Title

Building Resilient and Sustainable Water Infrastructure with District Financing in Texas

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Publication Date

2024-05-01

Peer reviewed

LINCOLN INSTITUTE
OF LAND POLICY

Building Resilient and Sustainable Water Infrastructure with District Financing in Texas

Working Paper WP24MK1

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May 2024

Executive Summary

Climate change-induced extreme weather conditions and environmental disasters have elevated the importance of building resilient and sustainable infrastructure globally. This case study analyzes the use of special district financing in Texas as an example of a land-based financing tool for building resilient and sustainable infrastructure. The case of Bridgeland, an 11,400-acre master-planned community near Houston, Texas, is used to extract lessons for successful implementation of such a district financing tool.

The performance of Bridgeland's water infrastructure—drainage systems and water and wastewater treatment facilities—have exceeded industry norms and expectations. Bridgeland's homes and structures went undamaged during two recent historic flood events: the Tax Day flood in 2016, and Hurricane Harvey in 2017. In fact, the community's lakes took in the overflow from the regional watershed, Cypress Creek, enhancing its drainage capacity and reducing more severe flooding along the creek. Moreover, the stormwater detained in the lakes is treated and reused to irrigate common area landscaping, reducing reliance on groundwater reservoirs.

The use of special districts is largely responsible for the construction of such resilient and sustainable water infrastructure in Bridgeland. At the most basic level, special districts issue municipal bonds to borrow money and pay for infrastructure construction costs. However, as this case study demonstrates, not all special districts are created equal. The specific ways in which the tools are designed, implemented, and regulated largely determines their efficacy and fiscal health, and who pays and who benefits. Two types of water districts, Municipal Utilities District (MUD) and Water Control and Improvement District (WCID), were used to finance the water infrastructure in Bridgeland. A total of $332 million worth of bonds were issued between 2007 and 2022. Bond proceeds were used to build $268 million worth of water, wastewater, stormwater drainage facilities, and detention ponds, and to pay for the ongoing operation and maintenance of these infrastructures.

An in-depth analysis of the water districts' design and their regulatory frameworks reveals important lessons for designing and implementing a financially sustainable and equitable land-based financing tool. The case discusses these lessons in detail and evaluates the tool's potential as an equitable, efficient, land-based infrastructure financing strategy. The broader questions and critiques around the use of special districts for managing water resources and financing real estate developments are also addressed. The conclusion reached is that special districts are a double-edged sword whose impact depends on the specific contexts in which the tool is applied. When applied in an appropriate setting, special districts can be a balanced and equitable financing tool for building climate-resilient infrastructure

About the Author

Minjee Kim, Ph.D., is an Assistant Professor at Florida State University's Department of Urban and Regional Planning. She earned her PhD and master's degrees from Massachusetts Institute of Technology and has multiple years of experience working in local governments including the cities of Boston and Cambridge. She studies the relationship between real estate development and urban planning and writes about land value capture, large-scale real estate developments, exactions, negotiated developments, and urban public finance. Her works have appeared in high impact academic journals such as the *Journal of the American Planning Association, Journal of Planning Education and Research, Journal of Planning Literature,* and *Urban Studies*. She also frequently writes practitioner and policy-oriented publications for reputable professional and research organizations including the Lincoln Institute of Land Policy and Urban Land Institute. She has been recognized both nationally and internationally as an emerging expert in US land use regulation and zoning and has been working closely with the Lincoln Institute for promoting global land-based financing strategies.

Acknowledgements

I would like to thank the Lincoln Institute of Land Policy for providing financial support for this case study project. Specifically, I would like to thank Luis Felipe Quintanilla Tamez, Senior Policy Analyst at the Lincoln Institute, for his substantive comments on the earlier drafts and timely administrative support throughout the process.

The following individuals have generously offered their expert knowledge and time for this project, providing integral insights and feedback. I sincerely thank them for their invaluable contributions. I could not have written this case without their help.

- Mitchell Page, Partner at Schwartz, Page & Harding, L.L.P.
- Andrew Paynter, Technical Specialist at Texas Commission on Environmental Quality
- Dan Kolkhorst, Vice President of Land Development at The Howard Hughes Corporation
- Jim Carman, President of the Houston Region at The Howard Hughes Corporation
- Heath Melton, President of the Phoenix Region at The Howard Hughes Corporation

Two resources have been particularly instrumental in developing this case study. The 2018 ULI Case Study of Bridgeland (ULI 2018), and a white paper written by Michael G. Page and Howard M. Cohen at Schwartz, Page & Harding, L.L.P. (Cohen 2015). I feel indebted to the authors of these resources for the opportunity to learn from and build on their knowledge bases.

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Building Resilient and Sustainable Water Infrastructure with District Financing in Texas

Introduction

Shortage of water supplies, on the one hand, and flooding risks, on the other, have largely shaped the pace and geography of growth in Texas. These issues have not prevented or slowed the state's growth but have placed water management among the top issues to be addressed to meet the needs of a growing population. More recently, climate change and the ensuing extreme weather conditions and environmental disasters have added to the importance of ensuring a sustainable supply of clean water and sufficient stormwater detention and drainage capacity.

One solution to addressing the state's water resource and management needs, while also meeting the demand for new growth and development, has been the use of water districts. The Texas constitution was amended in 1917 to allow for the creation of water districts that would manage and strengthen water supply in rural and unincorporated parts of the state (Galvan 2007, p. 3069). Later amendments to the law and the passage of Chapter 54 of the Texas Water Code in 1971 allowed for the creation of a Municipal Utilities District (MUD), which opened the doors to using water districts for massive suburbanization on land that lay just outside of cities.

The use of special districts, like MUDs, for financing infrastructure is not unique to the state of Texas. Similar types of special district financing exist in other states under different labels, such as the *Metro District* (Colorado), *Community Facility District* (Arizona, California, Hawaii, Washington), *Community Development Districts* (Florida), and *Special Improvement District* (Colorado, Delaware, Montana, Nevada). Texas alone offers various types of special districts, with the most common ones being MUDs, Water Control and Improvement Districts (WCID), Public Improvement Districts (PID), and Tax Increment Reinvestment Zone (TIRZ).

This study analyzes the use of water districts—MUDs and WCIDs, in particular—to build water facilities and drainage infrastructure for large-scale master planned communities. The case of Bridgeland, an 11,400-acre master-planned community near Houston, Texas, is used to provide a concrete context in which the implementation of district financing tools will be explained. It analyzes the track record of Bridgeland's use of district financing tools in terms of: 1) financial and fiscal health of the district; 2) the efficacy of water management and flood control; and 3) the efficacy and equity implications as a land value capture tool. This case study also addresses broader questions and critiques regarding the use of special purpose agencies for managing water resources.

