.

Organization Change

To create the conditions that enabled the pursuit of environmental justice, planning agencies and firms must undergo organization change. Environmental justice scholars have discussed how the social and political context, as well as the local organizing efforts, shape how planning institutions create a more equitable project (Figure 25). In other words, they account for dynamics external to a planning organization. Planning scholarship also often assumes that organizations are equipped to achieve social justice goals. In so doing, they place responsibility on individual planners or a larger group of community and private stakeholders, inadvertently conceiving of organizations as static. This dissertation’s findings suggest that we can reconcile racist institutions with the hopeful notion that they might engineer justice when they also undergo organizational change.

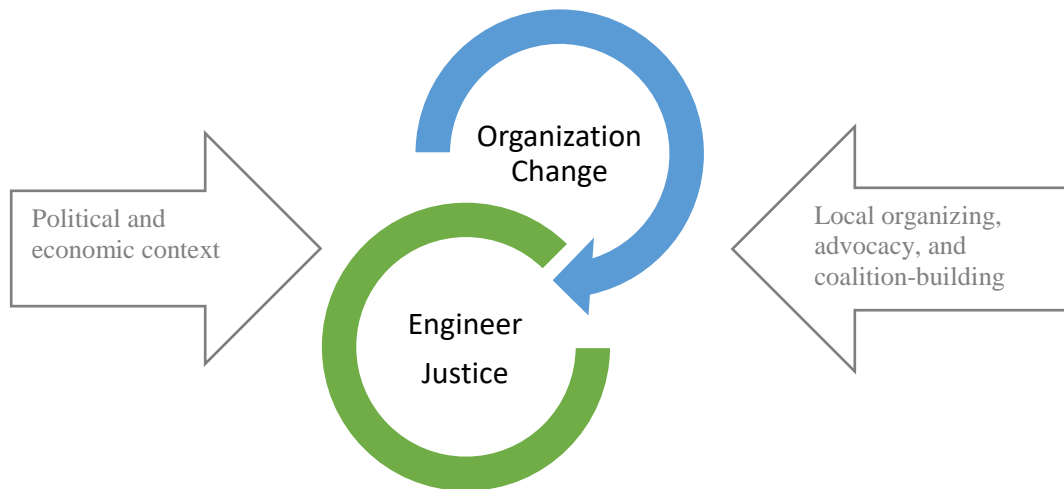


Figure 25. Organization change is essential to engineering justice.

In other words, infrastructure projects will only be socially just to the extent that planning organizations are equipped to promote these values. Organization theory is helpful in defining how agencies and firms might get there. It cautions that, without organization change, policies and initiatives can “sit on shelves” or be symbolic. Burke and Litwin (1992) identify both the causal links and its content of organization change, noting that change happens when external factors affect the organizational mission and strategy, leadership, and culture. As a result, transactional aspects of the organization—including its structure, systems, management practices, and climate—also change. These various forms of organization change are discussed throughout this dissertation as either an example of something that occurred or as the basis for tension in planning efforts. For example, as part of enforcing the Environmental Justice and Community Benefits policies, a new team of community and economic development professionals was created. Even large firms contracted to work on SSIP had to undergo some change, as the bidding process prompted them to make community benefits commitments to communities impacted by the city’s

operations. At a public Commission meeting that involved an update from the community benefits program, SFPUC General Manager Harlan Kelly pointed out the internal shifts:

I think that [agency officials] are coming around, because they understand that we are doing great work out there and this [environmental justice analysis] a way to document it. All the Community Benefits with our consultants that are working on projects that are also giving back to communities... We have an ability to effect areas that have been ignored, and I think everyone is getting jazzed up about, hey let's make a difference... We're changing as an organization (San Francisco 10-13-15, 1:13).

This internal work to advance equity has influenced a single planning project but it also involves the institutionalization of norms and principles that will affect projects to follow. These changes have the potential to calibrate an organization that pursues environmental justice in all future projects.

