

**MAPPING AND
QUALITATIVE DATA COLLECTION
FOR PEOPLE-FIRST FLOODPLAIN BUYOUT PROCESSES
HARRIS COUNTY, TX**

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by

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Abstract

Federally funded floodplain buyouts are a nonstructural flood mitigation practice that uses federal grants to remove people and businesses from flood-prone areas to end financial strain on the National Flood Insurance Program. Past research indicates that the selection processes of buyouts made by the program implementors can cause or perpetuate social inequities. More research on the experiences of pre- and post-buyout participants is needed to improve these practices for more benefit and less harm. Qualitative data about those participants exists in real property records found within County Clerk files that is useful for collecting demographics, legal proceedings, and post-buyout geographical information for research that supports transparency and equity in future buyout processes. This applied research project explores the qualitative information found on real property records, best data recording and interpretation practices, and mapping past buyouts in Harris County, Texas made by the Harris County Flood Control District.

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List of Abbreviations

Abbreviation	Description
CBA	Cost-Benefit Analysis
CDBG-DR	Community Development Block Grant Disaster Recovery Program
FEMA	Federal Emergency Management Administration
FMA	Flood Mitigation Assistance Program
FMV	Fair Market Value
FPA	Floodplain Property Acquisition
HCC	Harris County Clerk
HCCF	Harris County Clerk Files
HCFCD	Harris County Flood Control District
HMGP	Hazard Mitigation Grant Program
HUD	The US Department of Housing and Urban Development
NFIP	National Flood Insurance Program
ROW	Right of Way
SRL	Severe Repetitive Loss

I. Introduction

A floodplain property acquisition, also known as a “buyout”, is a nonstructural flood mitigation practice that permanently removes homes and businesses from high-risk, flood-prone areas. Buyouts are often used as a tool in purposeful movement of people and assets away from high-risk regions, especially those affected or to be affected by climate change, a practice referred to as “managed retreat”. Typically, buyout programs appraise flood-prone property and make an offer to the owners based on the pre- or post-disaster fair market value (FMV). By removing structures from flood-prone land and relocating families and businesses to safer areas, local governments can strengthen community flood hazard resilience, while also reducing the cost burdens of emergency response and recovery efforts on the National Flood Insurance Program (NFIP).

In the face of increased risks to coastal and riverine communities brought by climate change, buyouts offer state and local governments the ability to retreat people and infrastructure from flood-prone areas rather than relying solely on structural flood mitigation projects. Many vacated properties remain vacant, but some plots are cleared of structures and present opportunities for wildlife habitat improvement, ecosystem services enhancement, and the potential for new or extended recreational land for the public (ELI 2017). However, the success of transitioning buyout properties to public space or habitat restoration depends greatly upon the location of the property, available funding, and the ability of the local government or community to implement and maintain projects (Zavar 2016).

Buyouts also present potential social justice implications based on where and from whom government officials make decisions about acquiring properties (Siders 2018). Prior research on the processes of buyout decision-making indicates that there is a lack of transparency with the public by program implementers. Lack of transparency then has the

potential to exacerbate social inequity and reduce buyout participation rates (Siders 2018).

Transparency is key in the equation of good governance (Hood and Heald 2006), and as such, communities impacted by governmental decisions on buyouts and the management of land post-buyout must be presented with as much information and details as possible to have their voices heard and make the best decisions for themselves. Maps and easily accessible data can empower communities and non-governmental organizations with the proper information to analyze and make decisions (Knack et al. 2017). Therefore, providing comprehensive maps demonstrating the patterns and locations of all buyouts completed within a region may put the power of decision-making and choice into the hands of affected business owners, homeowners, land managers, and researchers.

The study area for this applied research report is centered in Harris County, Texas, one of the most flood susceptible counties in the United States due to urban planning decisions and policies that have resulted in substantial wetland losses and exponential growth in the impervious cover which have negatively impacted the land's ability to impede and absorb floodwaters (Zhang et al. 2018). Harris County has completed the greatest number of buyouts within the US (Patterson 2018). In combination with its flood control authority, the Harris County Flood Control District (HCFCD), which operates one of the nation's most robust and well-funded buyout programs, Harris County has the potential to serve as a premier example of an efficient and just purveyor of buyouts for all urban coastal and riverine communities.

Capital may serve as the underlying motivation of managed retreat for some which in turn perpetuates environmental injustice. The protection provided by appropriate, sound structural flood mitigation projects in all communities, the equitable assistance to permanently evacuate high-risk areas, and the prioritization of the physical and social well-being of residents over financial gain or loss set the foundation for a people-first approach to improving practices in flood resilience. Floodplain buyouts are an under-researched topic that lacks in knowledge of the personal experiences, critiques, and thoughts of those who have completed or tried to complete the process. To reap the greatest benefits of managed retreat tools like buyouts, more research is necessary.

This directed applied research project seeks to establish methods in data collection for a more thorough understanding of the past mistakes and successes in buyout programs so the future of buyouts renders more success than the past.

Using Harris County as the study site, the HCFCD as a governing authority of buyout programs, and the Harris County Clerk (HCC) real property archives as the source for collecting data about past buyouts, this directed research project investigates the following questions: Where have completed voluntary floodplain buyouts occurred within Harris County, Texas since 2000? What entities other than the HCFCD purchase floodplain properties? What information do real property records contain that can be analyzed and recorded to supply additional information about the properties and the property owners? How can we apply the findings of this type of research to inform the smarter, people-focused implementation of future buyouts?

II. Background

a. Harris County

This study is situated within Harris County, Texas. Located in Southeast Texas, the county includes the Houston metropolitan area and is home to nearly five million people (US Census Bureau 2020). The county's location along the Texas Gulf Coast combined with its clayey soil, its historical development within the floodplain, consistent population growth, and the ever-expanding built environment makes it particularly vulnerable to flood-related hazards. Over four percent of the county is covered by waterbodies, including two dozen creeks and bayous, and entails 22 classified watersheds (HCFCD 2020a). The county's hydrology is an important factor to consider due to the incredible number of lives, homes, businesses, and property that are impacted by its frequent flooding events. In fact, approximately 25 percent of the City of Houston's residential property value resides in the one percent or .2 percent floodplain (Sherman et al. 2021).

Harris County is also experiencing consistent population growth. In 2017, the county government reported that it experienced a 67 percent population growth since 1990, and it consistently ranks as one of the nation's fastest-growing counties (HCBMD 2017). As the population and impervious surfaces continue to grow, it is increasingly critical for the county to manage and plan for major flooding issues, especially as climate change continues to threaten coastal urban areas.

As the county continues to grow and expand its built environment, the at-risk surface area of climate change-related hazards will also expand (Kim and Newman 2019), increasing the number of lives at risk, as well as the costs of reconstruction. Private sectors and the Chamber of Commerce within the county have also contributed to urban development in high-risk areas (Fisher 1989) for the purpose of expanding and attracting businesses. As

climate change-related sea-level rise persists, the area of floodplains in Houston is expected to expand, further increasing flood risk (Newman and Kim 2019). The issues of Harris County's expanding urban boundary are exacerbated by the lack of formal zoning laws in Houston that could have prevented or halted present-day development in high-risk areas (Qian 2010).

b. The Harris County Flood Control District (HCFCD)

The HCFCD is a special purpose district tasked with addressing flood control within Harris County. As defined by the Texas Senate Research Center (2014), a special purpose district is the most basic level of government within Texas and serves more specific purposes than the general municipal, state, or county governments (Texas Senate Research Center 2014). Special purpose districts have the legal power to perform such actions as acquiring and selling land, collecting taxes, and issuing bonds. Special purpose districts are typically overseen by a commissioner court or a board of directors. In the case of HCFCD, the Harris County Commissioners Court is the special district's governing body. HCFCD serves as a local partner with the United States Army Corps of Engineers to implement flood mitigation projects (HCFCD 2020a).

The original purpose of the district was to oversee the rivers, floodwaters, and other water bodies within Harris County for municipal flood control. Other responsibilities included the drainage of overflow, conservation of forests within the county, and maintaining and regulating stormwater to ensure the navigability of the navigable waters within the county. Today, HCFCD's mission is to provide flood damage reduction projects. HCFCD states that it accomplishes that mission in three ways. First, by creating flood damage reduction plans. Second, by implementing the flood damage reduction plans. Third, by overseeing and

maintaining the quality and functionality of the infrastructure. (HCFCD 2020a). A key part of the organization's mission is to accomplish these steps with "appropriate consideration" of the community and the natural value of the areas where projects are planned and implemented. For much of the district's flood mitigation projects, use of eminent domain and "voluntary" buyouts are employed to empty up land.

As of 2018, the district used \$342 million in funds from the federal government, the state, and the county since its buyout program began in 1985 (Patterson 2018). Since 1985, the district has acquired over 3,100 properties and has restored over 1,060 acres to the floodplain. As the prominent local sponsor of the buyout program funded by FEMA, all applications for voluntary buyouts are submitted to HCFCD.

c. Buyouts

The HCFCD buyout program purchases properties that are several feet deep in the floodplain. Properties purchased have been deemed not cost-effective or the land has not been considered beneficial for the construction of flood control projects (HCFCD 2020a). Cost-effectiveness is measured by the home's value and the cost to demolish all structures. If that number is greater than the estimated cost to implement home elevation or flood control structures, it is not considered cost-effective. The buyout program is in part funded through the Federal Emergency Management Agency (FEMA) and the United States Department of Housing and Urban Development (HUD).

The timeline from applying for the buyout program to the payout and demolition of property can take over two years to complete (Song Ibid, Shaw, & Satilja 2017). The buyout process is accomplished in three main steps: securing funding, identifying and prioritizing properties, and lastly, property maintenance (FEMA 2020). The funding for the HCFCD

buyout program is secured largely by FEMA through the Hazard Mitigation Grant Program (HMGP). HUD issues grants under the Community Block Development Grant (HMGP) program. All grants are first released to state governments that have applied for funding following a disaster declaration. Local governments and agencies like the HCFCD can apply for grants that the state has secured. Once funding from the state is received, the HCFCD may begin allocating funds to its prioritized property owners (HCFCD 2020b). In most situations, the HCFCD is required to match at least 25 percent of the federal funding and often fronts the costs for expenses not covered by federal dollars, such as relocation (HCFCD 2021).

In general, FEMA provides grants for communities participating in the NFIP and requires all properties receiving funding from its agency to be environmentally sound, cost-effective, and viable in reducing future risk (FEMA 2007). While the administering agency determines the FMV price for the property, FEMA requires the FMV to be that of the property pre-disaster. Properties acquired using HUD funding are required to either benefit low- or moderate-income (LMI) households, address and eliminate slums and urban blight, or contribute to solving a public safety need (HUD 2017 eligibility). CDBG grants allow the administering agency to offer the owner either pre- or post-disaster FMV, and while offering the post-disaster FMV saves funds and allows the administrator to purchase more properties, it may also result in less participation in the buyout program (Siders 2019).

Each buyout program has its respective additional qualifications. The HCFCD prioritizes qualified properties based on five factors: flood depth and life safety, future land use, percent of public ownership, owner and community interest, and maintenance. Flood depth and life safety refer to how deep the property's floodplain is, as greater depth increases the risk of harm to life. Future land use refers to the possibilities of how the land

can be used after the acquisition. Percent of public ownership implies that a greater percentage of public ownership of a buyout area increases the benefits presented by the buyout. Owner and community interest refers to the amount of support the community shows for the buyout. Property maintenance refers to the costs of maintaining the land once a buyout is made- the lower the costs of maintenance, the higher the priority rating the property receives (HCFCD 2020b). Priority is given to homes that are within the 1 percent floodplain or nearest to bayous and creeks; the two factors typically coincide.