Description of the Problem

Water Management and Real Estate Development in Texas

Texas is referred to as a *private lands state*, meaning that the majority of land (95 percent) is held in private ownership (Lund and Smith 2021). Accordingly, much of the land and water resources are under the stewardship of private landowners. The state statute explicitly

"recognizes that a landowner owns the groundwater below the surface of the landowner's land as real property" (Texas Water Code §36.002).

Supply and control of water has remained a persistent challenge for Texas. The state regularly suffers from both floods and droughts, which have only gotten worse in recent years due to climate change. Illustratively, over the last 25 years (1998-2023), Texas had 66 disasters related to floods, coastal storms, and hurricanes (Texas Water Development Board 2022a). Between 1895 to 2017, there have been 12 historical droughts, with the most severe ones occurring between 2010 to 2015 (Texas Water Development Board 2022b). Accordingly, flood control and a sustainable supply of clean water resources are issues that must be addressed before any large-scale developments can take place in Texas, particularly in flood-prone areas.

The Texas Water Development Board manages watersheds and water resources through the delineation of Groundwater Management Areas (GMA). These areas were created "to provide for the conservation, preservation, protection, recharging, and prevention of waste of the groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water" (TWC §35.001). Each GMA comprises several Conservation and Subsidence Districts, the geographic units by which available groundwater volumes are modeled. Based on the results of the modeling, these Districts may impose limitations on the drilling of wells and the production of groundwater from these wells (TWC §36.116). In Bridgeland, the ground water permit issued by the Harris-Galveston Subsidence District defines the aggregate production of the four water wells that service Bridgeland. The total permitted production amount for Bridgeland was 15,500 million gallons for January 1, 2022, according to the permit, WP2021-4752. In addition to the four water wells, surface water (1,458 gpm) is also purchased from the West Harris County Regional Water Authority (TCEQ Districts Bond Team, August 15, 2022, p.3).

Management of floodplains and drainage systems, on the other hand, is more fragmented than management of watersheds and water resources. State law prohibits private landowners from "divert[ing] or impound[ing] the natural flow of surfaced waters… in a manner that damages the property of another by the overflow of the water diverted or impounded" (TWC §11.086). However, beyond this minimal boundary set by state law, flood control is largely left up to local governments and private landowners. Harris County is unique, as the Texas Legislature created a special purpose district, the Harris County Flood Control District (HCFCD) in 1937 in response to the devastating floods of 1929 and 1935. Given that this case study takes place in Harris County, the drainage system of Bridgeland is reviewed, approved, and monitored by HCFCD. The minimum elevation levels for building slabs are set by Harris County, requiring that residential slabs to be 18 inches above the 500-year floodplain as of 2023.

The Houston Metro Area

In the 1970s, the Houston area experienced an unprecedented rate of growth fueled by the oil boom. Illustratively, from 1973 to 1985, Houston's population exploded by more than 40 percent when many other cities were losing residents (Swartz 2023). This population growth consisted of upper- and middle-class households, affecting the demand for both new and high-quality housing (Smith and Ohsfeld 1979). As a result, new residential developments branched out into the

undeveloped and unserved extraterritorial jurisdiction (ETJ) outside of Houston. It is in this context in which MUDs began to spread in the Houston area. MUDs became available in 1971, and since then, Houston area developers have relied almost exclusively on MUDs to provide utility services (Peiser 1983, p.49).

The topography of the Houston metro area also makes MUDs an attractive and economic alternative. As one of the interviewed consultants noted, "Houston is flat as a pancake." Such a topography means that "expensive lift stations are needed in order to serve larger regional sewage treatment plants" (Peiser 1983, p. 50). MUDs, in contrast, serve a much smaller, confined area, reducing the need for higher line-haul costs.

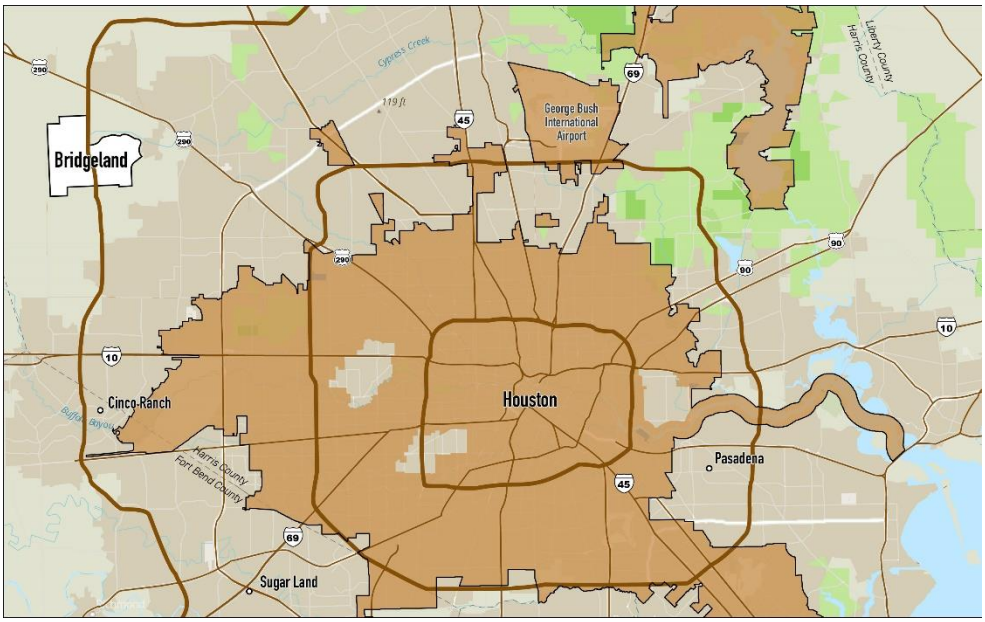
Houston's housing market came to a grinding halt in the mid-1980s with the collapse of the oil industry. Towards the end of the decade, the market recovered and has remained exceptionally strong ever since. The Houston-The Woodlands-Sugar Land metro area employment grew consistently, from 1.1 percent to 3.3 percent annual growth in the 1990s (TAMU Real Estate Center, January 25, 2009), accompanied by sustained population growth, ranging from 1.8 percent to 3.6 percent (TAMU Real Estate Center, January 5, 2009). The story of Bridgeland begins against this economic backdrop.

Bridgeland

Bridgeland is an 11,400-acre community located on the northwest side of Houston, along the third beltway around the city. The construction of the community began in October 2003, and home sales began in 2006. It is projected to have 65,000 residents at build out. The developer of the community is Howard Hughes Corporation (HHC), a publicly traded, Dallas-based company that specializes in the development and long-term operations of large-scale master planned communities. Other notable communities owned by the company include The Woodlands (Houston), Columbia (Maryland), and Summerlin (Las Vegas).