“Capacity building”—as commonly used in community and economic development literature and practice—is a helpful concept here. The phrase is typically ascribed to community-based organizations (Mitchell 2011). But my findings on organization change speak to something planning organizations are responsible for and have the ability to address. The Government Alliance for Racial Equity (GARE), a national network of government agencies working to advance racial justice, has a similar take. It provides support for the development of racial equity action plans. These plans account for the need to build organizational capacity: develop a racial equity team, supported by leadership and with leadership representation; lead implementation of Racial Equity Action Plans; and support leadership development skills that advance racial equity, with an emphasis on employees of color (Current et al. 20016). Indeed, an organization must internalize the values it seeks to infuse in planning projects.

Synergistic Movements

Wastewater infrastructure is heavily regulated by environmental policy. The pursuit of engineering justice in San Francisco's wastewater planning, however, points to its relevancy to many issues that are important to low-income communities of color (Table 12). For example, 1990s and 2000s activism around health disparities helped create a strong, organized base of environmental justice advocates. And the move to consider data on disadvantaged communities during the project selection process addressed issues pertaining to neighborhood revitalization and green infrastructure. With this information, communities can think creatively about which pressing needs to address in various phases of planning. Synergistic movements in infrastructure planning also has implications for planning institutions. It means greater inter-organizational coordination with other agencies that are also working to respond to pressing community concerns or implement existing policies. Partner firms may also want to consider building more interdisciplinarity in their professional teams to include people with backgrounds in planning, public health, and policy.

Table 12. Related Social Justice Efforts Across Six Phases of SSIP Planning.

| Planning Phase | Related efforts |
|----------------------------------|---|
| Siting/Expansion (1970s) | Education, workforce development |
| Project Objectives | Public health, workforce development |
| Environmental Review | Public health, workforce development, economic development, |
| Project Selection | Green infrastructure, neighborhood revitalization |
| Project Implementation | Educational opportunities, workforce development, small business opportunities |
| Monitoring and Evaluation | Public space, public safety, art, neighborhood revitalization, gentrification, displacement |

Challenges to Engineering Justice

Several challenges to engineering justice persist. One problem is the obduracy of infrastructure, a concept developed by Science and Technology Studies scholars which refers to infrastructure’s effect of concretizing social and spatial relationships. This applies in the case of the rebuilding of the Southeast Treatment Plant, where officials have cited several challenges associated to the relocation the treatment plant or a more spatially equitable treatment ratio. Inhibiting factors included attainability of the site, constructability, and distance from existing facilities, pump stations, and pipelines (“Review of the Biosolids Digester Facility Project by the Southeast Digester Task Force for the San Francisco Public Utilities Commission” 2010). A map of San Francisco’s large wastewater system shows the concentration of infrastructure in the city’s Southeast neighborhoods, including pump stations, transport/storage boxes, and a deep-water outfall (Figure 26). Agency engineer Carolyn Chiu pointed out the city’s density as a reason for not relocating the plant:

We can't just take it out and move it far away into some dense trees or unpopulated area... We live in a dense city, and that's just not possible. It's so unusual that it is here in the middle of the community, but every city has one. Ours is just more visible (L. Johnson 2015).

The obduracy of urban wastewater networks can be cited by local officials as reasons to constrain the realm of possibility for the redistribution of environmental burdens. Like San Francisco, all American cities also have an existing urban infrastructure to contend with.

