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What Do We Do with the Land Left Behind? XSP for Floodplain Buyout Parcels

Working Paper WP22KM1

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August 2022

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Abstract

Flood risk is increasing across the country due to extreme precipitation, outdated infrastructure, poor development practices, and climate change. As climate impacts like storm surge and sea level rise intensify risks, some communities are considering voluntary property acquisition programs (buyouts) as part of their adaptation and resilience strategies. Buyouts have been used for decades as a way to permanently mitigate flood hazard, but existing programs are full of problems such as inequitable outcomes, long wait times, and burdensome management practices for acquired parcels. Uncertainty about participation rates, funding sources, and the contiguity of participating properties makes planning for effective adaptive reuse especially challenging. Small municipalities with limited capacity struggle to overcome the technical challenges of applying for federal flood mitigation grants, implementing buyouts, supporting participating households as they relocate, and tending to the open space which buyouts create. To date, the ability of such governments to integrate buyout programs into comprehensive and long-range planning for housing, the environment, land use, or capital improvements remains elusive. Since exploratory scenario planning is a useful tool for managing uncertainty, this research project set out to explore what the key scenario planning considerations for buyout program managers could be. This paper will provide an overview of the role of buyouts in permanent flood mitigation, the key drivers for buyout planning, certainties and uncertainties in land use planning, and a conceptual design outcome for one identified scenario (a stormwater pocket park), using Long Island as a case study site intervention.

Keywords: Climate change adaptation, flood mitigation, voluntary property acquisition, home buyout, adaptive reuse, environmental restoration, exploratory scenario planning, landscape architecture

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Acknowledgements

Buy-In Community Planning would like to thank everyone who has contributed to this project, particularly our Summer 2021 Research Intern, Victoria Woods, and the thought partnership of Dept. LLC. In addition to the project team, this research is the fruit of multiple collaborative engagements and efforts, particularly with: Jane Brogan, former Chief Policy and Research Officer at the New York State Governor's Office of Storm Recovery (GOSR); Peter Mattingly, Research Program Manager (GOSR); Alex Pennington (GOSR). Special acknowledgement and thanks go to the Lincoln Institute of Land Policy team, particularly Patrick Welch, Amy Cotter, and the team who hosted the Consortium for Scenario Planning Conference in February 2022.

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What do we do with the land left behind? XSP for floodplain buyout parcels

Buyouts as a Tool for Permanent Flood Mitigation: Opportunities and Challenges

The number of neighborhoods in the United States threatened by severe and chronic (very frequent) flooding is increasing. In 2020, First Street Foundation's First National Flood Risk Assessment found that 16.2 million properties will be at substantial risk of flooding in any given year by 2050 (First Street Foundation, 2020). Increasingly frequent and catastrophic storms have already caused billions of dollars of damage across the country, displacing residents and taking lives. By 2045, more than 280,000 residents of the United States will be forced to adapt or relocate due to chronic, disruptive flooding, threatening \$135 billion in property (Dahl et. al, 2018). Additional studies confirm that flood risk is much more significant than FEMA's mapped estimates and that flood risk disproportionately impacts low income and non-White communities (Wing et. al, 2022). Where flood mitigation infrastructure does not or cannot fully protect properties from flooding, elevating, or reinforcing homes remains an option for households who would like to stay in place. However, this kind of adaptation in high-risk areas may merely defer hard decisions that towns must make about relocating infrastructure, housing, and critical assets as climate risks and their associated costs intensify.

Government-funded voluntary property acquisitions (also called buyouts) are an essential tool for residents and local governments seeking to permanently eliminate flood risk by removing assets from high-risk flood zones. Despite their utility in permanently eliminating risk and costs associated with flood hazards, buyouts have to date have had only a lukewarm reaction amongst planners and policy makers and are often approached with hesitation by residents. Many state and local governments do not plan for buyouts openly or proactively due to concerns about political backlash and loss of tax revenue. Consequently, buyout programs are primarily created and implemented as a post-disaster mechanism rather than as a proactive adaptation strategy to increase community resilience.

Since 1980, the Federal Emergency Management Agency (FEMA) has bought out more than 43,000 homes, although buyout programs are also funded by other federal agencies, states, and local programs. Unfortunately, the process required to apply for, obtain, and implement federally funded programs is complicated, slow, and opaque, averaging more than five years to implement from start to finish (Weber and Moore, 2019). Many low-capacity localities do not have the staff time or resources to apply for federal funds and manage awards effectively if funds are awarded. In the post-disaster context, program managers rarely have time to share best practices that could improve the buyout process and currently lack a forum for doing so (Greer and Binder, 2016). Buyout programs are notorious for poor communication, partially due to long time frames for approval across multiple levels of government. Poor communication not only leaves stakeholders at the local level confused and frustrated, but it can cause significant friction amongst participants and program managers, resulting in high attrition rates and mistrust of well-intentioned programs (Schwaller et. al, 2020).

In addition to administrative challenges, buyout programs face significant social and psychological barriers. Although buyout programs provide a critical relief lifeline for

homeowners who have had enough, leaving home can be a deeply challenging decision to make. For households who stay behind, there is often an overwhelming feeling of loss and despair, as neighborhoods and neighbors' homes are razed. This may result in a 'Swiss cheese' or 'checkerboard' effect, whereby only scattered, non-contiguous parcels participate. When this happens, buyouts are sometimes thought to increase blight, dumping, or depreciate property values in the neighborhood. Pursuing novel strategies such as life estates for "hold outs" or residents who are reluctant to leave could be one way to ensure that properties are incorporated into a longer-term vision for floodplain restoration and climate adaptation (Pew Charitable Trusts, 2022).

Likewise, buyout programs intersect with legacies of housing segregation that pushed communities of color to live in undesirable areas that are more vulnerable to these threats. According to the Center for Disease Control, the ten counties across the country that have been deemed the most vulnerable to disasters have populations that are 81% minority on average, although minorities only account for 39% of the US population (Frank, 2020). Despite their higher levels of vulnerability, continued disenfranchisement and inadequate resources have drastically undermined many communities' ability to access monetary and leadership resources for resilience and hazard mitigation planning, increasing inequality as risks intensify (Howell and Elliot, 2018). Recent studies have shown that buyouts are also disproportionately offered in wealthier, whiter counties, but that low income and minority neighborhoods are more likely to accept buyouts than their whiter, wealthier counterparts (Elliot et. al, 2020). Unequal protection of renters, a lack of affordable housing, and unequal access to credit mean that it is difficult for low-income households to find re-housing options. As a result, buyouts often reproduce historic discriminatory policies and practices, even when they comply with anti-discrimination laws (Cusick, 2020). The intersecting crises of housing, racial and economic justice have made implementing equitable buyout programs extremely challenging, leaving little room and attention to the adaptive reuse of buyout parcels, despite the robust potential outlined in the next section.

Planning for Reuse of Buyout Parcels

Existing Guidance and Implementation of End Use Best Practices

Buyout end use depends on the funding stream utilized. Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBG) programs, for example, allow for redevelopment of parcels, but FEMA-funded buyouts require parcels to remain deed-restricted open space in perpetuity. Unfortunately, such open space is rarely seen as a valuable asset and redevelopment often meets staunch opposition from displaced residents. For decades, FEMA has provided guidance for municipalities on what to do with the bought out properties. The FEMA Property Acquisition Handbook for Communities Phase IV Open Space Management (1998) identifies the following open space uses for buyout land: wetland restoration, greenway, athletic fields, campgrounds, gardens, bird sanctuary, wildlife refuge, and ecological education center. Prohibited uses include those that remove natural vegetation, restrict flows, reduce capacity to store floodwaters, increase velocities, or restrict access (FEMA, 1998, p. IV-4). Despite this available guidance, many local programs fail to maximize the adaptive reuse potential for buyouts, largely due to the funds required to identify, fund, develop, and maintain projects. Although FEMA-funded buyout programs have maintenance requirements for

municipalities, FEMA programs do not fund ongoing maintenance work, causing an undue financial burden on local governments that may already be cash strapped (Pew Charitable Trusts, 2022).

To date, limited research has been done on the adaptive reuse of buyout properties. A study on land use changes on floodplain buyout sites between 1990 and 2000 found that localities without land use plans, or a more “ad hoc approach to open space management” had higher rates of buyout properties being left simply as vacant land (Zavar and Hagelman, 2016) as opposed to integrated into a broader open space strategy. The study also highlights that despite federal guidance on best practices for buyout parcel reuse, most decisions about land use are made at the local level and are therefore heavily influenced by “adjacent land uses, managerial capacity, and pre- and post-disaster development trends” (Zavar and Hagelman, 2016). Additional factors which influence end use planning include the “history of natural disasters in the area, social and environmental geographies, development patterns, land prices, political dynamics, and the individual values and perceptions of nearby residents” (Albornoz, 2021). Communities that have open space plans are more likely to readily incorporate buyout properties into a strategic vision for community development and recovery. Thus, while guidance on best practices is likely to play an important role in identifying possibilities, alternative tools, and techniques for helping communities envision what to do with vacant, post-buyout parcels given their local contexts, capacities, and constraints is perhaps even more important.

Emerging Opportunities for Land Re-Use

Despite their challenges, buyouts have the potential for a range of tremendous social, economic, and environmental benefits. Federally funded buyout programs are required to have a Benefit-Cost Ratio (BCR) greater than 1, but limited empirical documentation of the benefits associated with buyout parcel reuse pose a barrier to competitive applications. Although FEMA changed its BCA methodology in 2013 to include environmental and ecosystem benefits, “environmental benefits can be added to a project’s total net benefits if (and only if) the project in question already has a BCR of 0.75 or greater using traditional benefits” (ELI and UNC, 2017). As a consequence, traditionally, gray infrastructure solutions like seawalls are usually preferred over buyouts due to the perceived stronger economic benefits of preserving the existing tax base. However, seawalls are increasingly shown to have adverse effects on ecosystems, and can cause a phenomenon called coastal squeeze, when migrating wetlands are blocked from moving inland.

Today, there is a growing appetite for green infrastructure solutions that provide multiple co-benefits that gray infrastructures lack, such as riverine and coastal floodplain restoration. Restoration projects can improve water quality, recharge aquifers, create wildlife habitat, sequester carbon, and generate economic benefits through sustainable agriculture and recreation (Albornoz, 2021). Restored floodplains may also help to protect surrounding built assets as climate risks intensify (Kodis et al. 2022). Conservation organizations, which are already experts in “preserving, restoring, and sometimes managing coastal, riparian, and fire prone landscapes,” (Kodis et al, 2022) are critical partners for helping plan, design, and implement land reuse strategies. Unfortunately, there are currently limited tools to connect homeowners and local governments to other organizations such as conservation groups, parks and recreational organizations, watershed organizations, and land trusts who may be interested in acquiring land or supporting the ongoing maintenance of acquired land (Pew Charitable Trusts, 2022). When

private management is infeasible, buyouts that convert high-risk private properties into public assets can create new opportunities for public land use planning (Zavar and Schumann, 2020) and increase equitable access to open space, an issue highlighted by the COVID-19 pandemic.