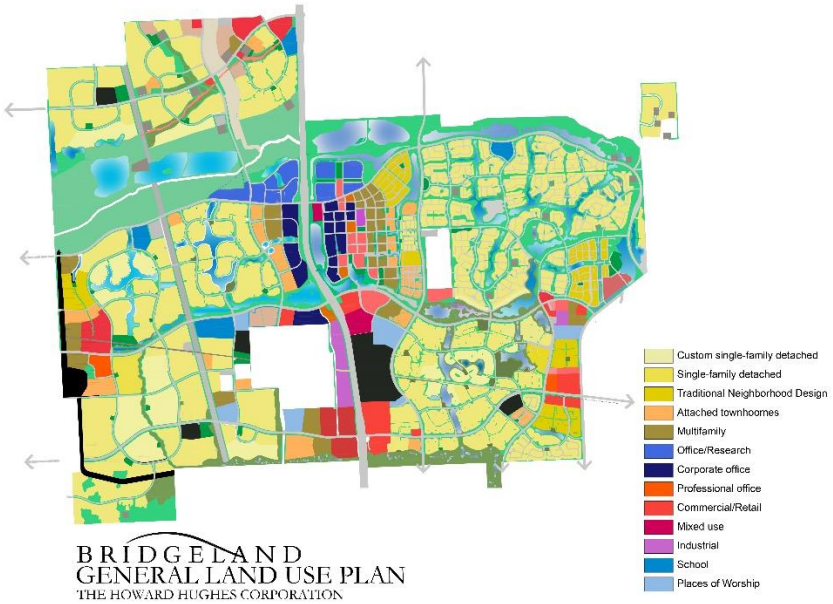
The land acquired for Bridgeland presented an amplified version of water management and drainage challenges commonly found in the Houston area. The site had "no topography, and [has] soil with a high clay content, which means there's little percolation" (Heath Melton cited in ULI 2018, p.2). Proper design and engineering of the drainage systems were sorely needed for any type of development to happen. Water treatment facilities also needed to be built to provide a sustainable, reliable, and affordable supply of water for future residents. The financing mechanism used to build these infrastructures and facilities is the focus of the case study.

Figure 1: Metro area map showing the location of Bridgeland relative to the City of Houston and its ring roads.



Source: Author

Figure 2: General land use plan of Bridgeland, 2021



Source: Original land use plan provided by The Howard Hughes Corporation (modified by the author)

Possible Strategies and Solutions

Options for Infrastructure Financing

The Organization for Economic Cooperation and Development (OECD) has proposed a comprehensive taxonomy of infrastructure financing options as part of their global campaign to encourage long-term investment by institutional investors (OECD 2015). According to the OECD taxonomy (p.15), there are two main avenues for financing infrastructure projects: corporate financing, or project financing. The corporate financing option is for non-public infrastructure built by companies that are in business to build and operate infrastructure. Project financing of infrastructure is where the debt and equity used to finance the project are paid back from the cash flow generated by the project. This case study is concerned with the project financing option.

There are three types of investment vehicles for project financing: fixed-income instruments, which are bonds and loans; hybrid instruments, such as mezzanine loans; and equity instruments, such as direct investments for shared ownership of the project. Construction of infrastructure typically needs to combine all three types of vehicles, with fixed-income instruments taking up the largest share of capital (OECD 2015, p.17). This has been the case for financing infrastructure in planned communities in Texas. One of the most critical sources of funding that allows the developers to build financially viable projects has been district financing, a bond instrument that is backed by either revenue from the completed project (project bond) or by taxes collected (municipal bond). The following section delves deeper into the different types of district financing in Texas.

District Financing in Texas

According to Carter Froelich, a leading consultant in the district financing business, three main types of district financing tools are available in Texas: water districts (most commonly MUDs and WCIDs), Public Improvement Districts (PIDs), and Tax Increment Reinvestment Zones (TIRZ). Each tool is codified in different parts of the state statute. Water districts are governed by the Texas Water Code (Chapter 49, 51, and 54); PIDs are governed by the Texas Local Government Code (Chapter 37); TIRZs are governed by the Texas Tax Code (Chapter 311). PIDs and TIRZs are sometimes used in conjunction with each other, whereas water districts are used either alone or in conjunction with other water districts, because the rules and agencies governing water districts differ from PIDs and TIRZs. Water districts are political subdivisions of the state and are centrally regulated by the Texas Commission on Environmental Quality (TCEQ), whereas PIDs and TIRZs are created and governed by cities and counties and thus are subject to local control and discretion.

The fact that PIDs and TIRZs are created and controlled by local governments has both advantages and disadvantages. One advantage is that the terms of the bond financing, governance, and oversight can be negotiated with the local governments, which can offer flexibility to the developers. The flip side of such increased flexibility is inconsistency and uncertainty. For example, local elected officials are on the board of directors of PIDs and TIRZs, which can mean that the district's long-term success may not align with the board's interests.

There are other significant differences between water districts and PIDs and TIRZs. Most importantly, their revenue sources differ. For water districts, revenue comes from either fees collected from providing services, or from property taxes imposed above and beyond those assessed by existing taxing units. For PIDs, special assessments are the main revenue source, paid by the future direct beneficiaries of the infrastructure improvement projects. TIRZs, on the other hand, are a form of tax increment financing, which redirects a portion of future property taxes, rather than levying new taxes, to service the debt obligations of the bonds being issued. In practice, these different sources of revenue have meant that water districts generate the most nominal dollars over time, because the districts can issue and sell bonds every year if the assessed value of the properties within the district continues to grow. By contrast, PIDs typically issue a single bond upfront based on the aggregated anticipated growth for the lifetime of the project, because governance by local elected officials does not guarantee that bonds can be issued in the future. Tax increments for TIRZs can fluctuate depending on market conditions, making it a risky, and thus more expensive, investment instrument.

On the other hand, the main advantage of PIDs and TIRZs is that bond proceeds can be used to pay for infrastructure construction costs from the very early stages of the development. By contrast, developers using water districts have to pay for the initial infrastructure costs upfront and get reimbursed with bond proceeds. This is because of the regulatory oversight provided by the TCEQ. Pursuant to the Texas Water Code, water districts have to seek a review and an approval from TCEQ for each bond they issue, and the TCEQ has a set of rules for ensuring the economic feasibilities of these bonds.[1] One such guardrail is that at least 25 percent of the taxable properties that will support the bond must already exist prior to the first bond issuance (Texas Administrative Code §293.59). There are additional guardrails furthering the same objective, which are discussed later herein. The aggregate effect of these guardrails has been that developers who use the MUD financing option must first pay for the initial construction costs of water facilities and get reimbursed with bond proceeds at a later point, once sufficient taxable properties have been constructed.