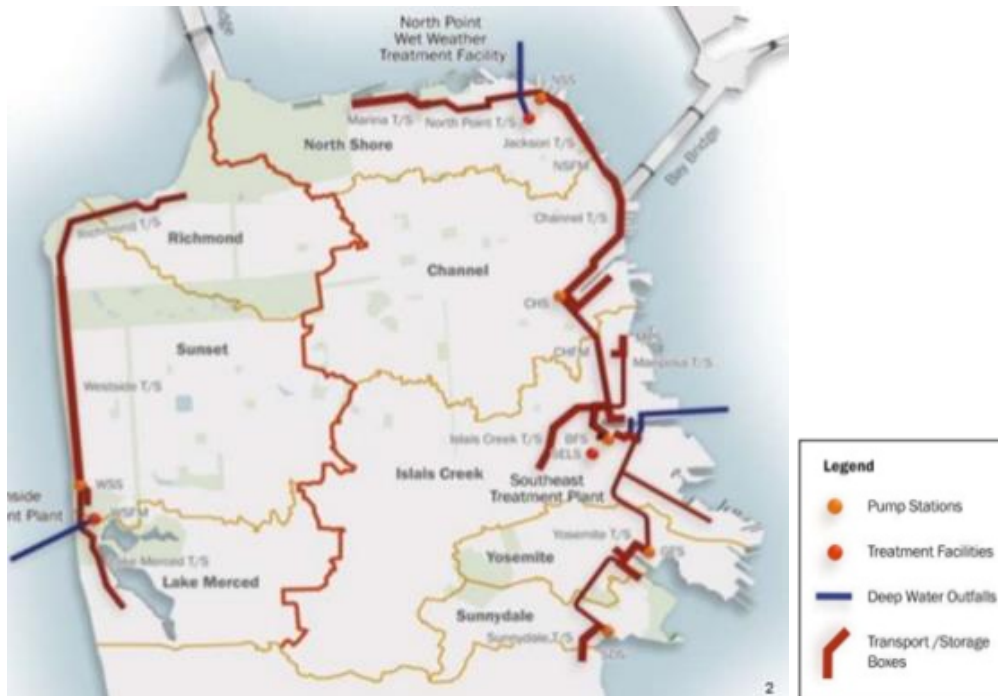


Figure 26. Wastewater system features are concentrated in San Francisco's southeast neighborhoods.

Second, many steps to engineer justice are not incentivized by local, state, or federal policy. For example, in the 1970s SEP under the Clean Water Act, local advocates had to request additional funds to pay for the Southeast Community Facility. And the environmental justice analysis was conducted to adhere to a state policy that does not mandate a consideration of the social justice implications of a project. As a third example, California's Proposition 209 prevents public institutions from using affirmative action. The steps utilities take to engineer justice is thus contingent on local activism. Which measures utilities pursue will likely be a reflection of community capacity and priorities. My findings do not preclude the importance and potential of greater federal involvement. Rather, I aim to highlight some of the possibilities for social justice that exist despite these constraints.

Relatedly, in most chapters, there are indications of challenges associated with what one interviewee called "mission creep," or going beyond the basic obligations of utilities to provide water, power, and sewer services. I provide examples of city officials' expressions of disinterest and skepticism of environmental justice priorities. Most often, these changes were viewed as extraneous to the mission of the organization. Some firm consultants also do not see the value in these interventions. The disinterest is the pursuit of justice through infrastructure rebuilding holds important implications, not only for the viability of certain social justice efforts and outcomes, but for the inner workings of the organization. Despite the many changes the SFPUC has made to address environmental justice concerns, it is still a public utility that promotes conventional engineering approaches. Internal resistance to the pursuit of social justice may be a contributing factor to the high turnover rate amongst the agency's community and economic professional, as a former employee suggested. They came to the utility with a background in organizing and was excited to advance the agency's progressive work but felt a lack of support from high level agency staff to do her work in a way that reflected her values. They left the agency soon after I interviewed them. Any

efforts to engineering justice must pay heed to how those charged with implementing these mandates are not isolated or burdened.

Contributions

This study makes three contributions to infrastructure planning. First, it advances a critical and substantive discussion of a prevalent but understudied phenomenon: repair. In concert with others, I show that repair is not a mundane activity. Rather, it involves designing infrastructure in conventional or new ways. Water scholars have pointed out the need to make drastic changes to the next generation of water infrastructure planning to better manage systems and protect the environment. But this project illustrates how infrastructure with seemingly universal public benefits can perpetuate existing social inequities. Indeed, environmental justice is implicated in wastewater systems' past and their future.

Second, the concept of engineering justice serves as a heuristic framework for communities and public works agencies. By pointing to the role of environmental justice in every phase of planning, as well as the cost-, benefit-, and process-based claims involved, I distinguish the multiple opportunities infrastructure rebuilding creates to address structural racism. This approach differs from common environmental justice analyses that consist of identifying the adverse impacts of a particular siting or land use decision on low-income communities of color. I also show how the institutionalization of interventions to pursue participatory and distributive justice can involve trade-offs or create new social justice concerns.