Learning from Vacant Land Revitalization and Urban Greening Literature

In many ways, the challenges with buyout programs mirror other vacant land challenges, which also have disproportionately affected communities of color. Though the root causes are different, the spatial, economic, and social impacts of urban vacancy and buy-out properties are surprisingly similar. Research shows that vacant land left unmanaged within a neighborhood is associated with higher crime rates than managed vacant land (Heinze, 2018). Likewise, vacant land may reduce community wellbeing by increasing anxiety and “overshadowing positive aspects of the community, contributing to fractures between neighbors... and making residents fearful” (Garvin et. al, 2013). In addition to the negative mental health impacts of vacancy, low-contiguity patterns can cause a maintenance headache for municipalities due to a relative increase in the cost of continuing to provide infrastructure and public services to properties that remain behind. Mallach (2018) illuminates that, “although vacant properties are a problem, they are first and foremost a symptom of other problems—concentrated poverty, economic decline, and market failure”. Thus, communities with limited government staff capacity, funding, and civic engagement may not be able to utilize buyout properties to the fullest extent.

There is opportunity to learn from public agencies that have overcome the challenges of vacant land. The growing number of potential buy-out properties considered in comprehensive ‘managed retreat’ plans from the coast may eventually match the scale of “shrinking” cities such as Detroit, Cleveland, and Baltimore, which historically have suffered declining populations and urban vacancy due to deindustrialization, economic shifts, and employment patterns. Unique approaches to vacant land in these postindustrial cities include side-lot programs, urban gardens, and neighborhood greening committees. Community organizing and deep engagement with resident desires can overcome some of the challenges mentioned above (see Mallach, 2018). For example, in a neighborhood in Detroit, local community organizations, public organizations and private organizations leverage a myriad of private and public dollars to support a community driven, multi-pronged approach to revitalization that included housing rehabilitation, the creation of a greenway and community park, and innovative vacant lot greening as dog parks, urban gardens and informal community space. The use of land banks and community land trusts to consolidate and manage vacant land is another strategy worth exploring for communities facing the daunting planning challenges associated with buyout program design, management, and implementation. Beyond these benefits, there is also a gap in connecting buyout land reuse to improved mental health and well-being cited in urban greening literature. For example, greenways, parks, and community gardens that provide critical spaces for residents to engage in physical and social activities may also provide critical positive restorative effects on mental health and well-being (Lee, 2015). For communities facing recent or even repetitive trauma from catastrophic events, identifying methods to maximize social benefit that take these critical elements into consideration will be critical to the field in the years to come.

Buyouts as a Tool for Stormwater Management and Flood Protection

In addition to the myriad of environmental and social benefits buyouts can provide, property acquisitions can directly support flood mitigation through stormwater retention and detention systems. Although climate change is exacerbating flood risk globally, poor development practices and outdated infrastructure systems have created a series of wicked stormwater management problems, especially in urban areas. Although many outdated systems can be upgraded or improved to increase conveyance capacity, alternative solutions such as detention or retention systems are also growing in popularity, as they slow the flow of water into the system, recharge ground water, and can provide ecological amenities when well designed. In built up areas, rain gardens or smaller detention systems can reduce localized flooding and reduce strain on gray infrastructure systems. Along waterways, vacant parcels unlock opportunities to create landscaped buffers that protect surrounding neighborhoods from riverine overflow and can improve water quality of runoff from impervious surfaces. Landscaped buffers in coastal zones can stabilize coastal dune systems and reduce wave velocities and storm surge heights during extreme weather. While there is not an abundance of case studies showing best practices, a few programs and examples stick out:

- **The Charlotte-Mecklenburg Storm Water Services Floodplain Buyout Program** has acquired more than 450 properties since 1999. Although the program was first funded through federal grants, the agency has since utilized local stormwater fees and partnerships to increase local revenues available for buyout program implementation, increasing flexibility and speed in its buyout programs. The agency has identified a number of uses for buyout properties, including expanding the city's greenway trails system as well as detention systems, reforested natural areas, and community gardens. Vegetated retention areas not only improve water quality and reduce flooding but provide an opportunity to educate the community on stormwater management.

Figure 1. A water filtration retention system (left) and detention basin (right) constructed on bought out properties in Charlotte Mecklenburg County, North Carolina.



Image Credit: Kelly Leilani Main

- **Harris County Flood Control District (HCFCD)** has one of the most robust and ambitious buyout programs in the country, including a voluntary sign-up sheet on its

website that facilitates proactive acquisitions from deep within the county's floodplains. HCFCD has a number of flood reduction projects throughout its territory that are accomplished through an on-going Capital Improvement Program (CIP), Operations and Maintenance, and the 2018 Bond Program. One Active Project, *F-II Stormwater Detention Basins in Large Buyout Areas*, looks at utilizing bought out properties and other available parcels to reduce flood risk to neighborhoods around Cypress Creek by storing stormwater and releasing it back into the creek after flooding has passed. Additional benefits of the project include restoring floodplain function, controlling sediment, and managing vegetation.

- **Good Neighbor Stormwater Park, North Miami, FL** is a community open space that doubles as a stormwater basin for local flood hazard mitigation. The park transformed a half-acre vacant repetitive loss buyout property within North Miami's Sunny Acres neighborhood. The Van Alen Institute's Keeping Current Initiative selected the City of North Miami for an international design competition directed towards collecting design concepts for a pilot park and master plan for the city's buyout properties. Dept. won the competition and proposed a concept that integrated stormwater retention with a neighborhood park. The resulting Good Neighbor Stormwater Park multiplies the stormwater retention capacity of the vacant buyout site by four times and integrates South Florida native plants, public art that registers the fluctuating water levels in the retention basin, and a new walking path. In addition to the initial funding from Van Alen, the project was funded through the Florida Department of Environmental Protection's Office of Resilience and donations from The Nature Conservancy. The pilot park was designed in tandem with a city-wide vision plan for replicating the design strategies across additional buyout properties. The Good Neighbor Stormwater Park is a model for localized flood reduction that provides multiple benefits including public open space, ecological restoration, and educational opportunities.
- **Coastal Infrastructure / Coastal Forest.** In contrast to many of the gray infrastructure strategies employed by the Army Corps of Engineers in coastal locations, "Beyond Restoration: Planting Coastal Infrastructure" by landscape architect Rosetta Elkin proposes using plants and working within coastal ecologies as a form of resilient infrastructure (Elkin, 2017). By exploiting various growth behaviors of woody species (including sprouting and rhizomatic growth), planted infrastructures go beyond the defense systems of typical concrete sea walls or steel flood gates. The benefits of planted systems not only include natural wave attenuation and flood control, but also include increased flexibility, and adaptive capacity.

These key case studies provide significant inspiration for our exploratory scenario planning exercise presented below.

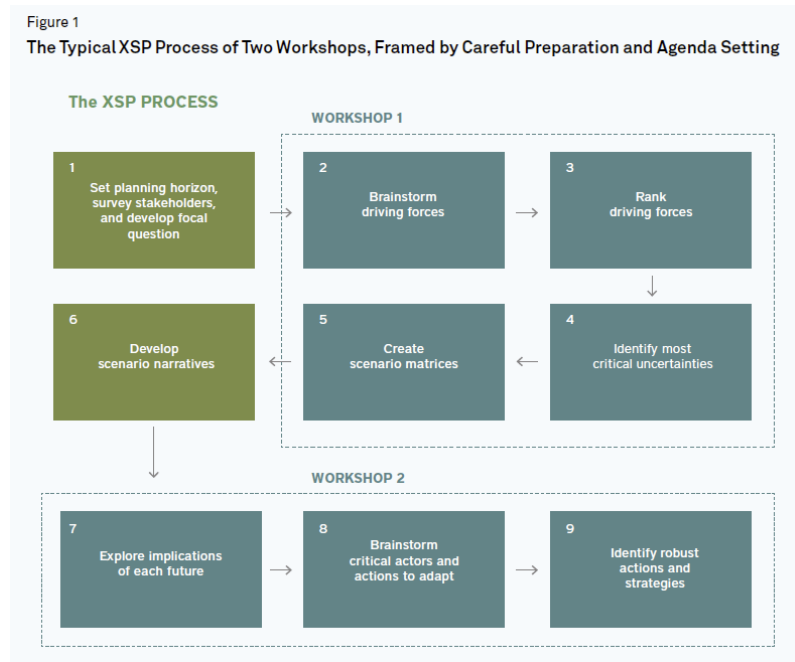
The Role of Exploratory Scenario Planning

Planning for climate change is full of uncertainty, and as illuminated by the review above, planning for buyouts can also be deeply uncertain. Program administrators deal with unpredictable participation rates, unreliable funding streams, precarious political support, and a limited number of best practices to maximize reuse potential. However, planning for buyouts can improve local resilience and create valuable social and ecological amenities. To date, many planners may conceptualize buyout programs more along the lines of normative scenario planning - where they identify a priority area for buyouts, and then offer buyouts to homeowners in that area without having any certainty about levels of interest. In scenarios where buyout programs must be entirely voluntary, individual decision making can lead to great uncertainty since households in an identified buyout area may have different social, emotional, or financial barriers to participation. This approach creates inefficiencies in program implementation by relying on multiple rounds of engagement, education, and outreach, during which time households may reject participation offers or drop out altogether. Historically, forcing consensus on buyout programs (an all or nothing approach) has been a way to avoid the checkerboarding, or ‘Swiss-cheese’ effect that some buyout programs suffer from. This more normative scenario planning approach to buyout programs would make planning for the adaptive re-use of large buyout sites much more straightforward, since it would identify a clear area and target project for re-use. However, despite a call under the Trump administration to start using eminent domain in repetitive loss areas (Flavelle, 2021), the general consensus on buyout programs remains that they should be voluntary and community led.

The challenges described above will be extremely difficult to overcome. However, local jurisdictions faced with increasing flood risk from climate change should begin to explore what retreat looks like in their communities - even if only conceptually. This is where exploratory scenario planning exercises may come in handy. Exploratory scenario planning tries to help planners prepare for probable, desired, and uncertain futures (Stapleton et. al, 2020), meaning there is a greater range of outcomes to plan for. Thus, this research set out to explore whether scenario planning would be a useful tool for exploring the *potential* end use of floodplain buyout parcels, given a range of possible options and uncertainty about a number of critical factors. Various, adaptable “narratives of plausible futures that can--ideally with little revision--remain relevant over the planning horizon” will be critically important for illuminating the myriad benefits that buyout programs can provide (Stapleton et. al, 2020). We began to test some of these ideas by first conducting an analysis of existing buyout programs to understand the different driving factors for end use planning, selecting a few key driving forces, and experimenting with resulting scenarios.