Going with the Water Districts

Howard Hughes Corporation decided to establish two types of water districts, MUDs and WCIDs, to finance the construction of water infrastructure in Bridgeland. Three WCIDs were established to reimburse HHC for construction of regional drainage facilities, which are the large detention ponds that comprise the lake system in Bridgeland. Accordingly, the boundaries of WCIDs were set up to correspond to the watershed boundaries. Seven MUDs, on the other hand, were established to reimburse HHC for construction of water and wastewater treatment facilities as well as storm drainage in the roads. MUD boundaries thus follow the boundaries of neighborhoods and the road network. In other words, WCIDs and MUDs co-exist because the beneficiaries of the special benefits provided by the two types of districts differ.

Mitch Page, the main legal counsel for Bridgeland's MUDs, shared that the water district industry in Texas takes significant pride in the economic feasibility of the financing tool, which was not always the case in the history of water districts. According to Page, prior to the 1980s,

[1] Not all bonds issued by the water districts are reviewed by the TCEQ: For example, bonds issued for construction of roads and for refinancing existing bonds are not reviewed by the TCEQ.

water districts were allowed to issue bonds without any significant tax base, colloquially referred to as “dirt bonds” in the industry. However, the financial distress of the 1980s brought about seismic disruption to this practice. Many of the dirt bonds either defaulted or existing property owners were hit with exorbitant tax rates to meet debt service obligations of the outstanding bonds. Out of self-regulation, the water district industry worked collaboratively with the TCEQ to establish a set of rules that would ensure the economic feasibility of the bonds and agreed to have the TCEQ review and approve each bond issuance by the districts.

Consistent oversight and regulatory guardrails provided by the TCEQ have ensured stable financial performance of bonds issued by the water districts in Texas, enhancing the marketability of the bonds to investors. Andrew Paynter, a technical specialist with the districts bond team at the TCEQ, confirmed that the agency’s primary role in district financing is to ensure a stable bond market. This is one of the main reasons why the water districts have been the preferred district-financing strategy by Texas developers. The specific rules for examining the bonds’ economic feasibility is discussed in the Analysis and Evaluation.