Finally, this research supports the mantra that equity lifts all boats. The Environmental Justice and Community Benefits policies were critical to responding to Bayview Hunters Point resident concerns but these policies also had broader, lasting impact. They improved the overall planning process by augmenting project value, enhancing transparency, and creating synergies with other policies. Moreover, as agency-wide policies, these institutionalized interventions—rooted in Bayview Hunters Point resident experience with injustice—will protect and create opportunities for residents citywide. This impact dispels the notion that environmental justice concerns are a special interest that gets in the way of rebuilding efforts.

“Congratulations on the mess you made of things/I'm trying to reconstruct the air and all that brings,” sings TV on the Radio. Environmental planning practices of the past have contributed to racial inequality. Cities undertaking wastewater infrastructure rebuilding efforts have an opportunity to help clean up this mess, particularly in light of intensifying public discussions on race. New planning approaches must be informed by vulnerable groups' relationship to the built and natural environment. Historic injustices associated to wastewater planning require this vigilance and action.

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Appendices

Appendix A

List of Respondents

| Name | Affiliation |
|---------------------|------------------------------|
| Leamon Abrams | AECOM/Parsons |
| Tom Birgmingham | Brown and Caldwell |
| Dion-Jay Brookter | Young Community Developers |
| Jessica Buendia | SFPUC |
| Jennifer Clary | Citizen's Advisory Committee |
| Steven Currie | SFPUC |
| Alaric Degrafinried | SFPUC |
| Rosey Jenks | SFPUC |
| Dwayne Jones | RDJ Enterprises |
| Martin Dorward | AECOM |
| Yolanda Manzone | SFPUC |
| Siri Datta S Khalsa | San Francisco Foliage |
| Raphael Garcia | SFPUC |
| David Minkus | Jefferson and Associates |
| Sam Murray | SFPUC |
| Alexander Quinn | Sustainable Economics |
| Mary Ratcliff | Bay View Newspaper |
| Stephen Robinson | MWH Global |
| Andrea Tacdol | Southeast Community Facility |
| Bessie Tam | SFPUC |
| Ann-Ariel Vecchio | Parson's Corporation |
| Villy Wang | BAYCAT |
| Renee Willette | SFPUC |
| Bryce Wilson | AECOM |
| David Wood | AECOM |
| Tracy Zhu | Citizen's Advisory Committee |

Appendix B

SSIP Goals, LOS, and Strategies - Final (August 28, 2012)