III. Literature Review

Managed retreat is a mitigation strategy that removes people and businesses out of hazardous areas, “retreating” from the impacts of climate change or the poor city planning decisions of the past- sometimes a combination of both. Buyout programs are a tool for achieving managed retreat. Implementing buyouts as a mitigation strategy saves funds, decreases dependence on structural mitigation action, and presents opportunities for communities to repurpose the newly emptied land into public spaces.

However, the process is considered controversial to many. The decisions of who, where, and what is acceptable for a buyout generate the possibility of sustaining or creating social inequities and environmental injustice. With the goal of creating a more agreeable process, governments and buyout program implementers need to continuously make improvements in decision-making processes by creating a culture of absolute transparency in the programs’ parameters and procedures to gain public trust, as well as include the public in meetings to keep them informed.

The impacts of climate change will undoubtedly continue to increase the risk from

major flooding events and storms. Hurricanes and major storms that result in flooding are expensive. Hurricane Harvey alone resulted in an estimated \$125 billion in damages in Texas (NHC 2018). Due to the rising costs of protecting and restoring communities deep in the floodplain, managed voluntary retreat by buyout is expected to play an important role in floodplain adaptation (Kousky 2014). The intention of buyouts is to reduce the damage costs in future major flooding events by decreasing the number of NFIP at-risk policies (FEMA 2021c). FEMA claims that buyout programs instituted in Austin, Minnesota have saved millions of dollars in flood damage (FEMA 2021d), indicating that other regions can also be prevented from withdrawing billions of dollars in federal funding following a disaster. The HCFCD reported that an estimated \$12.4 million in damages were prevented from occurring during the 2015 Memorial Day floods in Texas because of the previous completion of 550 buyouts (FEMA 2021e). As flooding disasters become more frequent, buyouts aid in the prevention of high-cost recovery efforts.

Buyouts present the opportunity to pivot to a stronger reliance on non-structural solutions to flooding and less dependency on structural practices. While buyouts provide nearly certain safety for all those people and buildings that have been removed from the at-risk flood areas, structural mitigation projects like levees and dams only reduce the risk of flooding, are susceptible to failure, and create a false sense of security. Flood control structures also require additional funding for maintenance throughout their lifetime. Funds for the maintenance of the structures are dependent upon the amount of funding that communities and local governments can secure from the state and federal governments (Flood Factor 2021), which may impact the reliability of the structures during and after disasters. Construction of structural projects has been found to promote development and increase the population within floodplains (Holway and Burby 1988; Montz and Gruntfest

1986) therefore generating more risk.

Non-structural mitigation practices are generally accepted as cost-effective strategies that present additional benefits as such as more green spaces and opportunities for conservation projects. Once the property has been cleared of all buildings and structures, the use of the land is decided by the community or local governments. FEMA requires that the land be dedicated and maintained in perpetuity as an open space for the conservation of natural floodplain function” and allows for it to be used for the creation of parks, wetlands management, reserves, unpaved parking lots, and buffer zones (FEMA 2021f).

Repurposing the newly vacant land can improve wildlife habitats, provide new recreational areas, and enhance ecosystem services. Such projects may also increase the property values of surrounding properties (FEMA 2021f), improve the quality of life for the surrounding community with new amenities, and beautify the neighborhood (ELI 2017). However, not all completed buyout properties are considered high-utility, and the repurposing of the land is dependent upon the ideals and expectations of the surrounding community (Zavar 2012). While some local governments creatively repurpose the land, research indicates that most buyout sites remain as vacant lots, often too scattered and intermingled with private properties to provide enough contiguous land for open space development (Zavar and Hagelman 2016). The non-contiguous, patchwork buyout sites are particularly difficult to repurpose in urban environments where buildings, concrete, and lack of adequate space exists (ELI 2017). To make the most use of the newly vacated land, the buyout program administrators will need to communicate with other organizations implementing buyouts programs and strategically plan for buyouts that will yield contiguous vacant plots and focus on projects that benefit the remaining community.

The resources available to the community also determine how the site is repurposed.

Long-term management and maintenance of any newly developed open space requires funding sources and manpower (ELI 2017), which may impose limits on the abilities of a community to make meaningful use of the land. Funding, or lack thereof, is the most critical factor in determining how the land is used (Zavar and Hagelman 2016). Furthermore, the policies and guidelines for any buyout program and its post-buyout purpose are set by its local, overseeing agency, which often receives little to no guidance from the federal funding agencies in implementing the buyout program or the management of the site post-buyout (Greer and Binder 2017; Zavar 2016).

The practice of implementing buyouts and managed retreat (as funded by FEMA HMGP) has existed for over 25 years, but the process still requires maturation in the way of addressing social and environmental justice issues and community displacement. No climate change-driven impact is equally distributed socially, economically, or demographically (IPCC 2013), and the uneven distribution of resources and power will ensure that the responses to climate change are just as inequitable.

Decisions in the buyout process have the capacity to perpetuate or reduce social inequities depending on the methods that decision-makers implement, and in how transparent information and intentions are made. The ways by which the cost-benefit analysis (CBA) of properties is conducted may also perpetuate social inequities (Siders 2018).

CBAs of potential buyouts are inherently subjective and can exclude homes and properties within mid or low-income neighborhoods. Buyout CBAs are based on federal guidelines and subjective practices in judging the value of properties when measuring cost-effectiveness. This has resulted in officials deeming more low-income households as substantially damaged as compared to high-income homes (de Vries and Fraser 2012).

Property owners may choose to decline the buyout and instead alter their homes to comply with new floodplain management regulations. This often becomes troublesome because any homeowner receiving FEMA funds or living within a substantially damaged NFIP covered area will likely be required to make those alterations if the buyout is not accepted, instating the possibility for low-income homeowners to feel forced to accept the buyout if they cannot afford the alterations, (deVries and Fraser 2012) thus leading to the question of how “voluntary” voluntary buyouts truly are.

Additionally, low-income communities are more susceptible to community displacement than mid to high-income communities. The cost-effectiveness rule requires that the property be cheaper to demolish than to receive flood control structures for future flood protection. This leads to mid to high-income communities receiving the benefit of flood control structures and the ability to remain in their homes and community, whereas low-income communities are not afforded the same option (Tate et. al. 2016). Buyouts in low-income communities may also reduce the number of affordable housing options and lower tax revenues, further impacting those who choose to stay as well as those who hope to remain close to their original home. On the other hand, installing flood mitigation structures, removing low-income “substandard” homes, and renovating the empty land with amenities like parks can drive up property taxes, (FEMA 2021f) putting folks remaining in the vicinity in probable financial strain.

Since buyout funds are issued by the federal agency to the local agency, it is the responsibility of the local agency to decide the who and where, as well as the compensation for the voluntary buyout properties chosen; many people apply but only a small percentage are selected. Over 3,500 people applied to the HCFCD’s buyout program following 2017 Hurricane Harvey, but only 20 percent of the applicants met the many qualifications set in

place (Song Ibid, Shaw, and Satilja 2017). Some municipal governments may have buyout programs, but due to restrictions and qualifications, only a small portion will receive the benefits of buyouts while many are left in the 1 percent floodplain with greater financial obligations.

Furthermore, the time span alone from the disaster declaration to the application to the demolition of the home is discouraging enough to stop some people in dangerous flood-prone areas from applying to the program. An HCFCD flood mitigation project titled “Project Hunting” on Houston’s Hunting Bayou watershed was announced in the early 1990s, but voluntary relocations did not begin until 2007, followed seven years later by the initiation of houses taken via eminent domain. Affected residents were left without clear information regarding the timeline or certainty of the project’s implementation for nearly two decades, causing them prolonged anxiety and confusion (Lynn 2017). The processes used by officials require a look into best practices for implementing buyout programs with shorter timelines, or at minimum, that keep affected residents informed.

Buyout programs have been criticized for demonstrating a lack of transparency in their processes. Currently, no program requirements exist for governments or other program implementers to provide clear information regarding the program administration, inclusion or exclusion parameters, or honest, realistic timelines (Greer and Binder 2016). The lack of transparency in the buyout program fuels public distrust, leading to a lack of participation and creating the potential for buyouts to appear to have or to have socially inequitable results (Siders, Hino, and Mach 2019). Among other factors, transparency in the buyout process is a necessary step for program managers to implement to increase public trust and future participation. Transparency allows the public the opportunity to understand the process in its entirety while also demonstrating that those heading the program acknowledge and respect

the difficult decisions and changes those participants are agreeing to endure.

In a statement issued by the HCFCD regarding Project Hunting, the spokesperson promised to make those impacted by relocations “whole again” (Lynn 2017). Relocating communities and promising a sense of wholeness in their sense of place and belonging requires more than adequate compensation, and everyone’s interpretation of wholeness would vary. But in a unique move, HCFCD made efforts to communicate with the communities impacted by the project, initiating over 20 public meetings with residents, business owners, park and bayou protection organizations, the local Habitat for Humanity, and other local organizations. The public meetings rendered changes to the project that attempted to preserve the low-income, minority neighborhood, Kashmere Gardens, rather than eliminating the neighborhood entirely (Lynn 2017). While relocated residents and the neighborhood at large may not be “whole” as they were when the community was intact, these interactions between the HCFCD and the public exemplifies the power of the agency getting to know the people affected and seeking out their critiques and concerns before starting a mass flood control project that impacts living situations of others. The necessity for the public to participate in voluntary buyout programs will continue to rise as the demand for managed retreat increases.

Negative impacts from relocation are the responsibility of state actors who discount the importance of place and community, thus poorly and inadequately administering the process (Griffiths 2005). By principle, no community should be left “worse off” following the process of relocation (Griffiths 2005). Research from Kevin Lynn (2017) provides insights from the current and relocated residents of Kashmere Gardens on their experiences with the buyout process. Interviews revealed grief over leaving a home and neighborhood, frustration with timelines and interactions with HCFCD personnel, and anxiety from leaving a home where the mortgage is paid off, quality of the new home, and the financial strain the process might cause. Ultimately, the interviews indicated that households require ample information,

legal resources, access to mental health counseling, and opportunities to express concerns.

IV. Data

The data I collected for the floodplain property acquisition (FPA) database and maps were obtained from the Harris County Clerk Real Property search portal, data request portals on municipal government websites, and through GIS sources offering free shapefiles.

a. *Data Acquired through the Harris County Clerk Document Search Portal*

The majority of the data in the database I created was collected through the “Harris County Clerk Real Property Document Search Portal” on the Harris County Clerk (HCC) website. This document search portal allows users to search for all real property granted to HCFCD [Appendix A]. The initial search for all property granted to the HCFCD yielded approximately 2,300 return documents (as of November 1, 2021) for voluntary buyouts, as well as properties acquired through eminent domain by HCFCD for projects intended for flood control projects or by condemnation.

Voluntary buyouts are the focus of this study, but property acquisitions by eminent domain are an important next step in researching the processes of managed retreat from the floodplain. As such, I recorded all the information from documents describing eminent domain acquisitions in the FPA database.

Each return document is categorized into an instrument type, or legal document type, denoting the method by which the property was acquired. For this database, six instrument type categories were used: General warranty deeds, special warranty deeds, easements, final judgments on the award, lis pendens, and final court judgments.

The largest category is classified as “general warranty deeds”, notated in the search

portal as “W/D”. In Texas, general warranty deeds are documents that transfer titles with express and implied warranties and warrant the entire chain of title to the grantee (Silberman Law Firm 2021). Special warranty deeds are notated as “S W/D”, transfer property titles, but imply limitations on warranties or guarantees. “Easement” instrument types, notated as “EASMT” express eminent domain acquisitions of property, typically partial, for the use of easements. Instrument types listed as final judgments on award total, notated as “JUDGE”, indicate that the property grantor objected to the award offered by the HCFCD in court and that the court made a final decision on the award to the grantor. Lis pendens instrument types, notated as “L/P”, indicate that there is a pending legal action brought on by a notice of eminent domain to the original property owner. Final court judgment instrument types, notated as “ORDER”, include all court-ordered rulings on eminent domain legal proceedings.