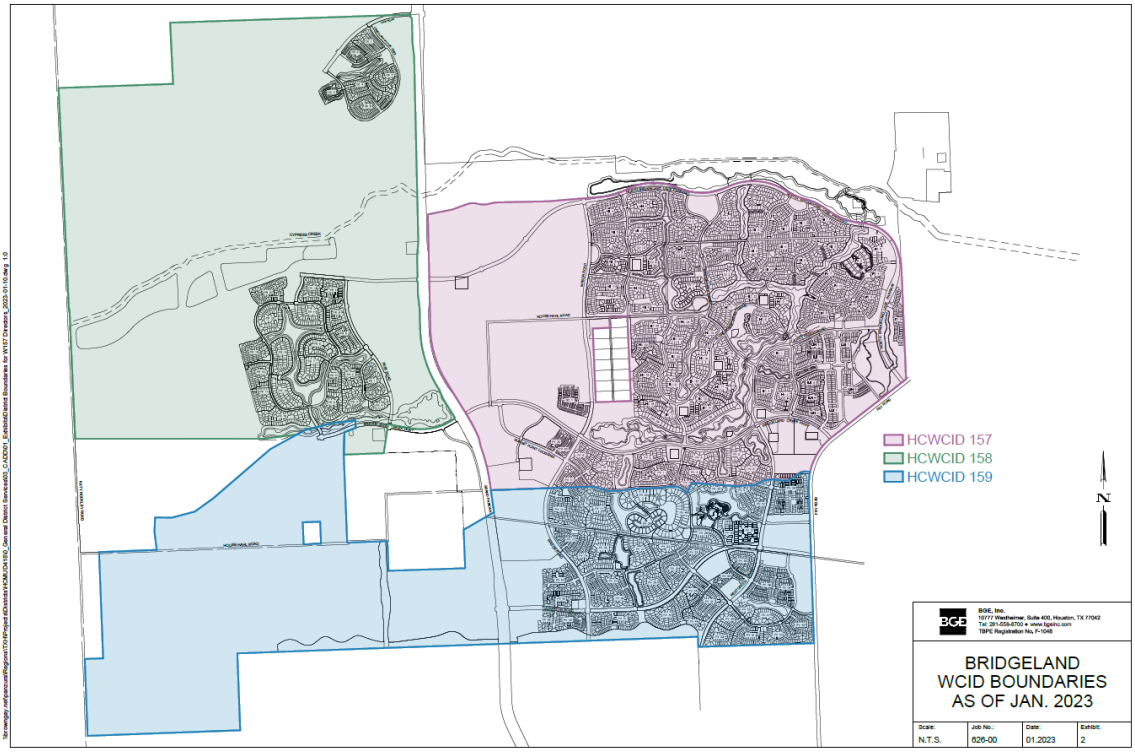
The Solution

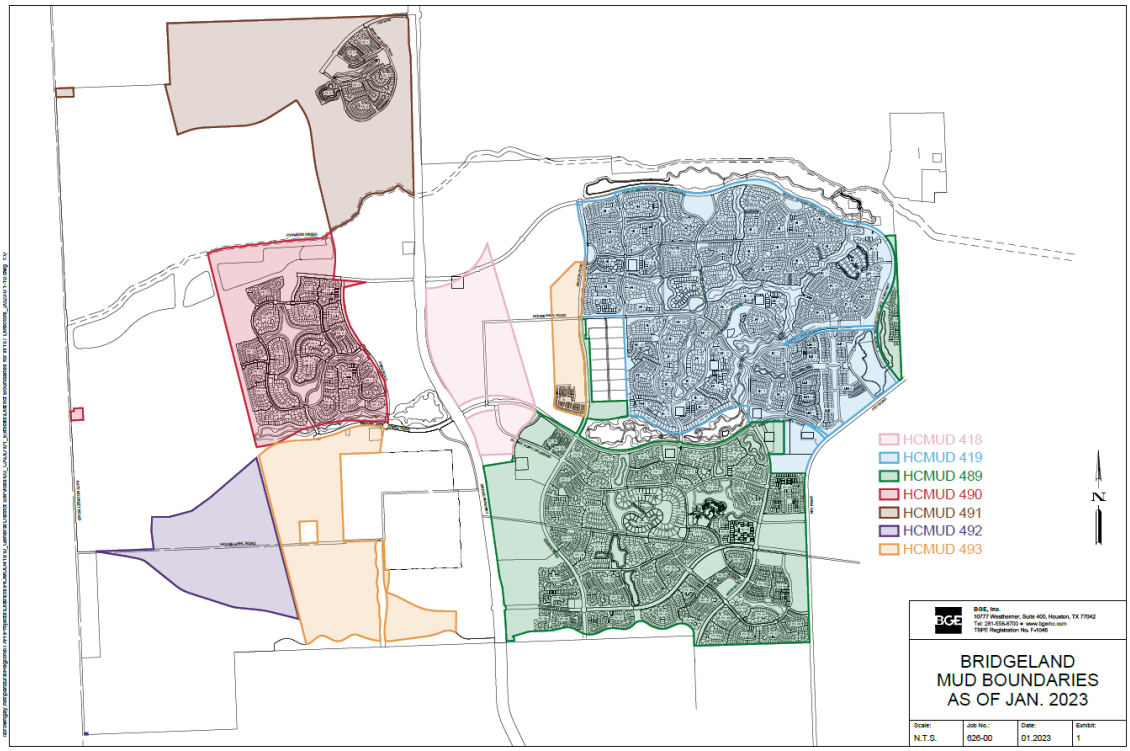
Structure of the MUDs in Bridgeland

HHC created three WCIDs (157, 158, and 159) and seven MUDs (418, 419, and 490 through 493). The WCIDs issue bonds to purchase regional drainage infrastructure from HHC. MUDs issue bonds to purchase water and wastewater facilities and local drainage infrastructure. Bridgeland’s MUD 418 is designed to serve as the *Master District* for all other MUDs, owning and operating the central water facilities and the major trunk lines providing service to the rest of Bridgeland. As of May 2022, MUD 418 owned water facilities that are worth $47.2 million (MUD 418 Independent Auditor’s Report and Financial Statements, May 31, 2022).

One unique aspect about Bridgeland’s MUD structure comprising a Master District and six subdistricts is that the developer reimbursement for the central facilities owned and operated by MUD 418 does not come from bonds issued by MUD 418. In fact, MUD 418 does not have any taxable properties within the district. Instead, revenues from connection charges from the other six MUDs have been used to reimburse the developer. The other six MUDs issue bonds to pay for the connection charges as well as the local infrastructure needed to connect individual home sites to the major trunk lines. In 2020, the connection charges were $4,436 per single-family house for water supply capacity and $3,309 for wastewater treatment capacity. When the districts were just starting out in 2007, the connection charges were $1,534 and $1,841, respectively.

Figures 3 & 4: Maps of the WCID and MUD district boundaries





Source: The Howard Hughes Corporation

Figure 5: Water treatment plant owned by MUD 418

Source: Author

Land Value Creation, Capture, and Distribution

Turning raw land into fully serviced, developable lots can generate a significant amount of land value (Smolka 2013). The exact incidence of this land value uplift largely depends on the economic context. If there is already a significant demand for new housing and other uses, the act of local governments changing the allowable density and intensity of uses can unlock higher land value. By contrast, if the existing demand is not strong, regulatory approval alone will not automatically lead to increases in land value, as new homes and buildings will not be rented out or sold (Kim 2023). In the latter scenario, land value uplift occurs as a result of a holistic set of actions: regulatory approval, infrastructure investments, project vision, and marketing.

Typically, because a real estate developer takes the initiative to implement a holistic set of actions, especially the infrastructure investment, that creates land value in weak real estate markets, the uplift is largely captured by the developer in the form of profits from selling the serviced lots to homebuilders. Local governments may be able to capture some of the land value

uplift during the regulatory approvals process in the form of impact fees or other exaction strategies.

In land development deals involving water districts, this distribution of the land value uplift is altered, because the developer, now with an understanding that the infrastructure costs can be recouped, does not fully pass on the cost of infrastructure to the price of the serviced lots. This means that the final prices of homes will be lower, due to cheaper lot prices (Peiser 1981).[2] In other words, the first homebuyer is also a beneficiary of the land value uplift due to district financing, and this homebuyer will realize the gain when selling the house in the future as the price of the homes would have appreciated significantly due to high-quality infrastructure.

Government entities also receive additional benefits beyond impact fees and exactions. With MUDs and WCIDs, developers build high quality infrastructure that performs above and beyond the minimum standards set by the regulatory agencies, resulting in climate-resilient infrastructure that can withstand extreme weather conditions. Developers still capture a portion of the land value uplift from selling the finished lots at a premium; and local government still has the option of capturing the value uplift through impact fees and other exaction strategies.

In the case of Bridgeland, the land value uplift resulted from infrastructure improvements and the developer's vision, risk-taking, and marketing of the community. However, this land value uplift was only *unlocked* because government agencies provided appropriate regulatory approvals. The infrastructure investments undertaken by the developer would not have occurred without the approval to create water districts. The City of Houston planning commission approved the Bridgeland *general plan*, which identifies proposed major and minor collector streets and general layout of land uses (City of Houston, TX, Code of Ordinances, Sec. 42-24.).

HHC invested $10.5 million worth of infrastructure for MUD 419 in 2005 as that phase kicked off, and as a result of this investment, the certified taxable assessed value of the land comprising MUD 419 jumped from $4,159,960 in 2005 to $31,000,000 in 2006 (Official Statement dated September 17, 2007). The approximately $26.8 million worth of land value uplift is a result of a $10.5 million infrastructure investment, leaving a $16.3 million net increase. This net land value uplift is not realized unless the homes or lots are sold. Rather, the land value uplift is leveraged to issue bonds, the proceeds from which are used to build additional infrastructure needed for the subsequent phases of the development.[3]

Moreover, the design of the water districts in Texas allows for a continued capturing of land value uplift as the project continues to grow. As more land gets serviced, additional land value

[2] The rule of thumb conventionally used in the industry is that the lot cost is approximately 20 percent of the home cost.

[3] Illustratively, MUD 419 subsequently issued bonds and borrowed money for further infrastructure investment supported by this land value uplift. According to the Official Statement dated September 17, 2007, home construction within the district began in 2006, and as of July 1, 2007, the underground utilities were complete for 977 lots, with 261 homes having been built, and 176 homes under construction. As a result of these activities, the preliminary taxable assessed value of the district further increased from $31 million in 2006 to $76,993,411 in 2007. The first bond issued was $6,880,000, which was estimated to be supportable at a tax rate of $0.70 per $100 assessed value. The district set the tax rate at $1.00 ($0.90 towards servicing debt and $0.10 towards the operation maintenance of the district), which comfortably covered the debt service needs in the coming years.

uplift occurs. This gets folded into the higher assessed property value, which in turn gets captured as additional property taxes. This additional property tax is then further leveraged to issue more bonds for future infrastructure investment and operation and maintenance needs.