| Wastewater Enterprise Goals | Wastewater Enterprise Levels of Service | Strategies |
|--|---|--|
| Provide a Compliant, Reliable, Resilient, and Flexible System that can Respond to Catastrophic Events | | |
| | Full compliance with State and Federal regulatory requirements applicable to the treatment and disposal of sewage and stormwater. | Reduce the annual Central drainage basin (Islais Creek) combined sewer discharges (CSDs) by 88 million gallons (from 923 million gallons to 835 million gallons) and 3 occurrences (from 13 to 10). Increase the level of Biosolids treatment to Class A. |
| | Critical functions are built with redundant infrastructure. | Construct redundancy for Channel, North Shore and Westside forcemains. Upgrade treatment plants with redundant electrical feeds. Add redundant pumps at major pump stations. |
| | Primary Treatment, with disinfection, must be on-line within 72 hours of a major earthquake. | Design critical and new facilities for: Magnitude 7.8 earthquake on the San Andreas Fault; and, Magnitude 7.1 earthquake on the Hayward Fault. |
| Integrate Green and Grey Infrastructure to Manage Stormwater and Minimize Flooding | | |
| | Control and manage flows from a storm of a three hour duration that delivers 1.3 inches of rain. | Maximize protection of the City during level of service storm. Develop projects using an Urban Watershed Approach which employs the Triple Bottom Line. Develop Design Standards for Green Infrastructure that are informed by the performance of Early Implementation Projects. Evaluate and develop projects to reduce Combined Sewer Discharged on public beaches. |
| Provide Benefits to Impacted Communities | | |
| | Limit odors to within the treatment facility's fence line. | Construct state-of-the art odor control systems at facilities where treatment occurs. Make visual improvements at the Treatment Plants and Pump Stations. Use operational controls to minimize Collection System Odor. |
| | Be a good neighbor. All projects will adhere to the Environmental Justice and Community Benefits policies. | Provide community benefits including job creation, workforce development, contracting opportunities, and greening. Work with other City and County agencies to coordinate capital projects to maximize multiple benefits. Engage residents in locating green infrastructure where multiple benefits can be optimized using the Triple Bottom Line. |
| Modify the System to Adapt to Climate Change | | |
| | New infrastructure must accommodate expected sea level rise within the service life of the asset (i.e., 16 inches by 2050, 25 inches by 2070, 55 inches by 2100). | Site new facilities to accommodate or adapt to expected sea level rise over their life. |
| | Existing infrastructure will be modified based on actual sea level rise. | Develop and implement an adaptation plan for existing infrastructure to address expected sea level rise within the service life of the asset. |
| Achieve Economic and Environmental Sustainability | | |
| | Beneficial reuse of 100% Biosolids. | Upgrade Biosolids Treatment to Class A. |
| | Use nonpotable water sources to meet 100% of WWE facilities nonpotable water demands. | Incorporate conservation measures, stormwater, groundwater, recycled water, and/or graywater reuse facilities into projects. |
| | Beneficially use 100% of biogas generated by WWE treatment facilities. | Incorporate cogeneration or other beneficial methane reuse options into the Biosolids Digester Facility. |
| | Stabilize lifecycle costs to achieve future economic stability. | Provide Triple Bottom Line (lifecycle analysis) review of projects. |
| Maintain Ratepayer Affordability | | |
| | Combined Sewer and Water Bill will be less than 2.5% of average household income for a single family residence. | Plan and phase projects to ensure affordability and predictability for ratepayers. |

Appendix C

**TABLE 5
SUMMARY OF ENVIRONMENTAL JUSTICE INDICATORS**

| Indicator Type | EJ Indicator | Notes Regarding Disproportionality |
|---|--------------|---|
| Ozone Concentrations | | Citywide rates are all the same (and lowest statewide) |
| PM2.5 Concentrations | ● | Percentage of people in an area with a PM2.5 concentration at or above 10 µg/m3 is 3.7 times the citywide percentage |
| DPM Concentrations | | DPM concentrations below citywide average |
| Toxic Releases from Facilities | | Rate of exposure to toxic releases is consistent with other tracts citywide |
| Cancer Risk from TACs | ● | Percentage of people in an area with total cancer risk greater than 100 cases per 1 million people is 1.6 times the citywide percentage |
| Nuisance Odors | ● | Nuisance odors are a known issue for this neighborhood |
| Traffic Density | ● | Only an indicator for western census tracts near U.S. 101 and I-280 |
| Truck Routes | | Lower percentage of residents live near truck routes than citywide |
| Outdoor Noise Levels | | Lower percentage of residents live in an area of high outdoor noise than citywide |
| Traffic-Related Injuries | | Lower rates of injuries than citywide |
| Polluted Discharges / Impaired Water Bodies | | Census tracts in proximity to Bay, Golden Gate, and Ocean all have high rates |
| Drinking Water Contamination | | SFPUC water is some of the least contaminated in the state |
| Agricultural Pesticide Use | | Data not available for or applicable to BV-HP |
| Presence of Cleanup / Brownfield Sites | ● | While several neighborhoods have a higher concentration of sites, approximately one-third of all sites citywide are located in BV-HP |
| LUST Concentration | | LUSTs are most associated with gas stations, evenly distributed throughout City |
| Hazardous Waste Generators / Facilities Proximity | ● | Proximity score between 1.3 and 2.5 times the citywide average |
| Solid Waste Sites and Facilities Proximity | ● | Highest concentration in BV-HP compared to all other neighborhoods |
| Groundwater Threats | | Groundwater is not used as a potable supply in San Francisco |
| Zoning for Industrial Uses | ● | More than half of all industrial-zoned land in City is in BV-HP |
| Affordability Gap: Homeownership | | One of the lowest affordability gaps in the City |
| Affordability Gap: Rental | ● | Among the highest affordability gaps in the City |
| Rent Burden | | Citywide concern, with every neighborhood burdened |
| Percent of Housing Stock Affordable | | BV-HP housing stock almost five times more affordable than citywide stock |
| Prevalence of At Risk Foreclosure | ● | BV-HP foreclosure rate four times citywide average |
| Overcrowding | | Less overcrowded than citywide, and several neighborhoods more overcrowded |
| Displacement | ● | Percentage of BV-HP residents living in low-income tracts experiencing displacement is more than 35 percent greater than the city as a whole. |
| Housing Tenure | | Higher homeownership rate in BV-HP than citywide |
| New Housing Construction | | Not considered an indicator in and of itself |
| Housing Condition / Code Violations | | Lower rate of Code violations than citywide |
| Residential Mobility | | Similarly likely to move away as residents in City as a whole |
| Homelessness | ● | Citywide homelessness concentrated in Districts 10 and 6 |
| Residential Density | ○ | Most neighborhoods have a density at least double that of BV-HP |
| Motor Vehicle Access | | Higher car ownership rate than citywide |
| Public Transit Ridership and Score | ● | Less access to high-transit ridership streets than citywide |
| Bicycle Network | ● | Limited bike lanes, especially given geographic size of neighborhood |
| Walkability | ● | Most of San Francisco has low-to-moderate walkability, but walking is perceived as substantially less safe in BV-HP compared to other neighborhoods |