In addition to the background literature and case study analysis presented above, our team held three workshops to explore whether we could follow the exploratory scenario planning model for exploring potential land use options. The mini workshops we held follow the guidance for Exploratory Scenario Planning in Stapleton et. al 2020.

Figure 2. Exploratory Scenario Planning Process



Source: Stapleton et. al, 2020

Workshop 1: Focal Question and driving forces

Unfortunately, our team was not able to facilitate a workshop with other stakeholders during the course of this project, so we relied heavily on the case study analysis described above to gather information about driving forces pertaining to buyout programs and end use strategies. Thus, this review and our workshops primarily are driven from this research and analysis.

Focal Question

Given a lack of uncertainty about interest /participation in future buyout programs, and limited funding, how can we begin planning for the adaptive reuse potential of buyout properties to increase resilience to future flooding events and improve access to open space?

Driving Forces

To ground our approach to exploratory scenario planning our team first conducted an analysis of buyout programs across the country to examine some of the most predominant determinants of buyout end use. Our team reviewed 20 cases across 11 states, including Florida, Georgia, Iowa, Illinois, Indiana, Kentucky, Montana, Missouri, North Carolina, Texas, and Wisconsin, drawing heavily from the Environmental Law Institute and the University of North Carolina’s Floodplain Buyout Case Studies (ELI & UNC, 2016). Eighteen of the cases represented inland, riverine flooding. Two of the cases were in the coastal zone. The number of parcels acquired in these programs ranged from 10 to 1,356 parcels, highlighting a significant variation in the size and scope of buyout programs.

Unfortunately, this analysis was hindered due to a lack of clear available documentation of buyout parcel reuse plans, costs, implementation, maintenance, and landscaping requirements, as examples. The sheer lack of information on land use planning and adaptive reuse of buyout parcels remains a barrier to thorough analysis and research on buyout program best practices. Across all case studies, there was a significant challenge in categorizing end-use, due to overlap and multiple use types within a given area, as well as limited availability of program information across different end-use timelines. However, this gap speaks to the potential utility that such a database of best practices could provide. We hope that this preliminary investigation lays the groundwork for additional research on buyout properties as this topic becomes of increasing importance. A summary of the critical factors identified in the literature review and case study analysis are provided in Table 1 and form the basis of our driving forces. A summary of the analyzed case studies is provided in the Appendix. Because the driving forces are driven from this research and analysis, rather than specific stakeholders, they are more conceptual than site specific.

Table 1. Driving Forces for Buyout Program Design.

Category	Description
Political	<ul style="list-style-type: none"> ● Increasing or decreasing support for buyout programs ● Increasingly competitive funding streams from disaster declarations ● Short political timelines ● High turnover of public sector staff
Economic	<ul style="list-style-type: none"> ● Rising insurance costs ● Potential for depreciating coastal real estate values ● Increasing costs of disasters and rebuilding ● Lowered credit ratings for high-risk communities ● Costs of maintaining services in high-risk areas ● Job opportunities in high-risk communities
Social	<ul style="list-style-type: none"> ● Levels of Participation ● Increasing social awareness of climate change impacts ● Media attention ● Community social and kinship ties ● Other examples of successful buyout participation
Technological	<ul style="list-style-type: none"> ● Modeling and forecasting of flooding ● Building codes/resilience upgrades ● Seawalls, dykes, or levees (hard infrastructure)
Legal	<ul style="list-style-type: none"> ● Federal, state, or local mandates ● Eminent domain ● Property rights restrictions ● Land use / zoning changes ● Tort claims / inverse condemnation

Environmental	<ul style="list-style-type: none"> ● Geographic Location ● Conservation Goals ● Water quality mandates ● Sustainability initiatives ● Regional geomorphology ● Types of Flood Risk ● Sea level rise ● More extreme weather ● Presence of hazardous/toxic materials
Demographic	<ul style="list-style-type: none"> ● Stranded populations such as the low income, elderly, or disabled ● Retirement or empty nesting situations ● Climate gentrification
Spatial	<ul style="list-style-type: none"> ● Contiguity

Source: Authors. From literature review and case study analysis, included in Appendix. Critical factors possible to explore for this project are bolded.

Ranking Driving Forces, Identifying Critical Certainties and Uncertainties

Most of the uncertainty in buyout planning comes from the fact that since buyout programs are entirely voluntary and homeowners can drop out at any time, creating an adaptive reuse plan is nearly impossible until all buyouts have actually been carried out. However, regional (and somewhat local) geomorphology remains a constant for the planning and design of buyout sites. Thus, even if the exact location and number of people participating is unknown, the local geomorphological category remains relatively constant or predictable within any given community.

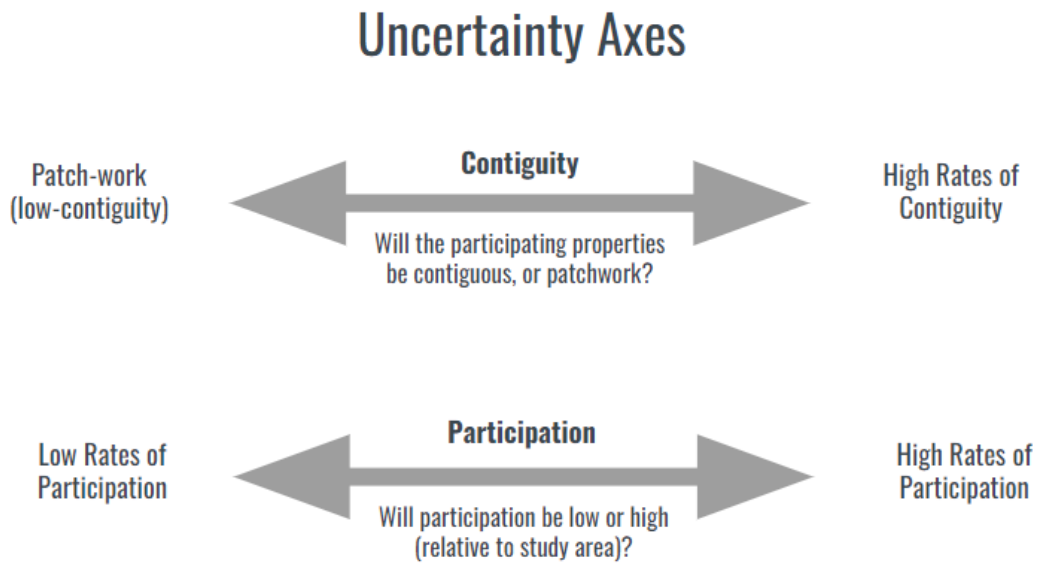
Table 2. Driving Forces for Maximizing Stormwater Management Potential

Driver	Root Cause	Category	Level of Certainty
Contiguity	Participation	Spatial	Uncertain
Number of parcels	Participation	Spatial	Uncertain
Financial Resources	Funding Streams	Economic	Uncertain
Geomorphological Constraints	Soil type, elevation, slope	Spatial	Certain
Type of Flooding	Geomorphology	Spatial	Certain

Create Scenario Matrices

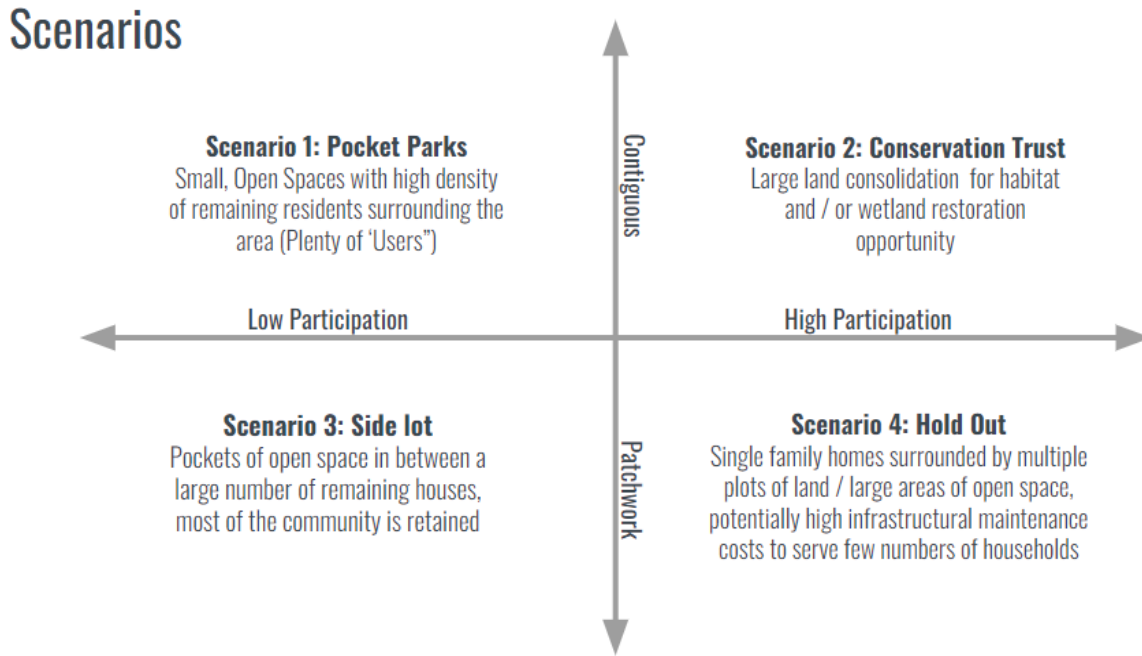
The four high-level planning scenarios below are derived from two driving factors for buyout adaptive reuse planning, contiguity and participation. They arrive at similar categories to the UNC action guide on buyout parcel management, which identifies characteristics of buyout programs as “dispersed across the landscape (patchwork); moderately connected with a few remaining homes and infrastructure (holdouts); or contiguous but removed from other buildings and infrastructure (comprehensive)” (ELI and UNC, 2017). Utilizing the uncertainty matrix approach also reveals a fourth category, which we identify as side lots. These scenarios only provide a very high level, conceptual approach to thinking about the possible uses of buyout properties depending on significant variation in participation rates and contiguity of properties and do not cover the wide variety of other driving factors present in end use decision making.

Figure 3. Two critical uncertainty axes, contiguity and participation.



Source: Kelly Leilani Main (Author)

Figure 4. Scenarios, including pocket parts, conservation trust, side lots, or hold out.



Source: Kelly Leilani Main (Author)

Scenarios

Since our original workshop exploration was not site-specific, the following scenarios are imagined and placeless, although they reference different types of hydrology, environment, and social conditions.