Enabling Framework

MUDs are created by filing a petition with the TCEQ. The petition must be signed by a majority in value of the landlords within the proposed boundary of the district (TWC §54.014). The petition must state "the general nature of the work proposed to be done, the necessity for the work, and the cost of the project" (TWC §54.015). The TCEQ will publish notice of an application and may conduct a hearing (TWC §54.018) in which it may "accept evidence on the sufficiency of the petition and whether the project is feasible and practicable and is necessary and would be a benefit to all or any part of the land proposed to be included in the district" (TWC §54.020).

MUDs are authorized to issue bonds for the purpose of purchasing, constructing, acquiring, owning, operating, repairing, improving, or extending any works, improvements, facilities, plants, equipment, and appliances needed to provide a waterworks system, sanitary sewer system, storm sewer system, and solid waste disposal system (TWC §54.501). In the orders or resolutions authorizing the issuance of bonds, the board may determine how the bond proceeds will be used, such as the flow of funds, the establishment and maintenance of the interest and sinking fund, the reserve fund, and other funds, and make additional covenants regarding the bonds, the pledged revenue, and the operation and maintenance of the facilities (TWC §54.510). These bonds can be repaid with the levy and collection of ad valorem taxes on all taxable property within the district and by pledging all or any part of the designated revenues resulting from the ownership or operation of the district's works (TWC §54.503). The board is authorized to levy ad valorem taxes "in sufficient amount to pay the interest on the bonds as it becomes due and to create a sinking fund for the payment of the principal of the bonds when due" (TWC §54.601).

Water District Governance and Oversight

MUDs and WCIDs are political subdivisions of the state and tightly regulated by the TCEQ. The board of directors for each district is approved by the TCEQ, and to be eligible for consideration, an applicant must either own land within the district or be a qualified voter within the district (TAC §293.32). All meetings of the board must be conducted in accordance with the open meetings law following the Texas Government Code, Chapter 551 (TWC §49.062).

The board of directors is required to audit the district's fiscal accounts and records and to file an annual audit report with the executive director of the TCEQ. This agency has the power to review the filed reports, ask for additional information, and raise objections to the reports for resolution. The executive director also has access to all vouchers, receipts, district fiscal and financial records, and other district records (TWC §49.194). Furthermore, audits on file with the districts and all other records are made available to the public following the Texas Government Code, Chapter 552 (TAC §293.4).

Districts must file a bond application report with the TCEQ for every bond they plan to issue with the agency's approval.[4] TCEQ staff evaluates both the engineering feasibility and the economic feasibility of the bond application. Economic feasibility is defined as "the determination of whether the land values, existing improvements and project improvements in the district will be sufficient to support a reasonable tax rate for debt service payments for existing and proposed bon indebtedness while maintaining competitive utility rates" (TCEQ Rules §293.59(b)). After reviewing the bond application, the TCEQ issues an order approving the proposed list of projects that will be funded by the bond proceeds and the issuance of bonds.

Results

Revenue Raised from Selling Bonds

According to the annual financial reports prepared by independent auditors, MUDs and WCIDs in Bridgeland owned approximately $268 million worth of water, wastewater, stormwater drainage facilities, and regional detention ponds as of May 31, 2022.[5] A total of $332 million worth of bonds have been issued to build this water infrastructure.[6] The total amount of the bond exceeds the value of water facilities owned by the districts, because approximately 20 percent of the proceeds are used to finance non-construction costs, such as operating expenses and various fees, while about 20 percent is the fee paid to the Master District for connecting to the central facilities owned by the Master District.

The revenue source for servicing the bonds' debt obligations is the property taxes paid by property owners (both residential and commercial) within the districts' boundaries. As an example, in 2021, MUD 419 imposed a property tax rate of $0.93 per $100 of the assessed property value and the overlapping WCID 157 charged a property tax rate of $0.41 per $100, the combined rate of which would be $1.34. Using the certified assessed value of properties in 2021, which was $1,348,498,413, and assuming 90 percent tax collection rate, MUD 419 was expected to collect over $11 million annually, which would comfortably cover the $7.5 million in expected annual total debt service. The total tax rate for a property owner in MUD 419, considering all other overlapping taxing units, amounted to $3.43 per $100 of the assessed value.

Property Taxes and Uses of Bond Proceeds

To understand how districts collect tax dollars and use them to borrow money, MUD 419 was chosen for a deeper dive analysis. MUD 419 has the longest and most extensive experience selling bonds, providing a window into the long-term financial sustainability of water districts. MUD 419 issued 13 separate bonds between 2007 and 2022, amounting to a total of $111,965,000. The sizes of the individual bonds ranged from $3.75 million to $18 million. For each bond issued, the district demonstrated and secured approval from the TCEQ that the taxes raised from the properties within the district would sufficiently cover the district's annual debt

[4] Not all bonds undergo TCEQ review. Bonds issued for road construction and refinancing of existing bonds are not reviewed by the agency.
[5] This total amount does not take into account depreciation.
[6] This figure does not include bonds issued for roads or for parks and recreational facilities.

obligation, including the one being issued. The surplus fund from each fiscal year is typically used for additional construction costs in the following year, with the TCEQ's approval. The certified assessed value increased from $31 million in 2007 to $1.35 billion in 2021. Annual increases in assessed property value are what have allowed the district to issue new bonds every year and borrow more money for additional infrastructure improvements.

Table 1: Bonds issued by MUD 419 from 2007 to 2022

	Bond amount	Certified assessed value
Unlimited tax bonds series 2007	$6,880,000	$31,080,699
Unlimited tax bonds series 2008	$8,955,000	$81,885,345
Unlimited tax bonds series 2009	$4,090,000	$185,864,080
Unlimited tax bonds series 2010	$11,200,000	$256,432,564
Unlimited tax bonds series 2011	$13,000,000	$366,129,350
Unlimited tax bonds series 2012	$3,750,000	$366,694,948
Unlimited tax bonds series 2014	$8,500,000	$678,797,188
Unlimited tax bonds series 2015A	$9,000,000	$809,013,213
Unlimited tax bonds series 2016A	$18,000,000	$909,115,824
Unlimited tax bonds series 2017	$12,400,000	$1,029,868,001
Unlimited tax bonds series 2018	$4,180,000	$1,153,264,870
Unlimited tax bonds series 2020	$6,725,000	$1,304,072,166
Unlimited tax bonds series 2021A	$5,285,000	$1,348,498,413

The property taxes raised have been used both to pay back the bondholders and for the operation and maintenance of the district and its facilities. The district's tax rate remained at $1.00 per $100 of assessed value until 2014, which gradually fell to $0.93 in 2021. In the early stages of the district, 90 cents of each tax dollar raised were used to meet the annual debt service, while 10 cents were used for operations and maintenance. In the later stages of the development, tax dollars used for operations and maintenance gradually increased. In 2021, 20 cents were used for operations and maintenance, and 73 cents went to debt service. The debt-service component of the water districts' taxes is the only portion used to support bond issuance.