TABLE 5 (Continued)
SUMMARY OF ENVIRONMENTAL JUSTICE INDICATORS

| Indicator Type | EJ Indicator | Notes Regarding Disproportionality |
|--|--------------|---|
| Library Proximity | | Similar proximity rate to citywide |
| Religious / Spiritual Density | | Higher concentration of such facilities than citywide |
| Community Center Proximity | | Similar concentration of such facilities citywide |
| Academic Performance of Schools | ● | Some of the lowest test scores in the City |
| Recreational Area Score | ● | Markedly lower score than citywide, although partially offset by other facilities |
| Open Space and Trees | ● | Poor proximity and access to open space, among the lowest concentration of trees in the City |
| Child Care Availability | | Performs less well than citywide, but not disproportionately so |
| Average Child Care Burden | ● | Cost burden higher; higher percentage of children not receiving subsidies |
| Healthy Food Retail Proximity | ● | Much lower proximity score than citywide |
| Financial Services Proximity | ● | Much lower proximity score than citywide |
| Concentration of Alcohol Vendors | | Lower concentration than citywide |
| Poverty: % Below Two Times Federal Poverty Level | ● | Also indicated in standard and enhanced community screening |
| Unemployment | ● | Double the citywide rate |
| Earned Income Tax Credit | ● | Percentage of EITC filers in BV-HP is more than double citywide |
| Population of Children | ● | Percentage of households with children more than double citywide |
| Population of Elderly | | Lower percentage of elderly residents than citywide |
| Pre-Natal Care Rate | ● | Worst pre-natal care rate in the City |
| Low Birth Weight | ● | BV-HP census tracts among the highest rate of low-birth weight babies statewide |
| Asthma Hospitalization Rate | ● | Rate is 3 times the citywide average |
| Preventable Hospitalizations / Emergency Room Visits | ● | Rate is almost double the citywide average |
| Voter Turnout | ● | Markedly lower than citywide participation rate |
| Educational Attainment | ● | Rate of non-high school graduates almost double citywide rate |
| Linguistic Isolation | ○ | Only one BV-HP census tract ranks at or about 75th percentile citywide, but overall limited English proficiency population is greater than citywide |
| Violent Crime Rate | ● | Double the citywide rate |
| Property Crime Rate | | Close to the citywide rate |
| Community Resiliency to Climate Change | ● | Ranked least resilient citywide, with five other neighborhoods |
| <p>Symbol Key: ● Means this is an indicator of environmental justice concern ○ Means this may be an indicator</p> <p>NOTE: Bayview-Hunters Point is abbreviated BV-HP in indicator tables throughout this section.</p> | | |