Scenario 1: The "Pocket Park"

A high density urban coastal neighborhood experienced a large storm surge that caused massive destruction. After the disaster occurred, residents were split on who wanted to move and who wanted to remain, leading to a non-contiguous patchwork of single lot open spaces. However, due to the region's high propensity for hurricanes in the future, the local jurisdiction anticipates buyout interest may increase, especially due to rising insurance costs. Since the community's infrastructure is decades old and the costs of upgrading are relatively high due to the precious buyout program and declining tax base, the city opts to maximize the storm water retention potential of the buyout sites by building stormwater detention systems that also improve local water quality and provide habitat patches for pollinators. These new assets not only reduce local flood risk and protection for the neighbors but also provide useful educational opportunities to inform residents about the multiple benefits of green infrastructure.

Scenario 2: The Conservation Trust

A small town with deep ties to its history has started to experience recurring flooding that is affecting residents located along the nearby marsh, which is also a regionally protected site with

a variety of endangered plant and animal species. Although a large storm event happened more than a decade ago, most of the flooding is high tide nuisance flooding that makes local county roads impassable. Some residents have also started to notice basement flooding and mold encroaching in basement storage due to rising groundwater levels. A flood mitigation study had previously recommended repairing a failing sea wall to reduce high tide flooding, but a concerned group of residents expressed fears that this would harm the landward migration of local wetlands that help preserve the community's water and habitat quality. A local community leader researched options and found out about a novel model for converting residential properties into restored wetlands. The historical society also discovered that the neighborhood was constructed after more than three dozen acres were filled as part of a mid-century residential development plan. After long deliberations and years of patient planning, a group of neighbors who backed up to the marshland all decided that they would form a community conservation land trust and donate their properties to the community as part of their estate planning. In addition to improving the resilience of their surrounding community, this collective effort resulted in a large fundraising opportunity to raise money for restoration and the construction of a local bird watching sanctuary in honor of the contributions of the homeowner donors. The residents were able to spend the rest of their lives on the marsh before their titles were transferred to the trust.

Scenario 3: The Side Lot Program

A historic neighborhood in a small city is located in the legacy floodplain of a local river. Over decades, there has been a significant amount of turnover in the neighborhood, with older residents passing on and new residents moving in, leading to a wide variety of the quality of housing stock. Some homes have been recently elevated above the Base Flood Elevation to reduce flood insurance premiums, but many other lower-income residents without a mortgage opt to keep their homes as is. Likewise, in recent years, the city has gotten a lot hotter, and the limited tree canopy and high density area is seeing an increase in temperatures and urban heat island effect. Recent austerity measures on the city also resulted in the parks department losing a significant amount of its annual budget, limiting capacity to maintain the locality's already small park system. When a flood happens, a small number of the older residents take buyouts as part of their desire to downsize and move out of harm's way. At the disaster recovery community meetings, the city expresses concern about their ability to maintain the small number of properties where owners have requested buyouts due to the low participation rates and high number of residents who want to stay. When the city proposes a side-lot lease program to neighboring owners, they gladly agree. A local nonprofit helps the owners plant trees on the acquired parcels, providing natural cooling benefits for surrounding houses through evapotranspiration and shade.

Scenario 4: Hold Outs

After years of successive and increasingly destructive flooding events, all residents of a low-lying neighborhood accept their county's buyout offer and relocate together to another part of the region where they have invested in a cooperative affordable housing community using financing from their buyout offers. One resident, whose property is a second home, refused the offer, choosing instead to elevate the structure and make significant resilience investments. Many of the residents barely know the owner and advocated for their collective buyout despite the city's reluctance to make an offer without all residents participating. Since the area was unincorporated, the county agreed to let the owner remain after an agreement that the county

would cease maintaining the residential road and the owner's property would remain responsible for their own well and septic system. The areas around the existing property are allowed to return to their pre-development state.

Workshop 2: Using Site Constraint Certainties to Develop Suitable Design Strategies

“Open space” is a broad category and can take many forms. In order to become more specific about the potential benefits of various open space design strategies, we focused our scenario planning on driving forces that were grounded in particular locales, physical environments, and site conditions. Broadly, the goal of the design strategies was to provide benefits to the surrounding neighborhoods through stormwater management, flood reduction, or ecosystem services. While program participation or parcel contiguity are critical uncertainties that affect the scale of a buyout end-use (for example, high parcel contiguity indicates a large buy-out site whereas low parcel contiguity indicates smaller sites), they do not inherently determine the performance of the site nor do they indicate possible land-based interventions.

In order to determine appropriate open space end-uses that provide flood management strategies, it is important to ground the scenario planning in particular physical and environmental contexts. Certain approaches to open space design may be more appropriate for one set of site conditions and not appropriate for another set: for example, if a buyout is located adjacent to the coastline the possible design concepts will differ greatly from a buyout site that is located inland or in a riparian zone. Each neighborhood and region of the country has unique hydrological and geomorphological features which influence the types of strategies that can be used to reduce flood risk. To explore this further, we analyzed a select number of buyout parcels from the New York Rising Buyout Program in the Village of Lindenhurst to see if these driving factors influenced end use planning. Then, we provide an alternative framework for approaching end use to maximize flood mitigation potential on two different types of sites.

Case Study: New York Rising Buyout and Acquisition Program

Outside of New York City, most post-Superstorm Sandy buyouts in New York State involved the New York Governor's Office of Storm Recovery (GOSR). GOSR is in command of the NY Rising Community Reconstruction Plans (made up of ten communities, three of which are in NYC). These are not to be confused with acquisitions for redevelopment, most notably conducted through NYC's Build It Back Program under the New York State Acquisition for Redevelopment Program (NYSaR). Confusion and miscommunication about which programs resulted in deed-restricted open space versus acquisition for redevelopment remain one of the unfortunate legacies of the program. However, the program has been influential for a number of reasons. For example, GOSR pioneered the incorporation of multiple incentives into their buyout program (Greer and Binder, 2016). These incentives ranged from individual households relocating within the home county as well as “clusters” of homeowners who were willing to relocate in groups. GOSR also funded an Acquisition and Redevelopment program, in which properties were acquired by the state at post-storm fair market value, held, and then auctioned off for redevelopment. As shown in the analysis below, the lack of spatial continuity for which parcels can be redeveloped and others cannot be, is likely both spatially and administratively challenging to manage and communicate to the public.

Despite general successes in support for repairs, GOSR's buyout program faced a number of challenges, including confusion about the identification of the targeted "Enhanced Buyout Areas" selected for buyouts and a lack of buyout timeline transparency (Greer and Binder, 2016). Poor communication was not only an issue between residents and the state legislature - it also caused problems between city and state level officials. Ideological tensions existed between Mayor De Blasio and Governor Cuomo regarding the prioritization of buyouts, as De Blasio favored redevelopment over relocation as a recovery strategy (Office of the Mayor, 2014). Lastly, HUD remains the core funding source for GOSR, but CDBG-DR funding awards are not always monetarily sufficient for buyout demand, nor are they announced with enough time for states to plan funding allocation. The lack of consistent and reliable funding made allocation timelines difficult to communicate down to local levels. Perhaps most importantly, a lack of clear and consistent communication about the role of buyouts in improving community resilience, maximizing conservation potential, and reducing long term costs burdens on households and municipalities limited the overall success of the program.

Data Overview

At the outset of this project, the research team anticipated the ability to analyze the end use parameters for buyout parcels through the GOSR New York Rising buyout program based on intrinsic and extrinsic site qualities. We sought to investigate whether or not disposition strategies were in any way informed by geomorphological, social, hydrological, clustering, or contiguity considerations. Although the original idea was to analyze the entire GOSR portfolio, this proved to be very difficult given the time and funding constraints of this preliminary exploration. Data for the summary analysis provided below was provided directly by the Governor's Office of Storm Recovery after filing a Data Request.

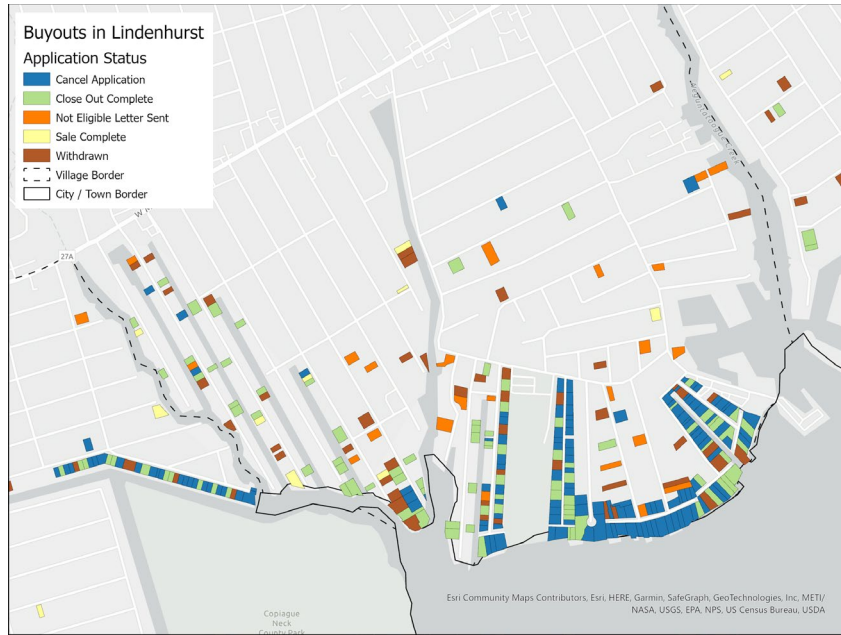
- As of 2021, GOSR had received 3,023 buyout applications
- 786 of these applications were canceled (26.0%)
- 656 applications were withdrawn (21.7%)
- 198 properties were deemed ineligible (6.5%)
- 198 had completed the sale (6.5%)
- 587 had completed close out of the property (19.4%)
- 391 had dispositions in progress (12.9%)
- 101 had dispositions complete (3.3%)

Disposition owner and final use for all properties that were eligible and in the process of being bought out or acquired (sale complete, disposition complete, close out complete, auction compliance review in progress, LIHP in progress, payment review) are highlighted below. This analysis highlighted a select number of towns that had received properties from GOSR - among them:

- Town of Babylon, 6 properties
- Town of Brookhaven, 63 properties
- Town of Southampton, 17 properties
- Village of Lindenhurst, 39 properties
- Village of Patchogue, 10 properties
- Village of Suffern 37 properties (open space), 21 properties (null).