Each of the documents pulled from the Harris County Clerk Portal contained some or all of the following details:

- The name of the property owner(s), also known as the “grantee”
- The compensation, or award, granted for the property by the HCFCD
- The date of the transfer
- The type of grant funding used for voluntary buyout properties
- A description of the property location

Some of the documents also contain additional information including the property’s tract and unit number, marital status of the grantee(s), the sex of the grantee(s), the purpose for the use of properties acquired through eminent domain, whether the land is commercial or residential, whether the property acquired contained a full or partial section of the parcel, the grantee(s) new address, and whether and why the use of eminent domain was legally contested.

The location of each property is listed in various ways on the documents. Most of the documents contain a unit and tract number, a lot and block number, the name of the subdivision, or descriptions of streets and intersections. A small portion of the documents contains physical addresses. Others contain metes and bounds descriptions recorded by the land survey contractor. A small number of the documents does not contain any information pertaining to the property's location. Recording geographic information about the property was necessary for the chance that the geocoded data I requested from the HCFCD was not received or if the received file was missing a property and I would need to manually add it to the map.

b. Data Acquired from the HCFCD

The HCFCD does not publish any of its geographic data in formats for GIS on its website. However, as public information, the data is available by request. I contacted the district via its website contact form requesting shapefiles of the buyouts and eminent domain acquisitions. The files I received contain 3,776 rows of buyout descriptions displayed as polygons in the shape of the property. The properties dated back to 2000. This file contained nearly three times the number of records I found in the HCC searches. I believe this can be attributed to lost paperwork and lack of upkeep with the online database.

The eminent domain acquisitions file is in the same format and contains over 10,000 rows dating back to the 1920s. Both shapefiles were converted from polygons to point features, and all eminent domain properties acquired before 2000 were removed from the attribute table leaving 1,615 points.

c. Data Acquired from Municipal Governments

To fully represent all the floodplain property buyouts completed throughout Harris County, I contacted every individual municipal government within Harris County for information and data on acquisitions made through programs led by the town without assistance from the HCFCD. Most of the municipalities do not lead an acquisition program and leave all acquisition decisions and projects to the HCFCD.

Aside from the buyout program that the HCFCD leads, Harris County's Community Service Department has a buyout program under the name "Project Recovery" that uses Hazard Mitigation Grant Programs (HMGP) funds. After filing requests for GIS data, I did not receive a response.

VI. Methodology

a. Collecting Data from All Entities with Federal Grant-Funded Buyout Programs

I sought to collect GIS data from every other organization and government within Harris County that leads a federal grant-funded floodplain buyout program. This involved researching governments and organizations that purchase floodplain properties, contacting those governments and organizations, and filing data requests.

Municipal governments also can apply for federal flood mitigation grants, so I attempted to collect any buyout data that might exist within the city governments of Harris County. I first contacted via email and/or phone call every municipal government within the county asking if they had a buyout program, and kept a chart detailing who was contacted, what the response was, and if data was received.

Of the 34 villages, towns, and cities partially or fully within the Harris County

boundaries, only two municipalities lead a buyout program. The Cities of La Porte and Pearland stated that their governments use federal grants to purchase flood-prone homes. I submitted data requests through each city's respective website and received shapefiles to add to the final map. The City of Nassau Bay led a one-time buyout project following Hurricane Harvey and provided me with addresses for the eight properties it purchased.

Harris County leads a buyout program separate from that of the HCFCD. The Harris County government established Project Recovery following the 2017 Hurricane Harvey to use CDBG-Mitigation (CDBG-MIT) funds to purchase flood-damaged homes (Harris Recovery 2021). While the program's website contains a section on program transparency, I was unable to obtain any data from it. This may be due to a lack of staff available to respond to calls and emails, or a lack of access to files that would have data. It should be mentioned here that local governments and organizations are likely not refusing to share data or information, but rather may have missed a request or lacked staff members knowledgeable on the topic of buyouts at the time of my requests.

b. Creating the Database

All data recorded in the FPA database was gathered through documents collected from the Harris County Clerk Real Property Document Search Portal and acts as supplemental information to the geodatabases I received from the HCFCD.

The FPA database was created using Microsoft Excel and contains 27 columns and approximately 2,300 rows summarizing each document [Appendix D]. The first column "Policy Document Number" contains the document identification number assigned by the Harris County Clerk, useful for recalling the document. The second column states whether the document is a buyout, notated as "BO", or eminent domain, notated as "ED". Aside from

JUDGE, L/P, and ORDER types, the documents do not explicitly indicate whether the property was acquired via eminent domain or a voluntary buyout. To decipher between which documents belonged to buyouts or eminent domain, I checked for additional pages attached to the document describing the grant funding type, which would only appear for buyouts, as well as information about buyout property regulations [Appendix B]. All other documents without the attached pages were classified as ED [Appendix C]. Additionally, ED included information about irregular parcel shapes, easements, or a note describing the HCFCD project the property was intended for. The following two columns describe the date and year of the purchase. Up to date information is critical for creating timelines of major flooding events leading up to the property acquisition.

The next three columns describe details surrounding the compensation or award for the property given to the grantor. Column E lists the total award for all documents except those with ORDER or JUDGE instrument types. For ORDER and JUDGE types, that were contested in court, the original award sum is listed here. All cells showing \$0 in this category indicate that the grantor offered the parcel as a charitable donation, likely in exchange for tax benefits. All cells that were left blank indicate that the document did not state a compensation amount. The two following columns are for ORDER and JUDGE types only. Column F, “Additional Award” shows the agreed-upon additional award to the defendant if the original was successfully contested by the defendant (grantor). Column G, “Final Award” lists the final total award ordered by the court. This information was split into three columns for ORDER and JUDGE types with the contested award sum so that future studies receive a summary of the award process before and after proceedings.

Column H, “Type” indicates the document’s instrument type. The instrument type is identified on the document’s header, as well as under “instrument type” on the initial returns

page of the HCC Real Property Document Search Portal.

The four following columns list information about the grantor(s). “Owner”, lists the name(s) of the individual(s) or organization that granted the property. “Owner Type” categorizes the grantor into six types: Individual, organization (“Org”), government (“Gov”), Not-for-profit organization (non-profit), religious organization (“Religious”), and estates (“Estate”). To determine which of these categories the grantor fell under, I used context clues, therefore the information listed in this column may not be 100 percent accurate. All grantors with names or names of family members were categorized as individuals. All documents that listed business names were listed as organizations, distinguished by abbreviations and acronyms in the name such as “LLC”, “Org”, “Corp.”, or “Ltd.”. All grantors described as public schools and school districts, cities, counties, municipal utility districts, state universities, or the federal government were categorized under “government”. Some documents included demographic information about the sex(es) of the grantor(s) as well as the grantor’s marital status, which is included in the database in their respective columns. The information regarding demographics and the type of grantor was recorded for the use of future studies should any researcher want to filter the database for a specific type of demographic.

Columns M through R provide summaries of all locational information listed on the document. This information is important for accurately recording the parcel on the map as most of the documents do not contain a physical address and need to be identified using another method should it not be listed in the databases given to me by the HCFCD. Documents that did include a physical address have the address listed within the “Street”, “Town”, and “Zip Code” columns.

The “Unit, Tract” column contains the unit and tract identification number assigned to

the property by Harris County. The unit number indicates the unique identification number for the watershed and facility type that the property is situated within (HCFCD 2021b). For example, the unit number “C100-00-00” is assigned to all properties situated within the Sims Bayou watershed, followed by a series of numbers and letters specifying the facility type (detention basin, channel, etc.) and project activity (bridge, maintenance, right of way (ROW), etc.). The tract number indicates the specific parcel identification number assigned to the property. The tract number follows the unit number. So, “C100-00-00-07-011.3” indicates that parcel 07-011.3 is within the Sims Bayou Watershed and classified as a channel.

Column Q, “Description”, contains all the additional geographic information about the property that is listed on the document. Most include the neighborhood/subdivision name, acreage, lot number, block number, and some contain intersection information. All the columns are filled in with information regardless of whether the other columns are completed for future studies which may require knowledge of topics like the subdivision or neighborhood names. Neither the buyout nor eminent domain HCFCD databases contain information about the properties’ neighborhood or subdivision.

Lastly, column R, “New Mailing Address”, contains the presumed new mailing address of the grantor. Assuming the new mailing address represents where the grantor relocated to after the property acquisition, this information will be useful for researchers studying the movement of people after property acquisition. All blank cells indicate that the information did not exist in the document and was therefore not recorded.

Column S, “Funding Type”, contains information regarding the type of grant HCFCD used to purchase a buyout property. Information about the grant funding types is located within the property document within a set of attached documents describing the regulations

and limitations of the remaining land after a buyout occurs. The grant information described here belongs exclusively to the voluntary buyout properties. Five types of grants were employed by HCFCD for voluntary buyouts. HMGP was the most common type of grant found throughout the documents with buyouts from 2008 to 2020 employing the funding type. HMGP funding is provided to states and local governments by FEMA following a presidentially declared disaster (FEMA 2021g).

Pre-disaster Mitigation Grant Program (PDM) funding is given to states and some non-profit organizations by FEMA for planning and directing hazard mitigation projects before a disaster occurs, helping to reduce the amount of federal funding given following an actual disaster (FEMA 2015). Buyouts made with PDM funding were found on documents from 2008 to 2020.

Community Development Block Grant Disaster Recovery Program (CDBG-DR) funding is provided by the United States Department of Housing and Urban Development (HUD) and is applied for by states and local governments following a Presidential declared disaster (HUD 2021b). CDBG-DR grants were less common in HCFCD buyouts and were used between the years 2012 to 2018. The Severe Repetitive Loss Program (SRL) provides states and local governments participating in the NFIP with funding for insured properties that have experienced two or more insurance claims that have together exceeded the value of the property (FEMA 2012). HCFCD employed SRL grants for buyouts between 2010 and 2015. Lastly, the FMA provides grants to applying states, local governments and communities, and some non-profits for purchasing properties to reduce future flood losses (FEMA 2015). HCFCD used FMA funds for buyouts between the years 2008 to 2018.

Determining if a property purchased via eminent domain removed the ownership of the entire property or a partial section of the property from the owner is important for studying

the patterns and differences of the use of eminent domain in different neighborhoods and areas. The HCFCD eminent domain database does not explicitly indicate if the property described is a full or partial amount of the original property. Column T, “Full or Partial Tract”, states whether HCFCD took the entire property or a portion of it. To determine which method was used, I referred to the description of the property. Within the description I looked for phrases like “save and except”, “portion of”, or “out of” as an indicator that only a portion of the property was taken. Descriptions of the acquisitions of the entire property use the phrase “all of [stated lot]”. Any documents that did not provide enough information regarding the tract size were left blank in this column.

The remaining four columns describe the intended project for eminent domain properties as well as information pertaining to trials and trial rulings. The “Contested” column indicates whether the grantor contested the original eminent domain notice. Documents that began with or included the phrase “No party having filed timely objections to the findings” imply that the grantors did not contest the notice or the awardsum. Documents including the phrases “HCFCD and [name of grantor] announced ready for trial” and “have reached a full... resolution of their differences” imply that the notice or the award sum were contested by the grantor. Only documents with the instrument types “ORDER” and “JUDGE” stated information about any contest. The following columns “Reason for Contest” and “Final Judgement” list the reasons the grantor contested the notice- typically due to the award offered, and the final judgment from the court. Lastly, the final column, “Reason”, describes the project that the HCFCDintended the property to be used for. Most projects listed were for drainage easements, detention ponds, or recreational lands, such as hike and bike trails, for public use. This information was either mentioned in the description of the property or at the top of the document with a project identification number.

c. Mapping Properties without Addresses

Most of the properties listed in the database overlapped with the geocoded databases HCFCD provided, but roughly 100 properties in the FPA database were unmatched. To display as many of the acquisitions completed as possible, I manually recorded the unmatched properties on the map. A small portion listed an address and was simply geocoded and added to the map. For those without a listed address, I used the additional locational descriptions to assign the properties a point representing the approximate locations.