To understand how bond proceeds have been used, the official statements from each bond's issuance and TCEQ staff memos were reviewed. Out of the $111,965,000 in total bond proceeds, approximately 61 percent has been used for construction costs, with 39 percent going to non-construction expenses. Construction costs include direct physical construction costs and/or the connection charges paid to the Master District. Such connection charges amounted to 27 percent of total bond proceeds, or 44 percent of construction costs. Non-construction costs include legal fees, fiscal agent fees, interest paid to the developer for their advanced investments, fees

associated with bond issuance, costs for market studies, operating costs, and other fees paid to the TCEQ and other regulatory agencies.

Table 2: Use of bond proceeds in MUD 419

Total amount of water bonds issued by MUD 419 (by end of 2022)	$ 111,965,000	100%
Value of improved land owned by the district at the end of FY21-22	$ 3,920,093	
Value of water and drainage facilities	$ 34,403,129	
Total water-related capital assets	$ 38,323,222	34.23%
Accumulated depreciation of water and drainage facilities	$ (7,628,675)	
Total water-related capital assets, net of depreciation	$ 30,694,547	
Total connection charges paid to MUD 418 (Master District)	$ 30,275,801	27.04%
Total construction costs (including connection charges)	$ 68,599,023	61.27%
Total non-construction costs	$ 43,365,977	38.73%

Environmental Benefits

The performance of Bridgeland's water and drainage system have far exceeded the minimum performance requirements set by regulatory agencies. Multiple engineering innovations have been incorporated into the design of Bridgeland's drainage system. For example, parts of Bridgeland drain into Cypress Creek, the structures along which have experienced frequent and deep flooding events in the past. Accordingly, the design and construction of an appropriate drainage system was critical so as not to further burden the drainage capacity of Cypress Creek. The solution was to engineer a series of stair-step drainage lakes, called Josey Lake, that use culverts, which are small dams with seven-foot-wide openings that also serve as bridges, to manage the rate of stormwater flows into Cypress Creek (ULI 2018).

Additional features have been incorporated to further enhance stormwater detention capacity in Bridgeland. For example, Josey Lake was designed with an extra eight feet of stormwater detention capacity; the outflow channel from Josey Lake is designed to drain the overflow stormwater into Cypress Lake, a manmade lake built to retain stormwater before it flows into Cypress Creek; the soil that has been dug out to create Cypress Lake has been used to lift other parts of Lakeland Village out of the 100-year flood plain.

Figure 6: Josey Lake

Source: The Howard Hughes Corporation

Two historic flood events in recent history – the Tax Day flood in 2016 and Hurricane Harvey in 2017 – demonstrated the excellence of Bridgeland's drainage system (ULI 2018). The high-water marks recorded in Bridgeland after the Tax Day flood occurred not from local runoff but because the community's lakes absorbed the overflow from Cypress Creek. During Harvey, streets and yards flooded, which was by design, and no homes were damaged.

The community, in fact, takes advantage of the high clay content of the soil. HHC and its consultants realized that the high impermeability of the soil presents challenges for drainage, but it provides an opportunity for greywater usage. The stormwater that gets detained in the detention ponds of Bridgeland are treated by the water treatment plants owned and managed by MUD 418. This recycled water gets put back into the lake system for recreational purposes. The pump stations around the lake pump the water out and use it to irrigate significant portions of the development. Almost all the common areas (esplanades, parks, etc.) are all irrigated with recycled water, reducing the reliance on groundwater supply.

Figure 7: Purple line irrigation picture/natural landscape

Source: Author

Analysis and Evaluation

Policy Innovation

The most innovative aspect of the water district financing tool in Texas is the regulatory framework and oversight. The TCEQ has developed a set of rules designed to ensure the long-term financial viability of water districts. Specifically, TAC Section 293.59 ensures that a project, and its future stream of property taxes, would viably support the district's debt obligations, so that the district does not default on its bond. There are multiple regulatory guardrails built to further this objective. First, the TCEQ imposes a cap on combined maximum tax rates of water districts under two scenarios. The normal growth scenario is one where the pace of construction and the sales of homes occur as projected. This maximum tax rate varies by county, and for Harris County the combined tax rate of all water districts is limited to $1.50 per $100 of assessed value (TAC §293.59. (k)(3)). The *no-growth* scenario is where none of the project growth is realized, and the district must meet the debt obligations based solely on the

current certified assessed value. The TCEQ limits the combined tax rate at $2.50 per $100 under such circumstances (TAC §293.59. (k)(4)).

Furthermore, districts must prove that over 95 percent of the water infrastructure that will be reimbursed using the bond proceeds, or necessary to serve the projected build-out, is already in place before issuing each bond (TAC §293.59. (k)(6)). These regulatory guardrails effectively render developers to pay upfront for the water infrastructure and get reimbursed later with bond proceeds only if the project is financially successful and is growing at the projected rate. Section 293.47. of the TCEQ rules, colloquially referred to as the *thirty percent rule*, requires financial contribution by the developer for building water infrastructure. According to subsection (d), "the developer shall contribute to the district's construction program an amount not less than 30 percent of the construction costs for all water, wastewater, drainage, and recreational facilities."[7] The primary goal of such requirement is to ensure that the cost of infrastructure is not completely burdened by the taxpayers and the government.

However, Texas's water district financing tool is designed to incentivize developers to deliver a high-quality project for which they can be rewarded with 100 percent reimbursement. There are conditions that exempt developers from this 30 percent contribution mandate, such as securing a good rating on the bond (e.g., AA or higher from Standard and Poor's) by the bond rating agencies or having a debt-to-assessed value ratio of 1:10 or higher. These exempt conditions in effect reward developers with a higher return if the lots and homes in the community are selling faster and at higher prices than what is typically expected, which can be achieved by building high-quality infrastructure and community design.

Another risk mitigation innovation of Texas's water district financing tool is selling bonds based on the certified assessed value of *existing* properties. This means that bonds are only being issued when the taxes collected from already existing properties are sufficient to cover the outstanding debt obligations. If the assessed value increases in the following year to support an additional bond issuance, the district can seek approval from the TCEQ to do so. This practice's incremental and conservative nature significantly reduces the chances of districts going into bankruptcy. Moreover, annual reassessment of property values allows for continued opportunities to sell more bonds if the project is performing well.