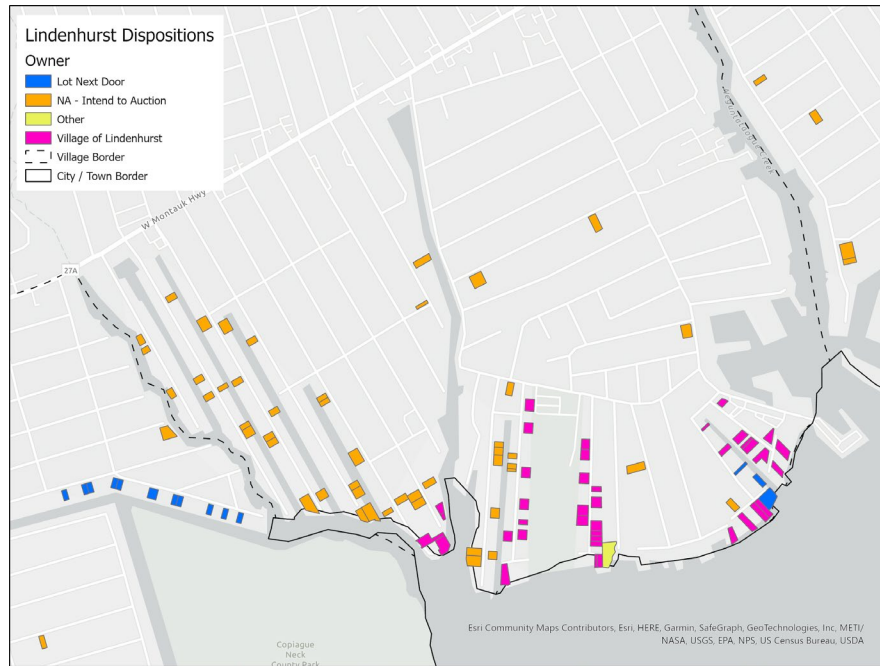
After conducting a visual analysis of these clusters of buyout properties, we settled on the Village of Lindenhurst to more closely analyze the buyout end use strategies. Figure 5 shows all applications, and Figure 6 shows buyouts at various stages of completion or auction through the redevelopment program.

Figure 5. All applications in Lindenhurst



Source: Kelly Leilani Main (Author)

Figure 6. Dispositions in Lindenhurst

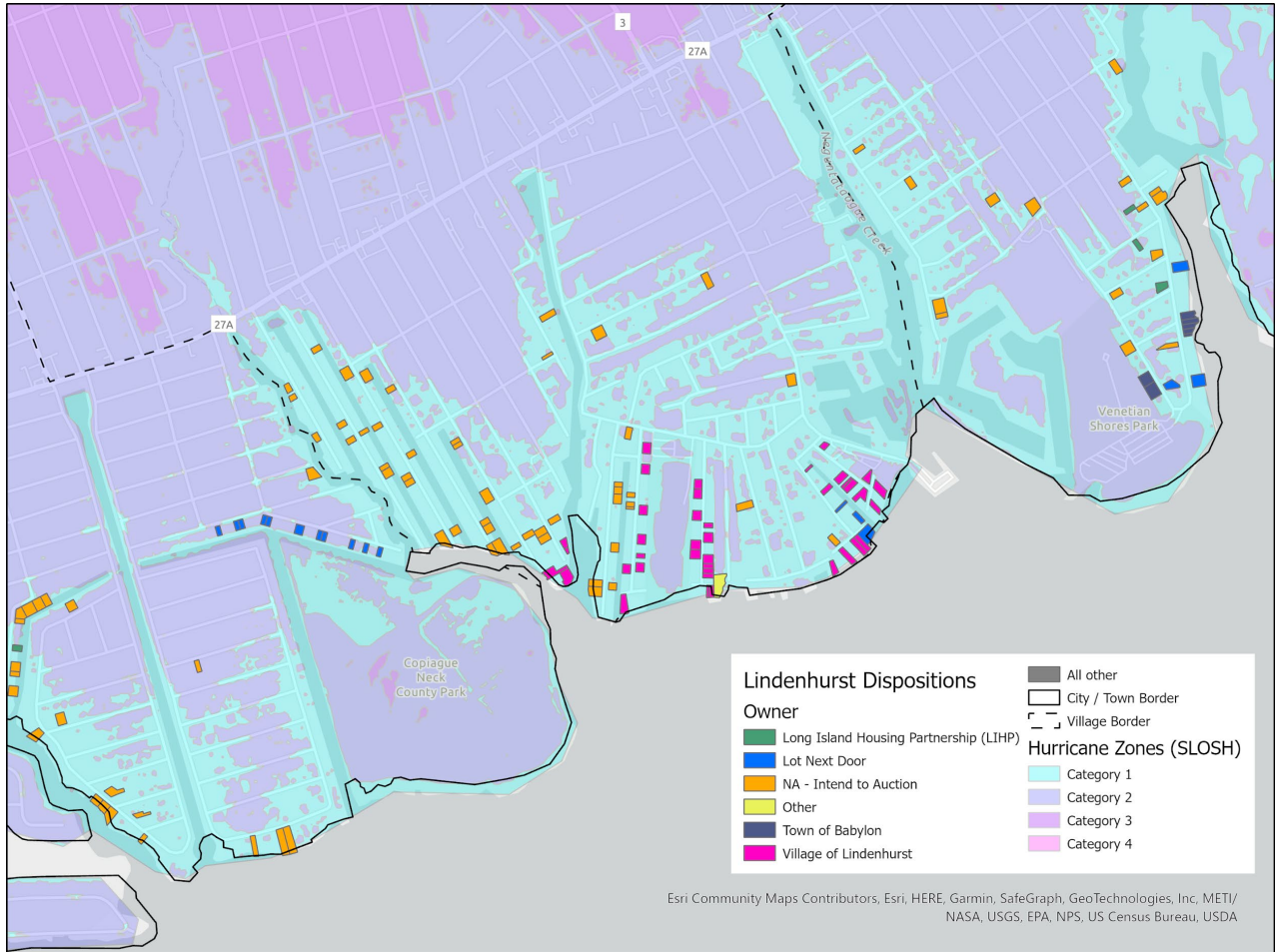


Source: Kelly Leilani Main (Author)

End Use Parameters Analysis

The following analysis highlights some preliminary findings of a mapping of buyout parcel disposition strategies in the Village of Lindenhurst and the Town of Babylon with a focus on what our workshop outcomes described as certainties -the geomorphological, environmental, and/or hydrological characteristics of the site. It includes a basic mapping that overlays buyout dispositions with Sea, Lake, and Overland Surges from Hurricanes (SLOSH) models (Figure 7), sea level rise projections (Figure 8), the NOAA Wetland Potential Layer (Figure 9), and Soil Type (Figure 10). These data layers were included based on our assumption that analyzing buyout end use potential based on risk (SLOSH and SLR), Habitat connectivity and improvement (Figure 9), and infiltration potential (Figure 10), are important variables for determining what to do with buyouts. However, we see no correlation between a buyout or acquisition parcel's overlay with any of these variables and end use planning.

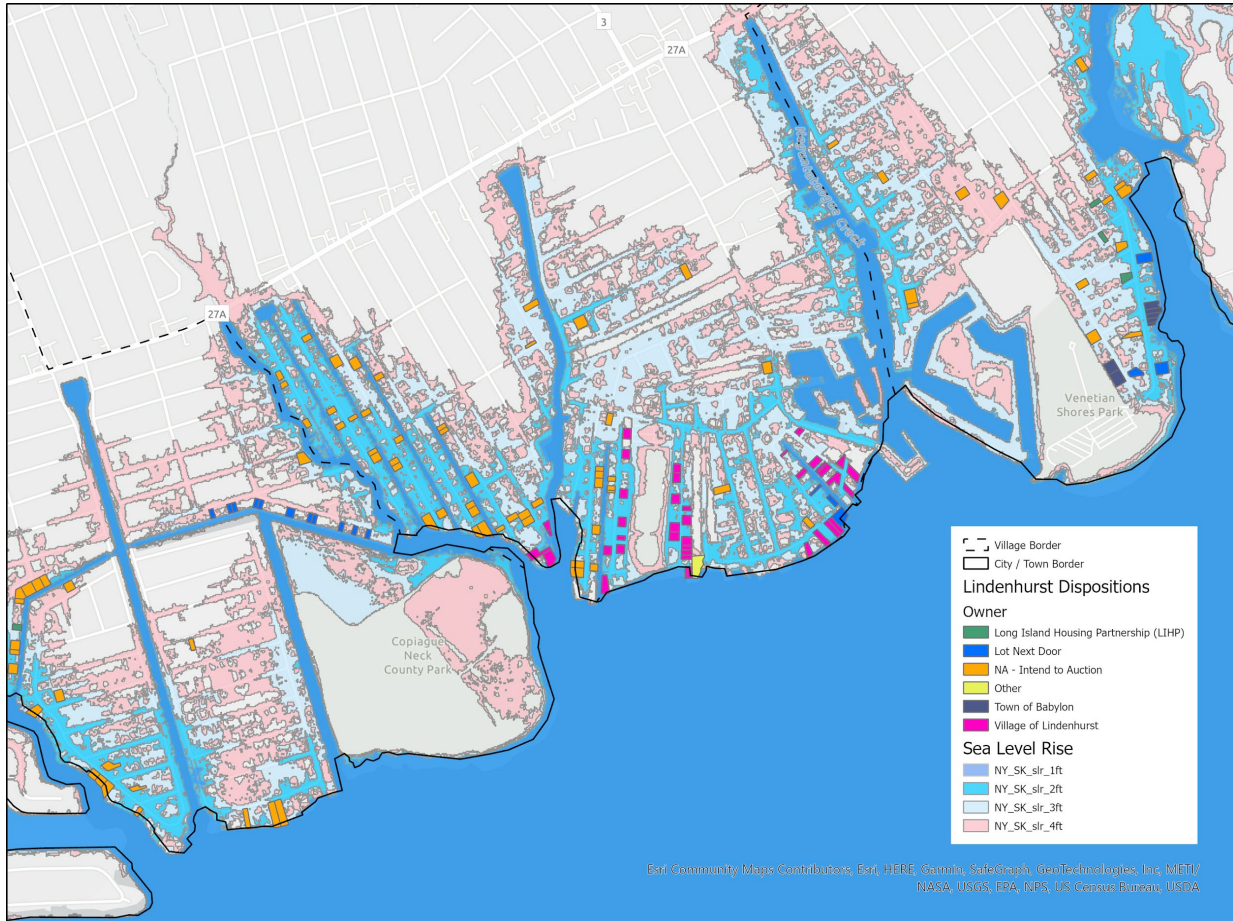
Figure 7. SLOSH Zones.



Source: NY State Hurricane Inundation Zones (SLOSH model), NY State GIS Clearinghouse. Map Credit: Kelly Leilani Main (Author)

Disposition strategies for acquisitions and bought out properties are shown. Nearly all of the properties exist within the category 1 Sea, Lake, and Overland Surges from Hurricanes (SLOSH) model projections, highlighting the vulnerability of redeveloped and remaining parcels to future hurricanes and storm surge.