For entries including a unit number, I first identified the watershed using the list of watershed identification and project numbers listed in a TX-DOT flood insurance study document (TXDOT 2019). The HCFCD website lists information on reading and decoding watershed and project IDs, but the TX-DOT document readily lists every ID and was, therefore, more efficient as a reference document. I then referenced the HCFCD “Active Projects in Harris County” embedded GIS application displaying the locations of every project and watershed number (HCFCD 2021c). General boundaries of the project ID located, I used the ArcGIS Pro “Create Feature” tool to add a point representing the recorded property. The point number listed on the attribute table was then added to the “Point Number” column of the database. The locations of these points are approximate, but closely indicate the areas where buyouts were completed.

For entries including a subdivision name within the property description, I used the ArcGIS “Locator” tool to search the subdivision and added a point representing the property. For those entries with subdivisions that the Locator tool could not identify, I referred to the attribute table of the Harris County subdivisions shapefile, adding a point within the

shaded selected area. These points are also recorded in the “Point Number” column. As with the properties mapped using the project ID, these are also approximate locations that closely indicate the areas where buyouts were completed.

The remaining entries that were not recorded in the HCFCD geocoded table and did not list enough information to be mapped using the unit number or subdivision references were left in the database for use of the other available categories of data. The remaining entries can likely be explained as a delay or mishap in recording the information by either the HCFCD or HCC.

d. Adding databases from other municipalities and organizations

The shapefiles given to me by the City of LaPorte and the City of Pearland were added to the map and displayed among the HCFCD points. Pearland is only partially within Harris County. The ArcGIS Pro “Clip” tool was used to exclude properties not within the county in the final map. The properties purchased by the City of Nassau Bay were added manually using the “Create Point Feature” tool. Figure 1 displays these properties alongside the HCFCD buyouts.

VII. Findings and Discussion

In this applied research paper, I asked what types of and how much data I could collect about past federally funded buyout properties, as well as how to visualize it and record it into a functioning database. I sought to establish data collection methods to reap the most information possible about each completed buyout in the past 20 years. With the knowledge that buyouts are under-researched despite presenting effectiveness in managed retreat, but also that programs are often accompanied by social and environmental injustices,

I wanted to know how the quantitative and geographic data could collaborate with qualitative data to add a “human” element to buyout research.

Using Harris County as the study site, the HCFCD as the example agency overseeing buyout programs, and real property data, this directed research report attempted to answer the following: Where have completed voluntary floodplain buyouts occurred within Harris County, Texas since 2001? What entities other than the HCFCD purchase floodplain properties? What information do real property records contain that can be analyzed and recorded to supply additional information about the properties and the previous property owners?

Buyout Properties in Harris County, TX
2000 - 2021

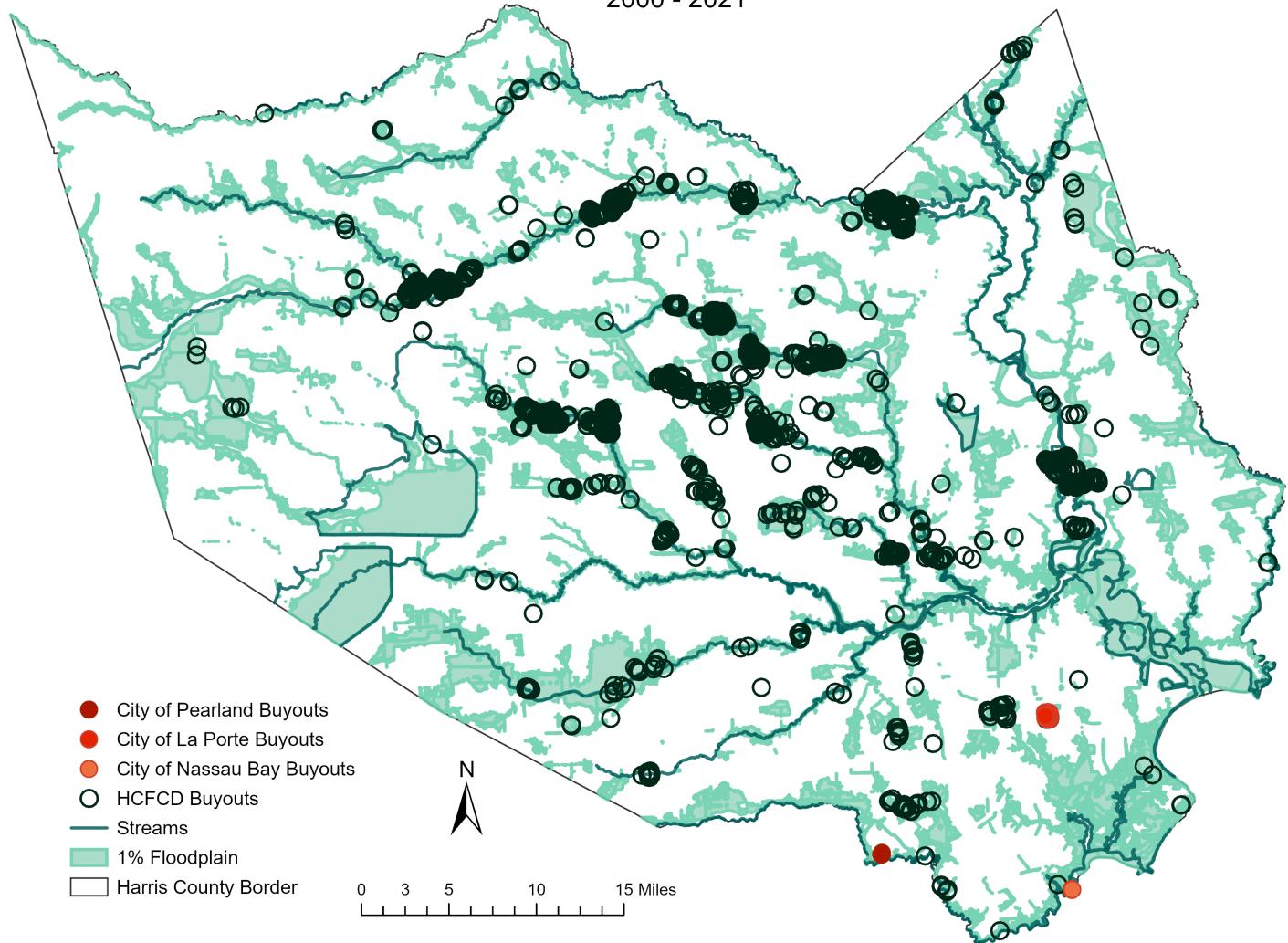


Figure 1. Map of Harris County representing the 1% floodplain, major streams, and federally funded buyouts since 2000

a. Maps of HCFCD buyout properties

I collected shapefiles of buyouts completed by the HCFCD since 2000 and mapped it on ArcGIS Pro Software [Fig. 1]. Nearly 3,000 buyouts completed by the HCFCD are represented with the acquisitions made by the city governments. Buyout locations tend to coincide with the 1 percent floodplain and streams. Concentrations of buyouts are evident in

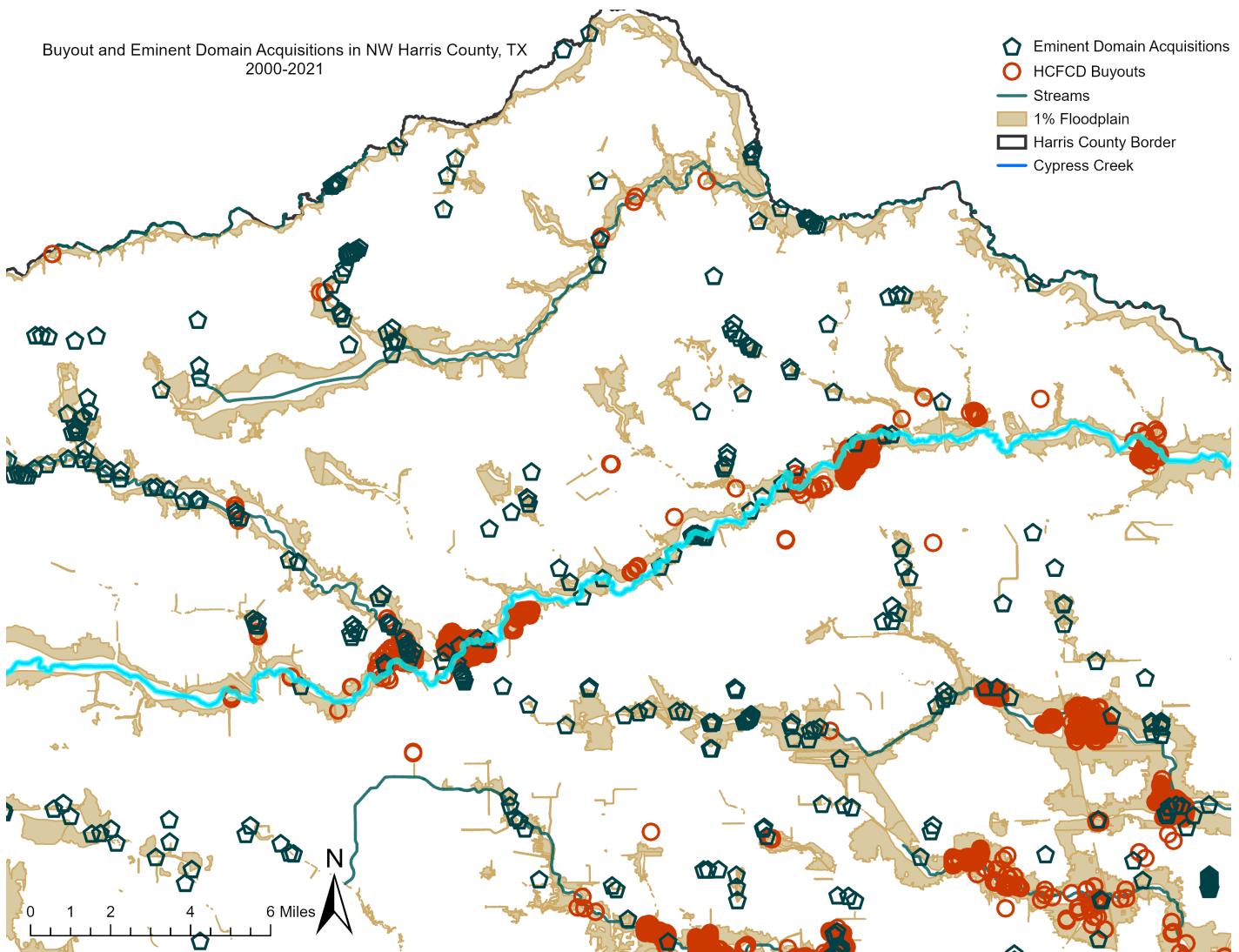


Figure 2. Large scale view of the Cypress Creek watershed area with buyout and eminent domain points

the northwest corner of the county where the Cypress Creek watershed is located.

Unsurprisingly, nearly 9,500 homes and businesses in the watershed were flooded during 2017 Hurricane Harvey. The heavily flood-prone Cypress Creek watershed is an

example of the errors of urbanization before floodplain maps of the county were drawn, errors of which are perpetuated today by a lack of urban development restrictions. A watershed plan from The Houston-Galveston Area Council (2018) estimated 52 percent of the watershed was covered in impervious, urban development, a large leap from the 18 percent cover in 1996.