The TCEQ allows districts to use projected future property values as the basis for issuing bonds, but even in such cases, bonds are sized based on the projected assessed value of the following year. Moreover, if a district wants to use the future, uncertified property value, they must prove that at least 75 percent of the properties have already been built before advertising the issuance of the first bond (TAC §293.59. (l)), and that at least 25 percent of the properties proposed in the previous bond have already been built for subsequent bonds (TAC §293.59. (k)(7)).

Furthermore, as noted above in this case study, water districts are required to go through independent audits every year at the district's expense, in adherence with chapter 49 of the Texas Water Code. These audit reports have to be filed by the district and available for a review by the TECQ and any member of the public, upon request. Such annual audits and reviews ensure that

[7] This mandate does not apply to central facilities serving multiple districts, for which the developer could be eligible to receive 100 percent reimbursement.

districts are managing collected tax dollars according to their plans specified in the bond offerings, and that there are sufficient surplus funds to cover the debt service and operational costs in case of emergency.

The composition of special districts' governing boards vary depending on how the law is written. For water districts in Texas, the boards are composed of either property owners or registered voters from the district, pursuant to TAC §293.32. In practice, during a district's nascent stages, the development company and its representatives make up most of the board, as there aren't any residents living in the district. However, as the community develops and homes are sold, the composition of the board changes to majority residents over time.

This resident-driven governance structure allows the board to have the district's long-term financial sustainability in the district's best interest. Residents work to ensure that their tax rates remain at a reasonable rate and ideally lowered over time, which means that the district must be shrewd at its spending and operations and maintenance of the facilities owned by the district. Likewise, it is also in the district's interest to ensure that the developer is delivering high quality infrastructure at a reasonable price, providing valuable checks and balances to the development practice.

Unintended Consequences of Water Districts

Despite the financial and fiscal success of water districts in Texas, they are not free from criticisms. First, water districts have been criticized for incentivizing and fueling leapfrog sprawl in the Houston area. The district financing tool essentially makes it less risky for land developers to develop rural, unserviced land, as the developers' upfront investment can be recouped if the project is successful. This means that more rural land can be taken up for development, exacerbating urban sprawl and longer commutes.

This criticism is valid. However, the takeaway from this case study should not be that other governments should not consider district financing because it encourages urban sprawl. Rather, the key takeaways should be the policy innovations that have been developed and refined over time to ensure the district financing tool's financial viability. The policy and regulatory framework used in Texas can be adopted for urban infill projects or limited to very large-scale developments of new towns where there are regional employment centers within the community, eliminating the need for long commutes.

MUDs are also criticized for fragmenting water management, since MUDs create water and wastewater facilities that serve the district residents and do not have to connect to regional water suppliers. However, in a region like Houston, where it is extremely expensive to create and manage regional water suppliers due to its flat terrain, having a fragmented water supplier network may be an acceptable option, as long as the supply of groundwater is regionally monitored and managed. The Harris-Galveston Subsidence District provides such regional oversight and regulation.

Transferability of the Tool

The water district financing system in Texas can be replicated in other counties and communities wishing to incentivize higher quality infrastructure for mitigating climate risks. However, the experience in Texas indicates that strong administrative oversight and regulation by government agencies are necessary to ensure the special districts' long-term financial success and sustainability. Without government oversight, prior to the 1990s, many of the water districts went bankrupt, because they were selling bonds based on anticipated growth of property values, which did not materialize once the oil economy imploded. With the TCEQ monitoring and approving each water bond since 1987, evaluating both the economic feasibility of the bonds and the soundness of the engineering project, water districts in Texas have proven to be extremely successful on both fronts. Bridgeland is a case in point that district financing can be used to build high performing water infrastructure that goes above and beyond the minimum requirements set by regulatory agencies.

Another important ingredient of success in Texas is the multiple layers of environmental oversight provided by regional agencies. The Harris-Galveston Subsidence District limits the amount of groundwater that can be used as the source of fresh water to ensure the water supply's long-term sustainability; HCFCD monitors regional drainage networks and prevents and minimizes flood risks; the City of Houston and Harris County also have their own set of standards for mitigating flood risks and ensuring freshwater supply. These overlapping but complementary jurisdictions that take into account the regional impacts of infrastructure investment are necessary ingredients for successful application of a district financing tool.

Lessons Learned and Policy Implications

Beyond the policy innovations discussed in the previous section, several additional lessons can be learned from the design and implementation of the water district financing tool in Texas. First, the water districts case suggests that not all district financing tools are created equal. Even within the state of Texas, the performance of other tools available demonstrates that the ways in which a tool is designed and implemented largely determines the tool's efficacy in delivering high quality infrastructure.

A couple of design features of water districts stand out as important for their success: 1) source of revenue; and 2) governance and oversight. The fact that the water districts are supported by additional property taxes levied as well as user fees collected from the services provided has proven to be a reliable and sustainable source of revenue. The fact that the board of directors for the water districts is composed of district residents ensures that the long-term financial sustainability and delivering and maintaining high quality infrastructure are in the district's best interest. The institutionalized review and oversight provided by the TCEQ and their regulatory guardrails for ensuring financial sustainability have proven to be key ingredient for success, as demonstrated by the performance of the water bonds issued since the 1990s.

The Bridgeland case, in particular, has some implications for the financing tool's application and impact. Water districts are a tool that can be used either for mitigating environmental risks or

risk exacerbating them. Water districts allow developers to build high quality drainage, water, and wastewater facilities, significantly reducing flooding risks and ensuring a clean and economic supply of clean water. However, when looking at the tool's impact at the metro level, water districts do promote urban sprawl, contributing to longer commutes, and encouraging the development of natural land. These divergent impacts suggest that a water district financing tool is a double-edged sword whose impact will depend on the specific context in which the tool is applied. Water districts should be promoted for larger-scale developments, and ideally, for new towns in which a significant employment base can be accommodated to minimize their impact on the use of automobiles. Another context in which the tool can be used is for urban infill projects.

Finally, in terms of its value as a land-based financing tool, district financing allows for a redistribution of the costs and benefits of land value uplift. The financial costs associated with land value uplift, the construction costs of infrastructure provision, are shared by the developer, the government, and future residents; the land value uplift is then enjoyed by all three entities as the developer receives higher returns on their investment, the government receives resilient infrastructure, and residents enjoy less expensive homes in the beginning and faster appreciation of the home values later. Although an exact breakdown of the costs and benefits is impossible, it seems fair to say that district financing can be designed as a balanced and equitable tool to finance climate resilient infrastructure.

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