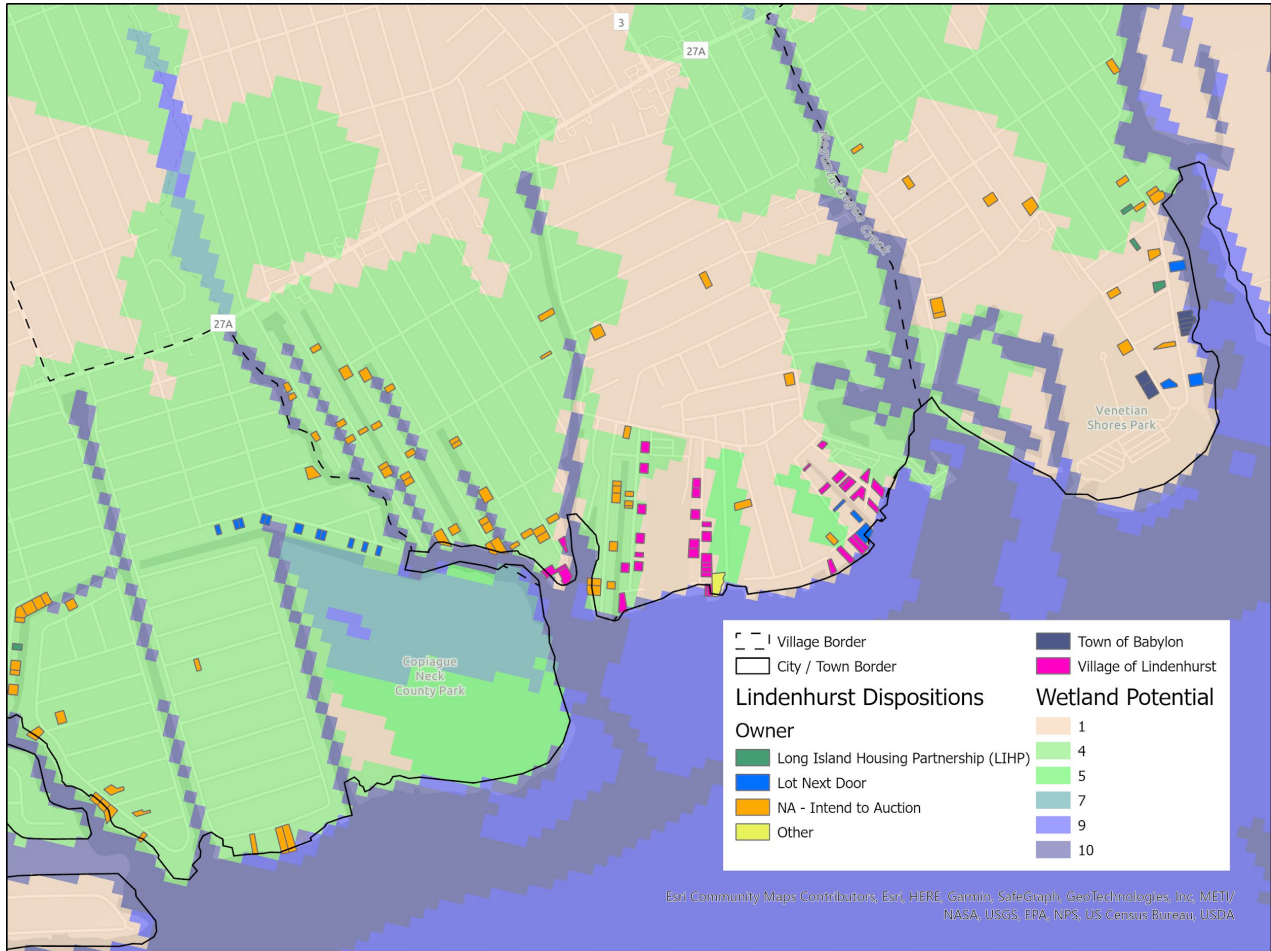
Figure 8: Sea Level Rise



Source: Sea Level Rise Projections for New York State, NY State GIS Clearinghouse. Map Credit: Kelly Leilani Main (Author)

This map shows forecasts for up to four feet of sea level rise in the study area. As we can see, most of the parcels fall within the 2ft sea level rise projections, but some are likely to face sea level rise impacts at later periods, reaching three or four feet of sea level rise. This project seeks to illuminate that more thoughtful planning for differentiating between various levels of vulnerability to future climate impacts, like sea level rise, could result in more thoughtful planning of disposition strategies and funding allocations (for example acquisition v. buyout offers) in order to help communities adapt to future climate impacts.

Figure 9: NOAA-C-CCAP Wetland Potential Layer.



Source: NOAA Wetland Potential Mapper, NY State GIS Clearinghouse. Map Credit: Kelly Leilani Main (Author)

The NOAA Wetland Potential layer provides a likelihood of wetlands based on a variety of geospatial datasets that may be useful for identifying areas of historic wetlands or where wetland mitigation or restoration could happen. The data set ranges from 1, very unlikely, to 9, highly likely. Although there are only a few areas where wetland potential scores high, there are some moderate wetland potential scores in areas where current auctions for redevelopment parcels exist. As the interest in wetland restoration and marsh migration programs increase due to lost habitat from sea level rise, buyout program design could help free up areas where new wetland projects could exist.

Figure 10: Soil Type



Source: USGS SSURGO Soil Survey (2018), NY State GIS Clearinghouse. Map Credit: Kelly Leilani Main (Author)

Data pulled from 2018 Web Soil Survey for Suffolk County shows that most of the parcels participating in the buyout program in the Village of Lindenhurst are located in soil type Fs, which stands for Filled land, Sandy, speaking to the history of wetland fill projects that have degraded historical ecosystems in these areas. However, the Village of Lindenhurst also has soil type Tm, which stands for Tidal Marsh. In this case, there are two parcels which overlap with a Tidal marsh area, but the parcels are still slated for auction and redevelopment. This project seeks to illuminate the potential of utilizing these types of datasets for more effective and ecologically minded land use planning, which would ideally result in identifying disposition strategies for parcels based off environmental planning principles based in hydrology and geomorphology of buyout sites as part of pre-planning. In areas where soil types other than fill exist, soil type could be a valuable determinant for identifying whether sites can be used for stormwater management techniques such as infiltration.

Concept Designs for a Scenario 1: Stormwater Pocket Park

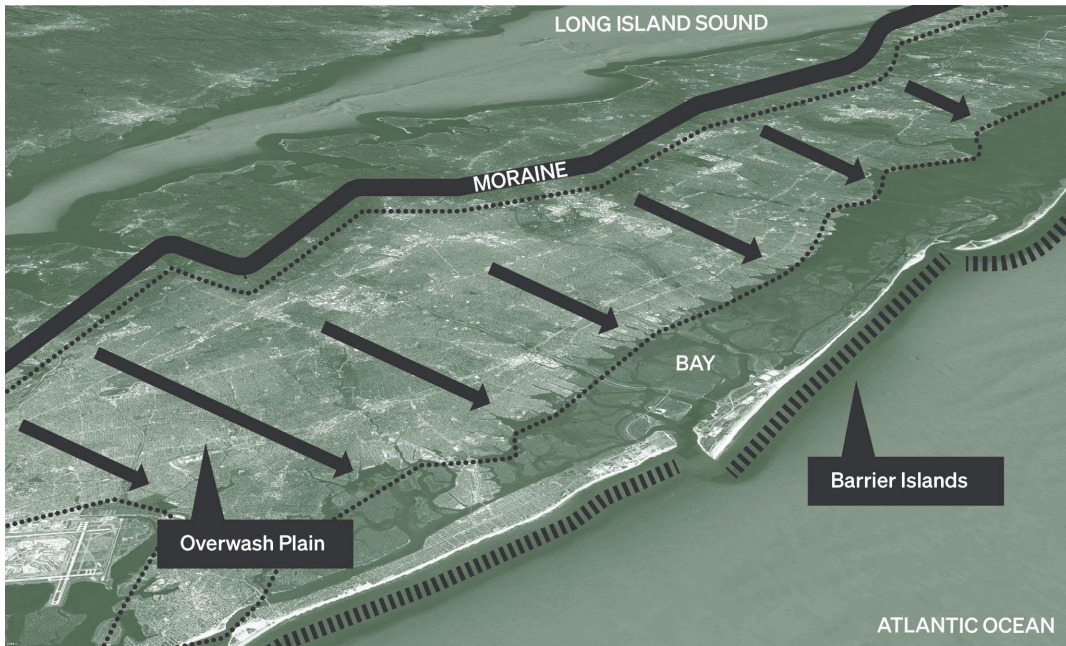
After analyzing the Lindhurst data set, we saw that the pattern looked closest to the low contiguity, low participation scenario, or Scenario 1: the Pocket Park. One critical consideration for program managers to consider is not just what can be done with the properties in terms of overall participation and contiguity, but what broader benefits the buyout properties can provide. In particular, we emphasize that buyout program managers should be considering, and perhaps prioritizing, the opportunity that bought out properties provide in terms of reducing flooding to the surrounding neighborhoods. Thus, we decided to take a closer look at design concepts that could maximize stormwater potential even in a low contiguity, low participation scenario. As described previously there are numerous uncertainties in buyout design, but critical certainties of site context location, geography, and inherent environmental, hydrological, and ecological conditions can help inform planning. As a result, the design decision around landscaping, groundwork, and infrastructure are likely to depend on questions such as:

- How is flooding occurring, and how can the intervention address flooding in this context?
- Is this area likely to experience storm surge?
- What types of landscaping or improvements can protect homes further inland?
- Will the site experience significant Sea Level Rise over the expected project lifespan?
- Can the site serve as drainage for existing stormwater infrastructure to increase capacity?
- What is more important, public accessibility, or flood mitigation function?
- What is more important, social benefit, or ecological benefit?