Generally, urbanization exposes communities to increasing flood hazards by increasing the size and frequency of flood events (Konrad 2016). Despite multiple major flooding events over the past 20 years, development is still permitted in the 1 percent floodplain so long as base elevation codes are met (WGA 2018). Interestingly, HCFCD engineers have made statements to the press that development in the floodplain and urban sprawl play no role in exacerbating flooding events because the HCFCD excavates detention ponds to accommodate new development (Zedaker, Vigh, Arraij 2020).

Transparency in governance is key in building just practices in flood mitigation- but sometimes the problems are so deeply rooted in decisions of the past, they are not immediately obvious. Observing the concentrations of buyouts and eminent domain occurrences in the Cypress Creek watershed [Fig. 2], it begs the question of ethics in flood mitigation. Most eminent domain points indicate that the HCFCD has structural mitigation projects in the area. It can be assumed that large percentages of buyout funding are spent in the Cypress Creek watershed in addition to the costs of detention excavations, not to mention the compensation to home and business owners when eminent domain is enacted to make room for structural mitigation projects to accommodate developers in the floodplain. Residents will continue to endure the distress and fear of flood waters entering their homes. The cycle of buyout applications pouring into the inboxes of the implementors followed by community disruption and more detention ponds and eminent domain use will continue

repeatedly until action is taken to restrict urban sprawl and new development in the deep floodplain. It is impossible to truly establish equitable practices in floodplain retreat and mitigation when this cycle perpetuates environmental injustice for everyone.

b. Municipal government buyouts

The Cities of Pearland and La Porte confirmed that each government has received federal grants for buyouts and continue to apply for funding when applicable.

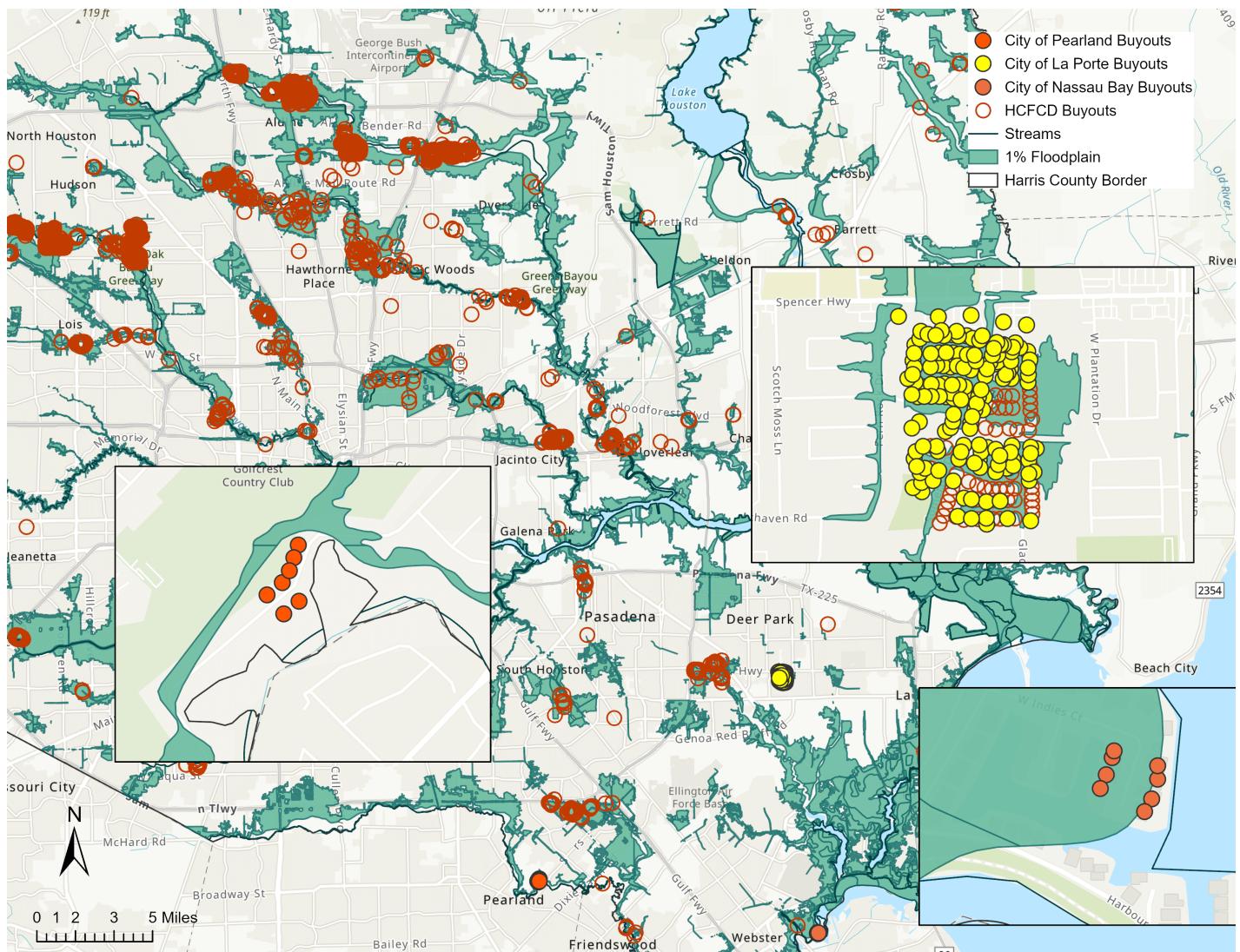


Figure 3. Completed buyouts in Harris County. Insets displaying Pearland, Nassau Bay, and La Porte buyouts

The City of Nassau Bay replied that while the city does not regularly apply for buyout grants, it did apply for and receive a one-time FMA grant to buyout a row of repetitive loss homes in 2017. The city used the funds to purchase and demolish eight houses on Leeward Lane [Fig. 3; yellow]. The city manager also relayed to me that one of the houses in the row did not qualify for the federal grant because it was not covered by an active flood policy. The city used its funds to purchase that house and demolish it. All the demolitions were completed in 2020 and the land now exists as open space in perpetuity for improved storm water quality.

I was surprised to find that so few cities and organizations head buyout programs. Observing city government buyouts, each appears successful in acquiring contiguous lots, which is easier and more realistic for repurposing the land for communitywide benefits. Larger organizations can select more houses for buyouts, but timelines and alternatives often result in program attrition and checkerboard lots, halting any useful land repurposing projects (Zavar and Hagelman 2016). Local governments can even navigate the buyout process quicker than can larger authorities or states when they establish a local funding mechanism independent of federal funds (Peterson et al. 2020), while also having the ability to tailor the projects to local needs and having more flexibility in the selection process (Curran-Groome et al. 2022). Harris County cities likely see the resources and funding of the HCFCD and see no additional benefits to implementing a separate program.

More Harris County cities apply for grants to fund housing elevations than for acquisitions. A representative for the City of Jersey Village confirmed that its government has been focused on using funds to elevate homes as a form of flood mitigation, stating that the city is able to help more residents with this method than by buyouts. The City of Houston began a base elevation program following Hurricane Harvey as did Nassau Bay, Piney Point

Village, Houston, and Friendswood.

c. Notable finds from the HCC search portal

Perhaps the most valuable information obtained throughout this research is contained within the database I created using records stored with the HCC. While the GIS data supplied to me by the HCFCD provided much of the geographical data I needed, the additional data gathered through the records offer details about the previous owners that will prove useful in analyzing past decisions. Using the HCC Document Search Portal, documents describing the exchange between the previous owner and the HCFCD can be found. This data is free and available to the public through the HCC website. The HCC documents provide details about the marital status and sex of the previous owners, the sum offered to the owners for the property, any related court proceedings, the previous owner's new address, and a description of the property including details about the subdivision and shape of the property.

Of the qualitative data collected from the real property documents, I was able to record the type of property owner (individual, business, non-profit, etc.) for 99 percent of the entries. Of those entries, I was able to interpret that approximately 78 percent of the properties acquired by the HCFCD, including by eminent domain, since 2000 were owned by individual residents, 16 percent belonged to businesses, with the remaining categories totaling less than 3 percent each [Table 1]. Some 22 percent of the records included a return address that may prove useful in locating or contacting previous property owners for interviews or surveys in addition to mapping their potential new locations [Fig. 4].

Property Owner Type	Percentage of Total Available Entries
Individual	78%
For Profit Organization/Business	16%
Non-Profit Organization	1%
Government	3%
House of Worship/Religious	1%
Estates and Trusts	<1%

Table 1. Table depicting the breakup of the 99 percent of database entries with information about the type of property owner

The real property documents also provided demographic information. The following numbers are approximate and include both buyout and eminent domain type acquisitions. 41 percent of the database entries provide information about the marital status of the owner. 70 percent of the total are married, with 27 percent single, and 3 percent widowed [Table 2]. 34 percent of the database entries include specification of the sex(es) of the owners. 80 percent of that data included indication of a male and female couple, 8 percent are male, and 12 percent are listed as female.

Qualitative data about the owners of the buyout and eminent domain properties found within the real property documents indicate that more specific details exist for more in-depth study of the kinds of individuals affected by relocation. Additionally, some categories contain further details about the individuals that can be used to create a better picture of them. For example, the “name” column contains some entries with multiple names of owners. It can be inferred that some properties with multiple names sharing a common surname were passed on generation to generation, while some contain multiple listings of the same name(s) under several different properties, perhaps indicating investment properties. In all, the qualitative

data recorded in the database provides specificities about the people and properties affected that would otherwise not be found in GIS shapefiles.

Marital Status	Percentage of Total Available Entries
Married	70%
Single	27%
Widowed	3%

Table 2. Table describing the breakup of 41% of the database entries with information about the marital status of the owner(s)

Sex	Percentage of total available entries
Male and Female Couples	80%
Female	12%
Male	8%

Table 3. Table describing the breakup of the 34 percent of database entries with information about the sex of the owner(s)

The variety of information found within the FPA database begins to create picture of the geographical, economic, and social patterns of Harris County's efforts toward flood mitigation. This data provides numbers and geographical information that can be displayed, studied, and questioned, but it lacks a certain human element. The maps and statistics do not describe the personal impacts or experiences of those who participated in a buyout, which is vital in fully understanding the social effects of the buyout process and the managed retreat process at large.