Appendix D

Notice of Preparation of an EIR
June 24, 2015

Case No. 2015-000644ENV
750 Phelps Street

TABLE 1
KEY FEATURES OF BIOSOLIDS DIGESTER FACILITIES PROJECT

| Feature | Existing Conditions | Future with Project |
|--|---|--|
| SEP Size | ~40 acres | ~47 acres |
| Digesters | 10 digesters – 2 million gallons each ^a Distance to Closest Residence: <100 feet | 6 digesters – 1.33 million gallons each Distance to Closest Residence: ~1,000 feet |
| SEP Design Flow | 250 million gallons per day (mgd) (wet weather) ^b 85 mgd (dry weather design average) ^b | No Change |
| Solids Load | 182,700 lbs/day (2010); 280,000 lbs/day (2045) | No Change |
| Solids Treatment Process | Thickening Dewatering Anaerobic Digestion ^c | Screening Thickening Dewatering Thermal Hydrolysis ^d Anaerobic Digestion ^c |
| Biogas ^e | Production: ~1.3 million cubic feet per day Flaring: Routine | Production: ~2.0 million cubic feet per day Flaring: Emergency Only |
| Electricity Generated | 2 Mega watts | 5 Mega watts |
| Biosolids | Production: 16,360 dry tons (2010) ^f Classification: Class B ^g | Production: 24,000 dry tons (2045) Classification: Class A ^g |
| Daily Biosolids Haul trips (Annual Average) | 7-9 per day | 8-10 per day (2022-2045) ^f |
| Odor Control | Existing odor control does not contain odors from existing biosolids facilities to within the SEP property | Designed to limit odors from BDFF within SEP fence line |
| SEP Staffing Levels (plant wide including biosolids) | 280 staff | No Change |

NOTES:

- ^a The SEP has 10 digesters: 7 are active, 2 are used for storage, and one has been converted to a biogas storage facility.
- ^b Flows at wastewater treatment plants are often expressed in terms of dry weather and wet weather since rainfall can substantially increase flows. At the SEP, during dry weather the combined sewer system flow is essentially domestic wastewater, with small contributions from industrial wastewater and urban runoff. During wet weather, the combined flow of wastewater and stormwater is governed by storm patterns and intensity.
- ^c Anaerobic digestion is a method of treating wastewater solids using biological processes to inactivate bacteria and pathogens (a biological agent that causes disease or illness) and produce stabilized organic biosolids, biogas, and water.
- ^d Thermal hydrolysis process (THP) provides sludge pretreatment prior to anaerobic digestion. Essentially, the sludge is heated with steam under pressure, held for a specified time in order to destroy pathogens, and then pressure is rapidly reduced to rupture microbial cells.
- ^e Biogas is a byproduct of the bacterial digestion process and comprised mostly of methane and carbon dioxide.
- ^f In the “no project” scenario, the production of biosolids would increase from existing conditions (2010) to 2045 due to projected future increases in wastewater flows and loads; however, production of biosolids without the project would result in approximately 27,700 dry tons compared to 24,000 dry tons with the project. Associated with the expected increase in biosolids under the “no project” scenario, the SEP daily biosolids truck trips would also increase from existing conditions (2010) to 2045, but the proposed processes under the BDFF would enable the SEP to reduce the number of biosolids truck trips compared to the projected future growth baseline.
- ^g The Standards for the Use or Disposal of Sewage Sludge (Title 40 of the Code of Federal Regulations [CFR], Part 503), also known as the Part 503 rule, establish rules for biosolids application to land for different classes of biosolids. Class A biosolids contain no detectable levels of pathogens, low levels of metals, and do not attract vectors. According to the US Environmental Protection Agency Guide to Part 503 Rule, Class A biosolids are considered exceptional quality and have the fewest restrictions for land applications such as soil conditioning and fertilizer. Class B biosolids are treated but still contain detectable levels of pathogens. There are buffer requirements, public access, and crop harvesting restrictions for virtually all forms of Class B biosolids. Anticipated regulations may further restrict Class B biosolids use.