Landscape Analysis: Long Island

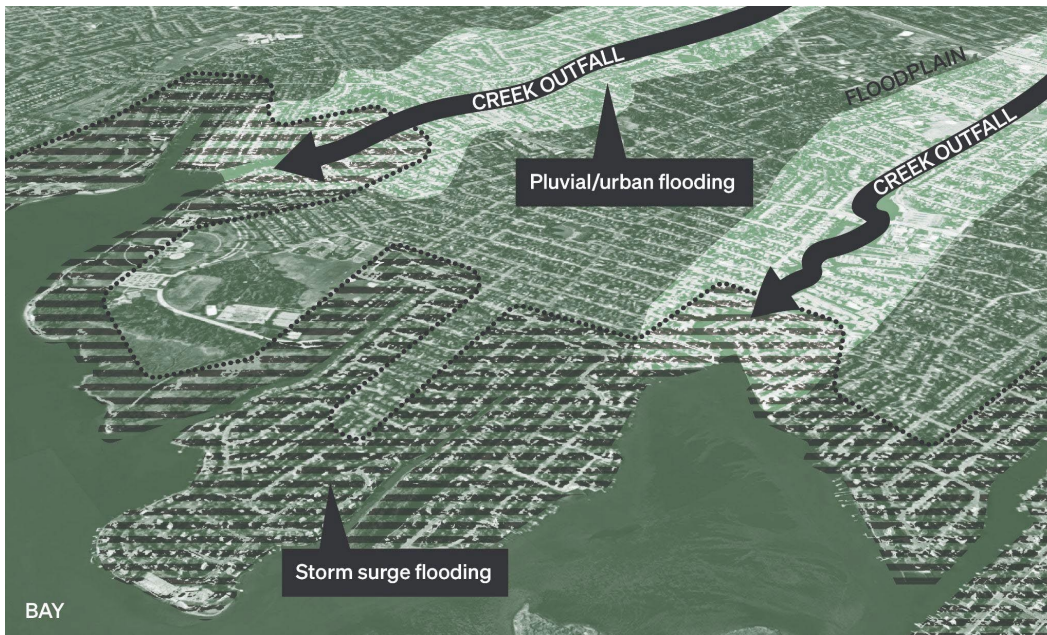
To explore these questions further, we revisited the GOSR dataset to understand what kind of stormwater pocket park solutions could exist in the region. A large portion of the buy-out properties included in the GOSR data set were concentrated on Long Island, which is a barrier island situated on the Atlantic Coast. While neighborhoods, communities, and jurisdictions differ along Long Island, the underlying geology and typical flood conditions pose several important and fixed patterns. As a barrier island, Long Island is relatively low-lying with much of the southeastern zone of its land mass characterized as an overwash plain. Geologically, this land is created through sedimentary deposits from upland rivers. In this region, the opportunities presented by a parcel or cluster of parcel's location on the landscape is defined either by being on the coastline, where properties are most vulnerable to storm surge, or if they are located on one of the coastline's many inlets, where properties are less vulnerable to storm surge but are likely to face significant drainage limitations as sea levels / groundwater rises. These inland sites may also be proximate to freshwater wetlands or provide critical brackish habitat opportunities as sea levels rise. Because increasing development has contributed to large volumes of stormwater runoff, in communities, green infrastructure and other types of stormwater capture mechanisms can play a critical role in preventing flooding of other properties.

Figure 10. Long Island is a barrier island off the coast of New York that is defined by a moraine ridge and a large overwash plain.



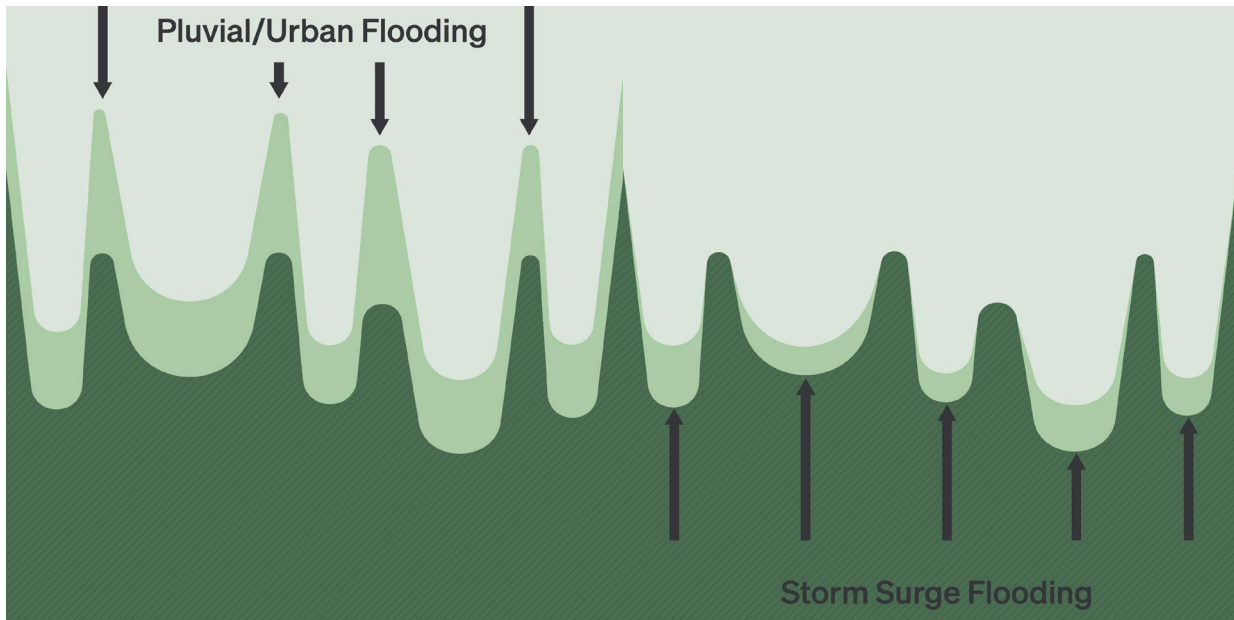
Source: Dept. (Authors)

Figure 11. Long Island (Suffolk and Nassau counties) experience inland riparian and pluvial flooding from creeks and tributaries and coastal storm surge flooding.



Source: Dept. (Authors)

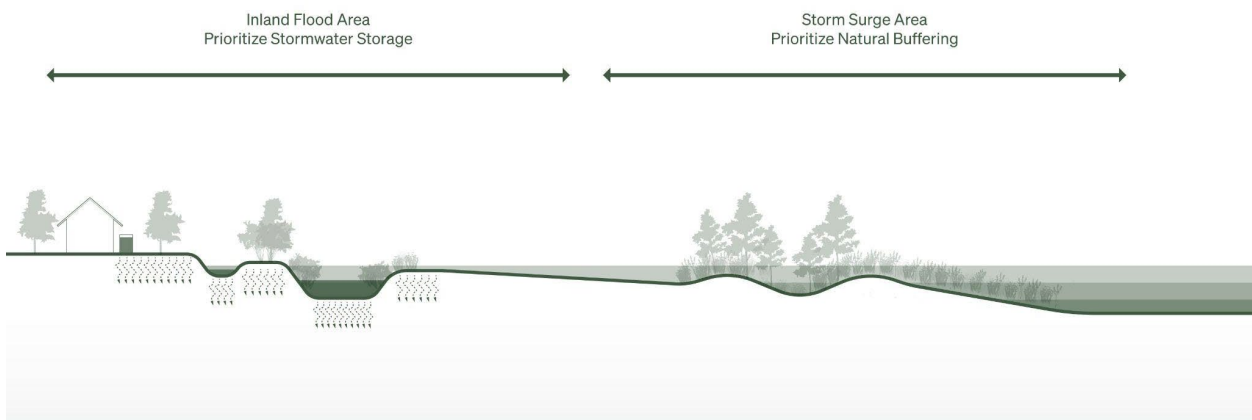
Figure 12. Inland Riparian, Pluvial, and Urban Flooding deals primarily with freshwater flooding from the drainage basin whereas storm surge flooding predominantly affects the coastline or shoreline.



Source: Dept. (Authors)

The design scenarios distinguish different landscape and end-use strategies for buy-out parcels based on these land-based and flooding conditions.

Figure 13. Sectional Diagram or Transect Diagram demonstrating the land-based approaches to buy-out end use designs. Inland flooded areas are prioritized for retention and storage while shoreline and storm surge-prone areas are prioritized for natural buffering.

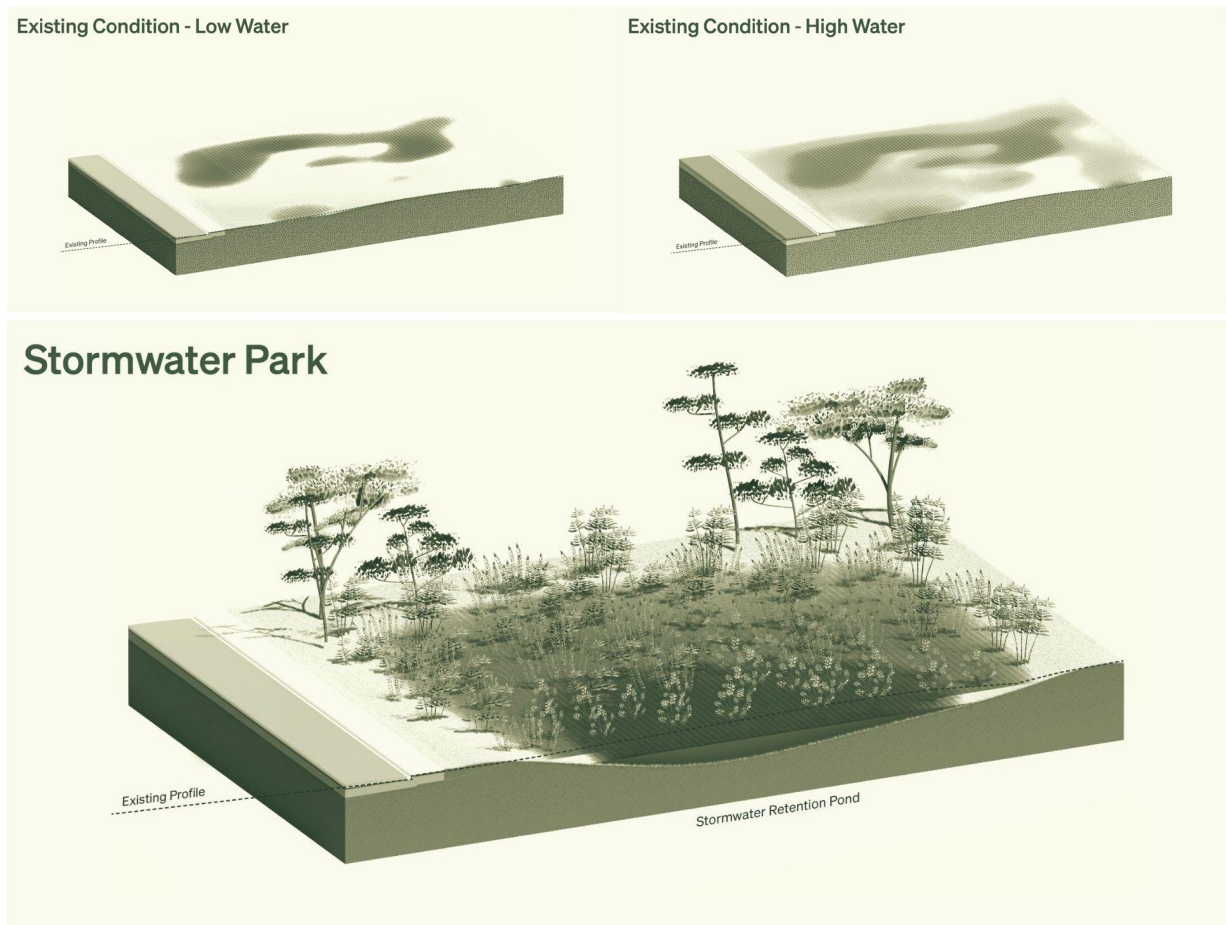


Source: Dept. (Authors)

Inland Riparian and Pluvial Flooding / Stormwater Park:

Inland riparian and pluvial flooding are caused by heavy rainfall and freshwater flooding from the many creeks and tributaries that drain through Long Island. Buy-out properties located within the floodplain of tributaries and that are further inland from the coast should prioritize strategies that retain or store water. Stormwater retention and infiltration in relatively upland areas prevents flooding downstream. Therefore, this design strategy integrates retention basins at varying depths on buy-out properties. These retention basins can also function as local pocket parks or community parks by integrating walking paths, flood-tolerant plantings, and open space. The benefit of the stormwater park end-use strategy is scalability - the retention space functions both at small and large scales and can be sited on either contiguous or scattered buy-out properties.