Additionally, this data does not provide knowledge of the homes or businesses that were not selected in the application process, nor does it display the impacts to those who

opted to stay in their location despite the financial burdens of repairing property and meeting new insurance requirements. A holistic approach will require additional information collected by interviews, surveys, and conversations with the people and communities most affected by the buyout process and past city planning that placed them within the 1 percent floodplain or higher to begin with. This mixed-method approach will allow us to comprehend and identify the benefits of the process, the areas for improvement, the long-term impacts on residents who either chose to stay and rebuild or whose homes were not selected. As the buyout method continues to grow in popularity, this holistic approach can aide in setting smarter guidelines for successful mitigation.

d. Possible new locations of buyout participants



Figure 4. Map displaying the presumed new locations of a portion of HCFCD buyout participants across Texas, South Dakota, Illinois, and Washington D.C.,

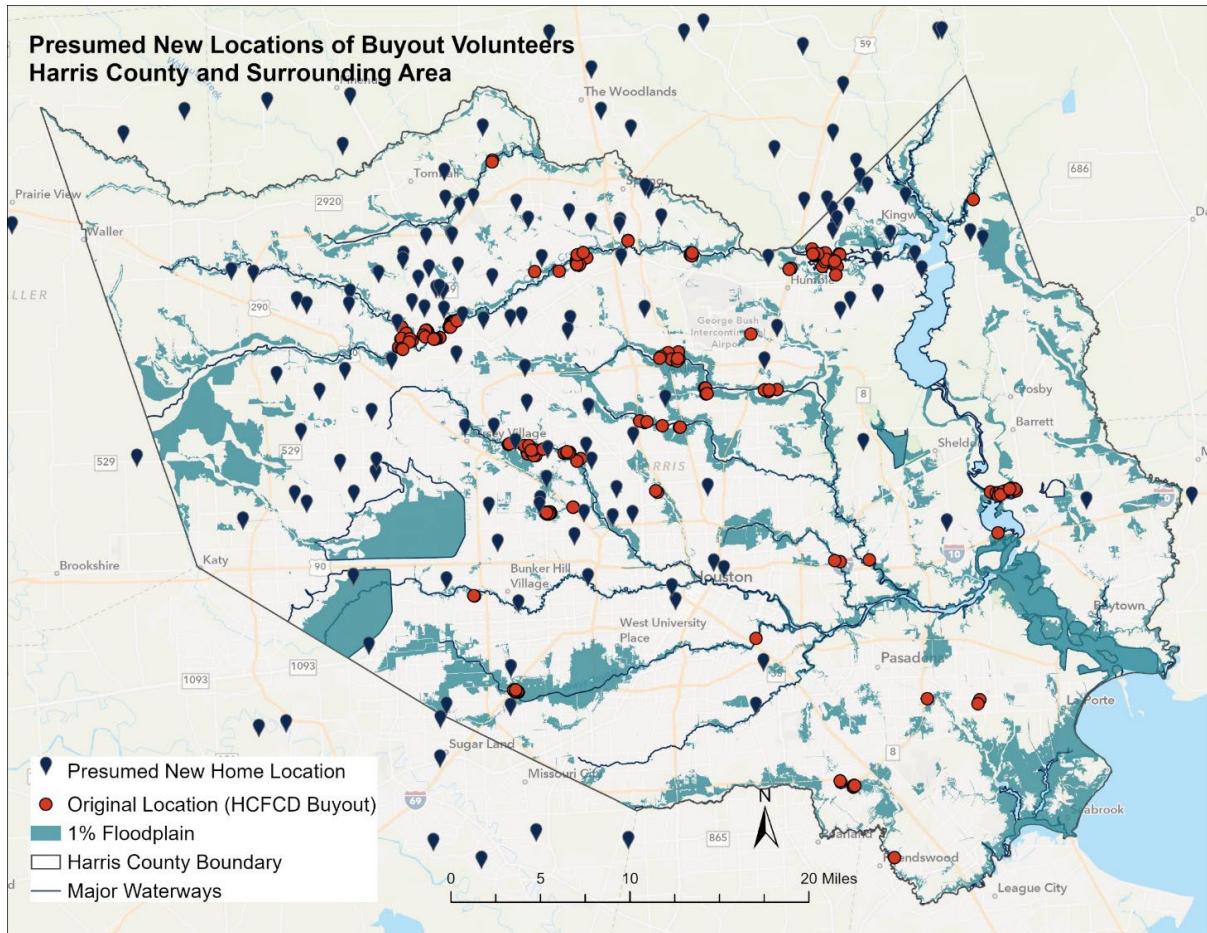


Figure 5. Map displaying the presumed new locations of a portion of HCFCD buyout volunteers who remained in the Harris County area contrasted with the 1% floodplain and original locations

Studying community displacement and the movement of people following the completion of a buyout is a necessary next step in understanding the social justice impacts of buyouts (Siders 2019). Information on where families and individuals move to after giving up their homes would provide researchers and buyout program implementers with a greater understanding of whether those people are remaining in the floodplain or if their new homes are of greater or lesser value than the last. It would also create opportunities to interview the buyout participants and gauge their perceptions of the process and whether they ultimately were happy with the decision.

HCC documents revealed that the new addresses of the homeowners can be found on some of the signature lines. Of the HCFCD buyout properties, 225 of the documents supplied a new home address. A small number of those addresses paint an interesting

backstory. For example, one of the buyout participants appeared to be living in a room at the Red Roof Inn at the time of the finalized transaction.

There are limitations to the accuracy of this data, however, and it should be noted that the addresses are *presumed* new locations. Some of the addresses the homeowner left were the addresses of the buyout property. Other properties may be owned by individuals who rent out the home and some may be unoccupied properties left to a family member in a will or trust. The same opportunities exist in studying the displacement of families and businesses following a full property acquisition by eminentdomain. Approximately 300 of the database entries for eminent domain acquisitions provide new addresses, though with the same limitations.

e. *Eminent domain acquisitions*

The real property documents provided valuable information about properties acquired via eminent domain which were unique to the buyout documents. Because eminent domain orders can be contested, there were court proceedings documents attached to the deed. While most contested for more pay, some documents had personality.

A single woman living in the historically Black neighborhood of Kashmere Gardens contested the eminent domain notice she received from the HCFCD that her home would soon be taken from her. The plot of land she lived on, along with that of other homes on her block, was to be cleared of structures and converted into a hike and bike trail. The court did not lift the eminent domain order, but the woman did convince the court to mandate that the HCFCD memorialize a pedestrian bridge or tree along the hike and bike trail with a plaque in memory of a well-loved teacher from the Kashmere Gardens neighborhood. Less captivating, a multi-acre landowner attempted to contest his compensation for about a quarter of his land.

Unfortunately, the court did not rule in his favor initially. Instead, he requested the dirt upheaved for the HCFCD's project be left on his side of the property for his use. The court granted him the dirt.

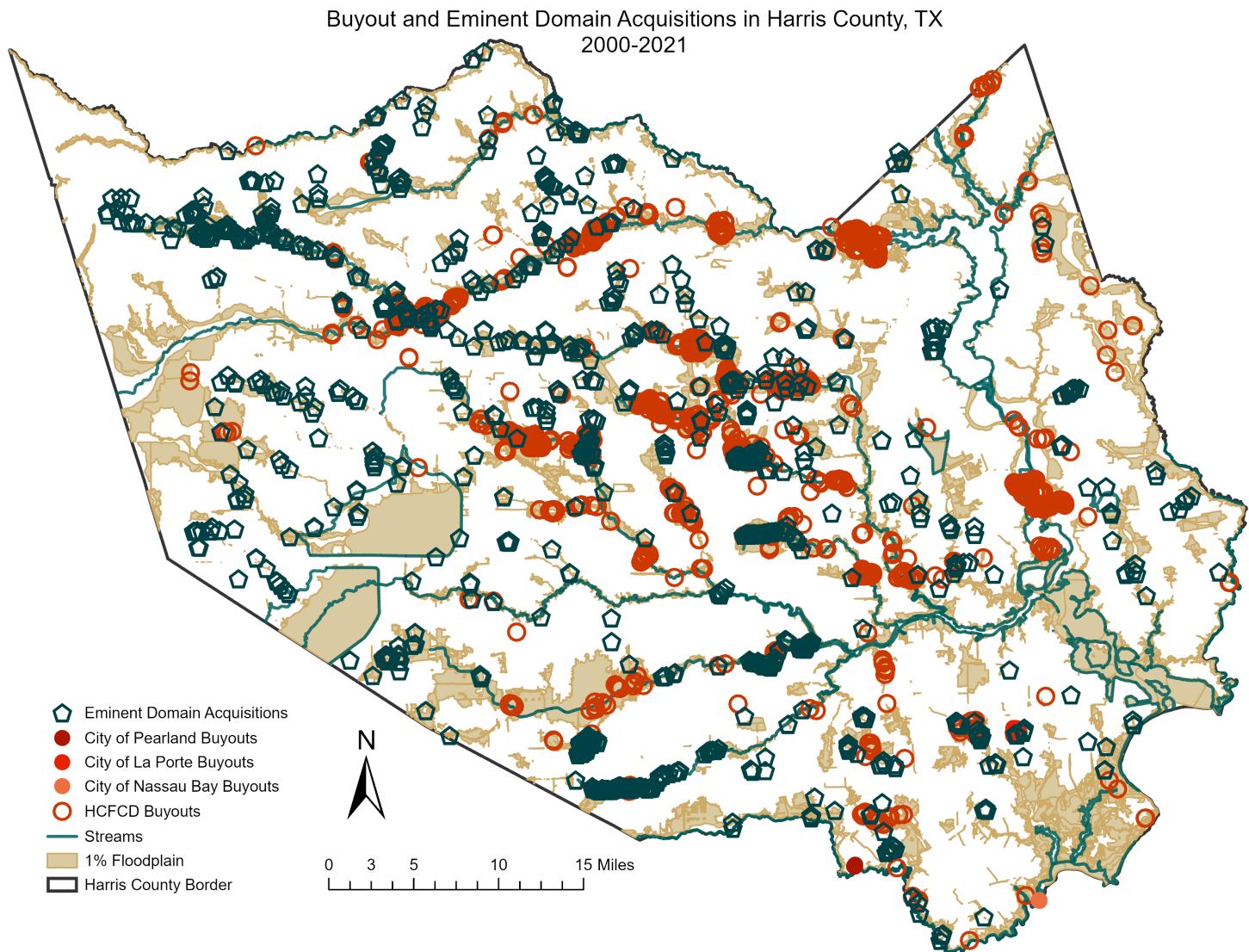


Figure 6. Map of Harris County displaying all HCFCD and municipal government buyouts and eminent domain orders. Eminent domain is ordered for public benefit (flood mitigation projects) or by condemnation.

Figure 6 displays point data from the HCFCD eminent domain database. Series of dots along waterways and the 1 percent floodplain lines indicate flood control projects like easements or ROWs. I performed a spatial analysis in Arc GIS Pro on the eminent domain

points to determine what percent of the points lay outside of the floodplain, but it confirmed that every point is within the floodplain. By this data, the HCFCD only uses its funding and power of eminent domain within its 1 percent floodplain parameters.

Unlike the inconsistent dispersing and condensing of the buyout points, the eminent domain points generally follow a smooth path along the waterways and floodplain. The HCFCD geodata for the eminent domain properties dates to the 1920s, and any eminent domain point that appears erratically placed more than likely connects to a line of other points for projects that occurred before 2000 or will in the future.

The connectivity of the eminent domain projects is especially useful for anticipating the next moves the HCFCD will make. With the knowledge that these points represent a mandatory handing over of property, one might grasp a clearer understanding of upcoming events. The HCFCD has maps on the website outlining future projects, however there is no indication that parts of property or the entire lot may be taken for the projects.

VII. Conclusion

Relocation practices and buyout programs that are socially and environmentally just begin with households and communities having access to comprehensible, accurate, and timely information about the buyout process, as well as for those who will experience mandatory relocation via eminent domain for the purpose of flood mitigation projects. The hope for this work is to describe methodology for buyout and eminent domain data collection and to share the data that can be found in a county clerk search portal. All of which can be compiled and studied and used for the betterment of future programs and to empower flood-prone communities with all the information necessary to educate themselves and have a voice in this process.

The motivating push behind this research lies in the social equity aspects of managed retreat and the buyout process. For many living in flood-prone areas, other environmental dangers exist day to day. On top of taking the brunt of many historical flooding events, the community of the historically Black neighborhood, Kashmere Gardens, has experienced air toxins and pollutants on a daily basis due to nearby chemical plants (Lynn 2017). Retreating from a flood-prone area should never lead a person or family to worse conditions, and those who remain in their neighborhoods among emptied houses should not ever be subjected to the hazards of decaying or unkempt lots or loss of resources.

It is likely that many, if not most, people are either satisfied with or ambivalent about their experiences with buyouts or even eminent domain. Those thousands of Houstonians who actively applied for HCFCD buyout funding are likely looking forward to leaving their flood-prone homes. While preparing to write the literature review, I encountered multiple news articles about dissatisfied Harris County residents following Hurricane Harvey, which mostly entailed distrust of their public leaders and feelings of being treated like a number by disaster response organizations. It indicates that processes which remove people from their homes should be people-focused even if they are happy to take their compensation and leave. Floodplain buyouts will likely gain in popularity in the coming years. Practicing transparency in decision-making, meeting with the community affected, proactive planning, and funding alternative methods to reduce risk will build public trust in organizations like the HCFCD.

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Appendices

Appendix A. Harris County Clerk Real Property Document Search Portal demonstrating criteria for searching warranty deed records

The screenshot shows the Harris County Clerk Real Property Document Search Portal. At the top, there is a logo for "TENESHIA HUDSPETH HARRIS COUNTY CLERK". Below the logo, a navigation bar includes links for "HOME", "COURTS", "PROPERTY RECORDS", "PERSONAL RECORDS", and "COMMISSIONERS COURT". The main search interface features several input fields: "File Number", "Film Code", "Date (From)" (MM/DD/YYYY), and "Date (To)" (MM/DD/YYYY). Below these are fields for "Grantor" (Last Name First - No Punctuation), "Grantee" (Harris County Flood Control District), and "Trustee" (Last Name First - No Punctuation). There are also fields for "Description", "Instrument Type" (W/D), "Volume and Page", "Section", "Lot", and "Block". At the bottom left are "SEARCH" and "CLEAR" buttons. A small credit at the bottom right reads "Photo by Katy Lagunes".

Appendix B. Example of a document that is classified as a buyout type

GENERAL WARRANTY DEED

NOTICE OF CONFIDENTIALITY RIGHTS: IF YOU ARE A NATURAL PERSON, YOU MAY REMOVE OR STRIKE ANY OR ALL OF THE FOLLOWING INFORMATION FROM ANY INSTRUMENT THAT TRANSFERS AN INTEREST IN REAL PROPERTY BEFORE IT IS FILED FOR RECORD IN THE PUBLIC RECORDS: YOUR SOCIAL SECURITY NUMBER OR YOUR DRIVER'S LICENSE NUMBER.

THE STATE OF TEXAS §
 §
COUNTY OF HARRIS §

KNOW ALL MEN BY THESE PRESENTS:

THAT, Amalia Vazquez and Fredik Adrian Vazquez Segovia, hereinafter known as Grantor (whether one or more), of the County of Harris, State of Texas, for and in consideration of the sum of Seventy Five Thousand and 00/100 Dollars(\$75,000.00) to Grantor paid by the Harris County Flood Control District, a political subdivision of the State of Texas, the receipt and sufficiency of which is hereby acknowledged, has granted, sold and conveyed, and by these presents District does grant, sell and convey unto the said Harris County Flood Control District, a political subdivision of the State of Texas, hereinafter known as District, its successors and assigns, the following described property situated in Harris County, Texas: (Unit P100-00-00 Tract 24-814.0)

Lot Fourteen (14), in Block Two (2), of Sequoia Estates Section Three (3), an addition in Harris County, Texas, according to the map or the plat thereof recorded in Volume 273, Page 82, of the Map Records of Harris County, Texas.

The above described property conveyed shall include all right, title and interest, if any, of Grantor in and to, (1) any land lying in a street, road, tollway, accessway or easement (including any drainage or flood control easement) open or proposed, in front of, at the side of, adjoining, or within the above described property, (2) the bed and banks of any bayou, stream, canal or ditch adjoining or adjacent to the above described property, (3) all reversionary rights attributable to the above described property, and (4) all rights of ingress and egress to the above described property by way of open or dedicated roads and streets adjoining the property.

This conveyance is made by Grantor and accepted by the District subject to all valid and subsisting encumbrances, conditions, covenants, restrictions, reservations, exceptions, rights-of-way and easements appearing of record in the Official Public Records of Real Property of Harris

County, Texas, relative to the above described property, but only to the extent the same are applicable to and enforceable against the District. This conveyance is further made subject to the restrictions and conditions contained in Exhibit "A" attached hereto and made part hereof.

TO HAVE AND TO HOLD the above described premises, together with all and singular the rights and appurtenances thereto in anywise belonging unto the said District, its successors and assigns, forever, and Grantor does hereby bind himself, his, herself, her itself, its themselves, their, heirs, executors and administrators, its successors and assigns to Warrant and Forever Defend all and singular the said premises unto the said District, its successors and assigns, against every person whomsoever lawfully claiming, or to claim the same, or any part thereof, subject to the reservations from and exceptions to warranty and conveyance described above.

EXECUTED on May 20, 2021.

Grantor's Address:

2346 Margaret St.
Houston TX 77093

GRANTOR:

Amalia Vazquez
Amalia Vazquez

Grantee's Address:

9900 NW Freeway
Houston, TX 77092

Fredrik Adrian Vazquez Segovia
Fredrik Adrian Vazquez Segovia

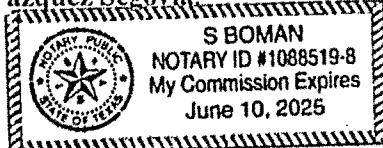
WITNESS:

Isaul Zuniga Hernandez
Isaul Zuniga Hernandez

ACKNOWLEDGMENT

THE STATE OF TEXAS §
 §
COUNTY OF HARRIS §

This instrument was acknowledged before me on May 20, 2021, by Amalia Vazquez and Fredrik Adrian Vazquez Segovia.



Notary Public Signature

NOTARY WITNESS AFFIDAVIT

Date: May 28, 2021

File No: BO2001333

Title Company: South Land Title LLC

Affiant (Witness): Isaul Zuniga Hernandez

Grantor: Fredik Adrian Vazquez Segovia

Property: Lot Twenty-six (26), of Final Plat of Shadow Pond, a subdivision in Brazoria County, Texas, according to the map or plat thereof recorded under County Clerk's File No. 2020043784, of the Official Public Records of Brazoria County, Texas

Affiant, being duly sworn, on oath affirms that the following statements are true:

1. I am over the age of eighteen (18) years and I am authorized to execute this affidavit.
2. The Grantor has executed the following instrument(s) in connection with the Property:

General Warranty Deed

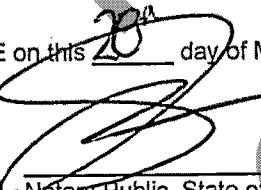
3. The Grantor, being personally known to me, is the person who executed the above described instrument(s), and is the person described in said instrument(s).
4. These representations are made to induce the undersigned notary officer to take the acknowledgment of Grantor in accordance with §121.005(a)(1) of the TEXAS CIVIL PRACTICE & REMEDIES CODE.

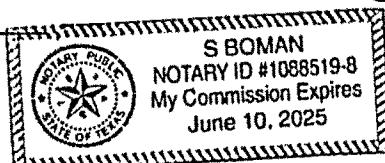

Isaul Zuniga Hernandez

STATE OF TEXAS *Harris* §
COUNTY OF *GALVESTON* §

SWORN AND SUBSCRIBED TO BEFORE ME on this 28 day of May, 2021, by Isaul Zuniga Hernandez.

My Commission Expires:


Notary Public, State of Texas



Notary Name Printed:

Exhibit A

In reference to the property or properties ("Property") conveyed by the Deed between **Amalia Vazquez and Fredrik Adrian Vazquez Segovia** participating in the federally-assisted acquisition project ("the Grantor") and the Harris County Flood Control District, ("the Grantee"), its successors and assigns:

WHEREAS, The Robert T. Stafford Disaster Relief and Emergency Assistance Act, ("The Stafford Act"), 42 U.S.C. § 5121 et seq., identifies the use of disaster relief funds under § 5170c, Hazard Mitigation Grant Program, including the acquisition and relocation of structures in the floodplain;

WHEREAS, the mitigation grant program provides a process for a local government, through the State, to apply for federal funds for mitigation assistance to acquire interests in property, including the purchase of structures in the floodplain, to demolish and/or remove the structures, and to maintain the use of the Property as open space in perpetuity;

Whereas, the State has applied for and been awarded such funding from the Department of Homeland Security, Federal Emergency Management Agency and has entered into a mitigation grant program Grant Agreement dated May 16, 2018 with FEMA and herein incorporated by reference; making it a mitigation grant program grantee.

Whereas, the Property is located in Harris County, and Harris County participates in the National Flood Insurance Program and is in good standing with NFIP as of the date of the Deed;

Whereas, the Harris County Flood Control District, acting by and through the Harris County Commissioners Court, has applied for and been awarded federal funds pursuant to an agreement with the State dated May 16, 2018 ("State-Local Agreement"), and herein incorporated by reference, making it a mitigation grant program subgrantee;

WHEREAS, the terms of the mitigation grant program statutory authorities, Federal program requirements consistent with 44 C.F.R. Part 80, the Grant Agreement, and the State-local Agreement require that the Grantee agree to conditions that restrict the use of the land to open space in perpetuity in order to protect and preserve natural floodplain values;

Now, therefore, the grant is made subject to the following terms and conditions:

1. Terms. Pursuant to the terms of the HMGP program statutory authorities, Federal program requirements consistent with 44 C.F.R. Part 80, the Grant Agreement, and the State- local Agreement, the following conditions and restrictions shall apply in perpetuity to the Property described in the attached deed and acquired by the Grantee pursuant to FEMA program requirements concerning the acquisition of property for open space:

a. Compatible uses. The Property shall be dedicated and maintained in perpetuity as open space for the conservation of natural floodplain functions. Such uses may include: parks for outdoor recreational activities; wetlands management; nature reserves; cultivation; grazing; camping (except where adequate warning time is not available to allow evacuation); unimproved, unpaved parking lots; buffer zones; and other uses consistent with FEMA guidance for open space acquisition, Hazard Mitigation Assistance, Requirements for Property Acquisition and Relocation for Open Space.

b. Structures. No new structures or improvements shall be erected on the Property other than:

- i. A public facility that is open on all sides and functionally related to a designated open space or recreational use;
- ii. A public rest room; or
- iii. A structure that is compatible with open space and conserves the natural function of the floodplain, including the uses described in Paragraph 1.a., above, and approved by the FEMA Administrator in writing before construction of the structure begins.

Any improvements on the Property shall be in accordance with proper floodplain management policies and practices. Structures built on the Property according to paragraph b. of this section shall be floodproofed or elevated to at least the base flood level plus 1 foot of freeboard, or greater, if required by FEMA, or if required by any State, Tribal, or local ordinance, and in accordance with criteria established by the FEMA Administrator.

c. Disaster Assistance and Flood Insurance. No Federal entity or source may provide disaster assistance for any purpose with respect to the Property, nor may any application for such assistance be made to any Federal entity or source. The Property is not eligible for coverage under the NFIP for damage to structures on the property occurring after the date of the property settlement, except for pre-existing structures being relocated off the property as a result of the project.

d. Transfer. The Grantee, including successors in interest, shall convey any interest in the Property only if the FEMA Regional Administrator, through the State, gives prior written approval of the transferee in accordance with this paragraph.

i. The request by the Grantee, through the State, to the FEMA Regional Administrator must include a signed statement from the proposed transferee that it acknowledges and agrees to be bound by the terms of this section, and documentation of its status as a qualified conservation organization if applicable.

ii. The Grantee may convey a property interest only to a public entity or to a qualified conservation organization. However, the Grantee may convey an easement or lease to a private individual or entity for purposes compatible with the uses described in paragraph (a), of this section, with the prior approval of the FEMA Regional Administrator, and so long as the conveyance does not include authority to control and enforce the terms and conditions of this section.

iii. If title to the Property is transferred to a public entity other than one with a conservation mission, it must be conveyed subject to a conservation easement that shall be recorded with the deed and shall incorporate all terms and conditions set forth in this section, including the easement holder's responsibility to enforce the easement. This shall be accomplished by one of the following means:

- a) The Grantee shall convey, in accordance with this paragraph, a conservation easement to an entity other than the title holder, which shall be recorded with the deed, or
- b) At the time of title transfer, the Grantee shall retain such conservation easement, and record it

with the deed.

iv. Conveyance of any property interest must reference and incorporate the original deed restrictions providing notice of the conditions in this section and must incorporate a provision for the property interest to revert to the State, Tribe, or local government in the event that the transferee ceases to exist or loses its eligible status under this section.

2. Inspection. FEMA, its representatives and assigns including the state or tribe shall have the right to enter upon the Property, at reasonable times and with reasonable notice, for the purpose of inspecting the Property to ensure compliance with the terms of this part, the Property conveyance and of the grant award.

3. Monitoring and Reporting. Every three years, the Grantee (mitigation grant program subgrantee), in coordination with any current successor in interest, shall submit through the State to the FEMA Regional Administrator a report certifying that the Grantee has inspected the Property within the month preceding the report, and that the Property continues to be maintained consistent with the provisions of 44 C.F.R. Part 80, the property conveyance, and the grant award.

4. Enforcement. The Grantee (mitigation grant program subgrantee), the State, FEMA, and their respective representatives, successors and assigns, are responsible for taking measures to bring the Property back into compliance if the Property is not maintained according to the terms of 44 C.F.R. Part 80, the property conveyance, and the grant award. The relative rights and responsibilities of FEMA, the State, the Grantee, and subsequent holders of the property interest at the time of enforcement, shall include the following:

a. The State will notify the Grantee and any current holder of the property interest in writing and advise them that they have 60 days to correct the violation.

i. If the Grantee or any current holder of the property interest fails to demonstrate a good faith effort to come into compliance with the terms of the grant within the 60-day period, the State shall enforce the terms of the grant by taking any measures it deems appropriate, including but not limited to bringing an action at law or in equity in a court of competent jurisdiction.

ii. FEMA, its representatives, and assignees may enforce the terms of the grant by taking any measures it deems appropriate, including but not limited to 1 or more of the following:

a) Withholding FEMA mitigation awards or assistance from the State or Tribe, and Grantee; and current holder of the property interest.

b) Requiring transfer of title. The Grantee or the current holder of the property interest shall bear the costs of bringing the Property back into compliance with the terms of the grant; or

c) Bringing an action at law or in equity in a court of competent jurisdiction against any or all of the following parties: the State, the Tribe, the local community, and their respective successors

5. Amendment. This agreement may be amended upon signatures of FEMA, the state, and the Grantee only to the extent that such amendment does not affect the fundamental and statutory purposes

Appendix C. Example of a document that is classified as an eminent domain type

WARRANTY DEED

THE STATE OF TEXAS

§
§
§

COUNTY OF HARRIS

KNOW ALL MEN BY THESE PRESENTS:

That **FULLER THOMPSON TEN, LTD.**, a Texas limited partnership hereinafter known as Grantor, in consideration of the sum of Ten Dollars (\$10.00) cash and other good and valuable considerations in hand paid by the **Harris County Flood Control District, a political subdivision of the State of Texas**, of the County of Harris, hereinafter known as Grantee, the receipt of which is hereby acknowledged, has **GRANTED, SOLD and CONVEYED** and by these presents does **GRANT, SELL and CONVEY**, unto the Grantee, its successors and assigns, those certain tracts or parcels of land situated in the County of Harris, State of Texas, described as follows, to wit (the "Property"):

6.3498 acres, more or less, of land situated in the Nathaniel Lynch Survey, Abstract No. 44, in Harris County, Texas, being more particularly described by metes and bounds in Exhibit "A" attached hereto and made a part hereof, for descriptive purposes.

The above described property conveyed shall include all right, title and interest, if any, of Grantor in and to, (1) any narrow strip of land lying between the described property, as described herein and any adjacent or abutting land not owned by Grantor, which narrow strip of land was intended by the Grantor and Grantee to be conveyed hereby as part of the described property, but which because of surveying error or omission may have been inadvertently excluded as part of the described property and (2) all reversionary rights attributable to the above described property.

This conveyance is made by Grantor and accepted by Grantee subject to all valid and subsisting encumbrances, conditions, covenants, restrictions, reservations, exceptions, rights-of-way, and easements appearing of record in the Official Public Records of Real Property of Harris County, Texas, relative to the Property, but only to the extent the same are applicable to and enforceable against Grantee.

TO HAVE AND TO HOLD the Property, together with all and singular the rights and appurtenances thereto in anywise belonging, unto said Grantee, its successors and assigns, forever, and Grantor does hereby bind itself, its successors and assigns, to WARRANT AND FOREVER DEFEND all and singular the Property, unto the said Grantee, its successors and assigns, against every person whomsoever lawfully claiming or to claim the same or any part thereof, by, through, or under Grantor, but not otherwise, subject however only to those to matters (other than liens) recorded in the Office of the County Clerk of Harris County, Texas to the extent same are valid and affect the Property and the reservations herein.

EXHIBIT A
Property

(Tract 1 of 1)

METES AND BOUNDS DESCRIPTION

6.3498 ACRES (TRACT 1)

HARRIS COUNTY, TEXAS

June 2, 2021

Description of 6.3498 acres (276,597 square feet) of land being the remainder of a called 139.3785 acres as conveyed by Special Warranty Deed dated November 30, 2007 to Fuller Thompson ten, Ltd. as recorded under Clerk's File No. 20070709051 of the Official Public Records of Real Property, Harris County, Texas and being situated in the Nathaniel Lynch Survey, Abstract No. 44, City of Baytown Harris County, Texas and being more particularly described by metes and bounds as follows: (*all bearings herein are based on GPS observations referenced to the Texas State Plane Coordinate System, South Central Zone*)

BEGINNING at a 5/8-inch iron rod with cap stamped "South Texas" found for easternmost corner of Lot 1, Block 1 of Thompson Ten Business Park, Section 1 as recorded under Film Code No. 676844 of the Map Records of Harris County, Texas and being situated in the west right-of-way line of Thompson Road (width varies);

THENCE South 02°12'09" East, along the west right-of-way line of said Thompson Road, for a distance of 165.09 feet to a 5/8-inch iron rod with cap stamped "Benchmark Engr" set for corner in the northwest line of Unit D, Block 142 of the Elena Fruit & Cotton Farms Subdivision as recorded under Volume 7, Page 48 of the Map Records of Harris County, Texas;

THENCE South 63°06'21" West, along the northwest line of said Unit D, Block 44 of the Elena Fruit & Cotton Subdivision, for a distance of 2,100.21 feet to a 5/8-inch iron rod with cap stamped "Benchmark Engr" set for corner at the easternmost corner of a called 13.388 acre tract as conveyed by Special Warranty Deed dated December 3, 2018 to MG Real Properties as recorded under Clerk's File No. RP-2018-541281 of the Official Public Records of Real Property, Harris County, Texas

THENCE North 81°59'14" West, along the north line of aid 13.388 Acre tract for a distance of 148.02 feet to a point for corner at the southeast corner of a called 3.420 acre tract as conveyed by Special Warranty Deed dated January 7, 2020 to QMC real Estate – Baytown LLC as recorded under Clerk's File No. RP-2020-17013 of the Official Public Records of Real Property, Harris County, Texas;

THENCE North 26°53'32" West, along the east line of said 3.420 acre tract, for a distance of 129.82 feet to a PK Nail found at the southwest corner of "Restricted Reserve B" of said Thompson Ten Business Park , Section 1;

THENCE South 81°55'33" East, along the south line of said Restricted Reserve "B", for a distance of 269.61 feet to a 5/8-inch iron rod with cap stamped "Benchmark Engr" set for corner;

THENCE North 63°06'21" East, along the south line of said Restricted Reserve "B", for a distance of 553.47 feet to 5/8-inch iron rod with cap stamped "Benchmark Engr" set for corner;

THENCE North 18°06'21" East, along the south line of said Restricted Reserve "B", for a distance of 127.28 feet to a 5/8-inch iron rod with cap stamped "Benchmark Engr" set for corner;

THENCE North 63°06'21" East, along the south line of said Restricted Reserve "B" and the south line of said Lot 1, Block 1, passing at a distance of 156.93 feet a 5/8-inch iron rod with cap stamped "South Texas" and continuing in all for a total distance of 1,426.15 feet to the **POINT OF BEGINNING** and containing within these calls 6.3498 acres (276,597 square feet) of land.

Appendix D.

Example Photos of the FPA Database

A	M	N	O	P	Q	R
Policy Document	Street	Town	Zip Col	Unit, Tract	Description	New Mailing Address
1				P118-14-00-01-0190	1.822 acre tract out of lot	
2	RP-2017-21780			P100-00-00-38-0320	portion lot 24, Bammel Oaks	10510 Rockcrest Rd., Houston, TX 77041
3	RP-2018-229610			D100-00-00-03-8080	Lot 21, Block 14, Idylwood	12710 S. Daily Ashford, Houston, TX 77099
4	RP-2018-508294			A118-00-00-01-8010	Lot 34, Block 11, Wedgewood Village, Section 3	16330 Blackhawk Blvd., Friendswood, TX 77546
5	RP-2018-181898			P136-00-00-03-0100	Lot 215, Block 12, Humble Road Place, Section 2	17303 Huntersgen Circle, Humble, TX 77396
6	RP-2018-51386					
7	RP-2018-560247			p118-00-00-14-8470	Lot 139, Block 8, Northline Terrace	18457 Melissa Springs, Tomball, TX 77325
8	RP-2018-315008			B10-00-00-07-8540	Lots 61, 62, and 63, Block 1, Rio Villa, Section 1	244 Roy Bean, Livingston, TX 77351
9	RP-2018-348599			B10-00-00-07-8540	Lot 18, Block 1, Brookglen, Section 1	3323 Gladbyne, LaPorte, TX 77551
10	RP-2018-102948	8475 Sonnevile Dr.	Houston	E115-00-00-03-8280	Lot 78, Block 5, Langwood, Section 2	3324 Avenue G., Galveston, TX 77550
11	20110375185			H100-00-00-R001, 13-0330	Lots 1092 and 1093, Block 47, Kashmere Gardens	5111 Wayne St., Houston, TX 77026
12	RP-2018-26253			H100-00-00-R001, 13-0330	Lot 168, Block 3, Castlewood Addition, Section 2	5702 Glemmere Ln., Spring, TX 77379
13	20120536057			H100-00-00-R001, 13-8150	Lots 1356 and 1357, Block 35, Kashmere Gardens Extension	6010 Delbury, Houston, TX 77085
14	RP-2017-57510			E124-00-00-01-8040	Lot 19, Block 1, Woodland Trails West, Section 2	6515 Coral Ridge Rd., Houston, TX 77069
15	20100195853			E121-00-00-01-8240	Lot 16, block 2, Arbor Oaks	7022 Plum Grove Ln., Houston, TX 77091
16	201003109269			H100-00-00-R001, 13-0120	out of lots 176, block 5, Crane Street Gardens	732 Bigwood St., Houston, TX 77016
17	RP-2018-80927			D10-00-00-20-8320	Lot 18, Block 6, Braeburn Glen Subdivision, Section 1	7911 a Roche Ln., Houston, TX 77036
18	RP-2018-472625			M100-00-00-15-8010	881 County Rd 3450, Lovelady, TX 773851	
19	RP-2018-282342			D100-00-00-20-8250	8322 Valley View Ln., Houston, TX 77074	
20	20150091989			P100-00-00-01-0300	Lot 1592, Block 56, Home Owned Estates, Section 4	9900 NW Fwy., Houston, TX 77092
21	RP-2017-88973	7139 Wood Heather Ln.	Houston	77040 E100-00-00-16-0340	Lot 37, Block 7, Woodland Trails West, Section 1	Red Roof Inn #231, 12929 NW Fwy., Houston, TX
22	20100262243			D100-00-00-00-0301	Lots 363 and 364, block 61, Kashmere Gardens	
23	200905629869	530 Maple Way	Houston	77015 H100-00-00-13-0540	Lot 1724, block 61, Home Owned Estates, section 5	
24	20100349956				Lot 8, block 1, Stannard Place	