Figure 14. The design scenario for inland buy-outs prioritizes stormwater retention capacity by excavating to maximize stormwater volume while also providing littoral vegetation that bolsters habitat and biodiversity.

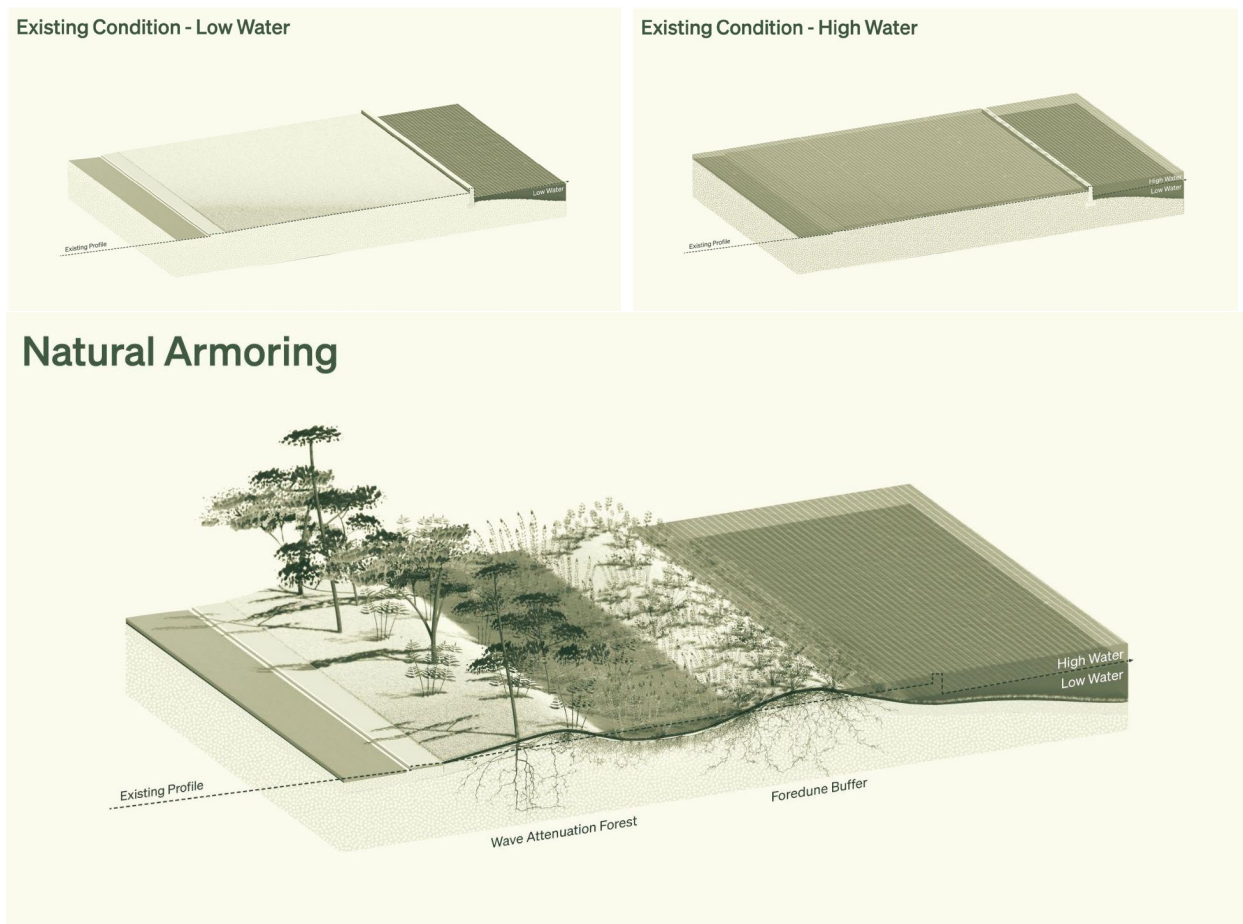


Source: Dept. (Authors)

Storm Surge and Coastal Flooding / Wave Attenuation Forest and Foredune Buffer:

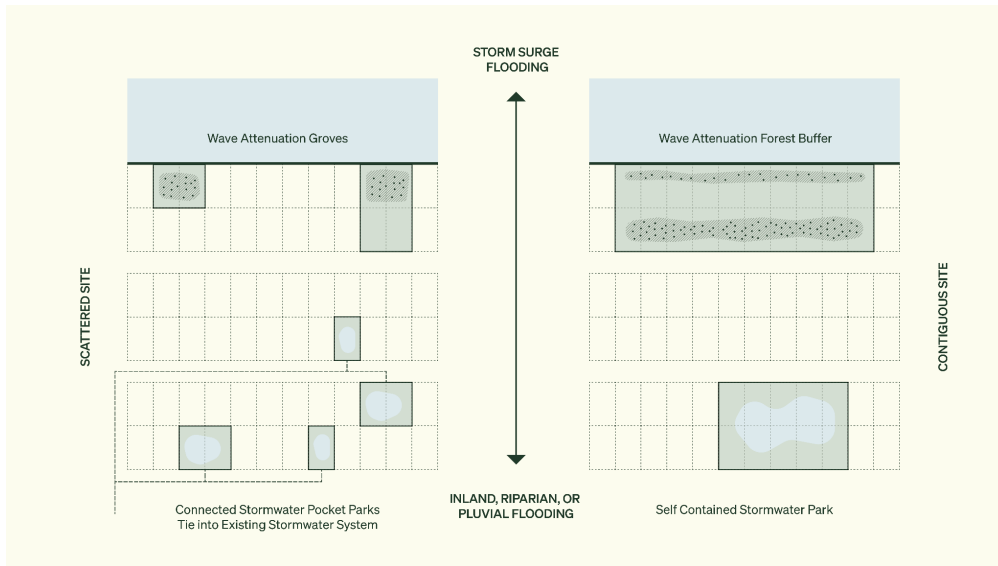
Storm Surge and Coastal Flooding is caused by hurricanes and heavy wind and storm events that bring water up and over the land with damaging force. Buy-properties that are located on the bay's shoreline are subject to storm surge flooding; and as such, they are in opportune locations to provide additional buffering and protection for further inland properties. Shoreline buy-out properties can behave like a natural barrier and reduce the impacts of storm surge. Rather than build a seawall, which are unsightly, costly, and susceptible to maintenance issues; this design strategy uses the inherent strength of natural vegetation that is well adapted to coastal conditions. These include salt tolerant and rhizomatic plants that stabilize the shoreline as well as larger maritime trees that create the main buffer and defense line. This natural barrier can also double as public open space and is well suited for linear parks and trails. This design strategy, while impactful even at a small scale, benefits from larger scale continuous buy-out sites.

Figure 15. The design scenario for shoreline buy-outs takes advantage of natural buffering from coastal vegetation that stabilizes the shoreline and provides protection from storm surge. A cut-fill technique is used to manipulate the ground to provide flood retention.



Source: Dept. (Authors)

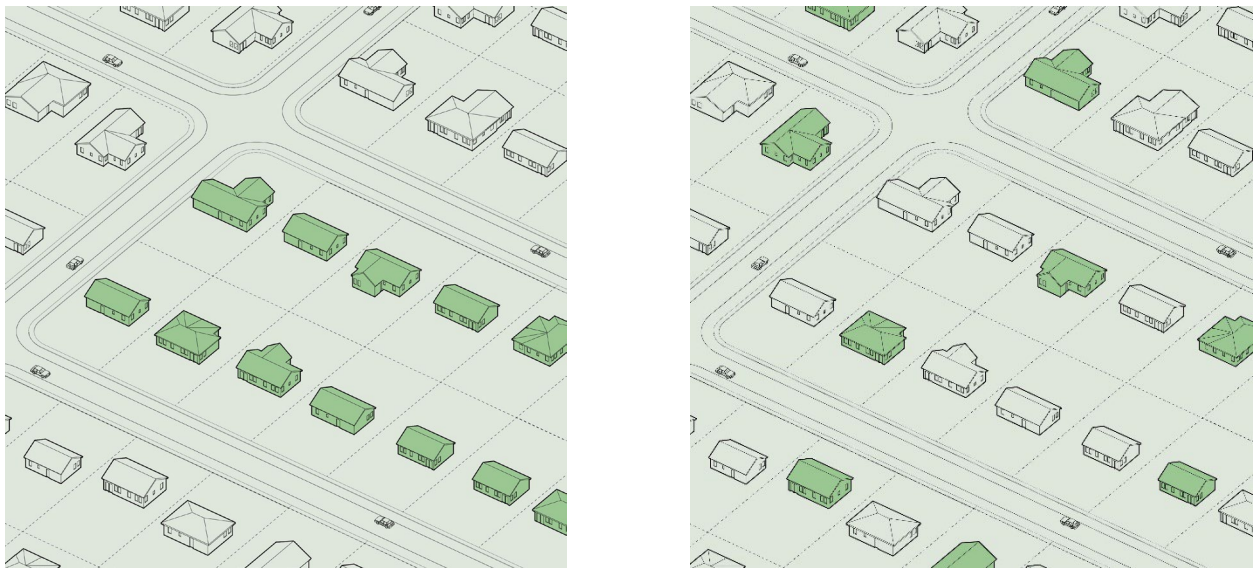
Figure 16. Scattered and Contiguous Site



Source: Dept. (Authors)

Diagrammatic illustration depicting two spatial conditions – scattered site buyouts and contiguous site buyouts – relative to the environmental and flooding condition. Wave attenuation forests are applied to areas prone to storm surge flooding whereas stormwater parks are applied to areas prone to inland, riparian, or pluvial flooding.

Figure 17. Illustration highlighting spatial difference between contiguous parcels and non-contiguous parcels



Source: Dept. (Authors)

Design Summary and Lessons Learned

A goal of this project is to support the recognition that buyout properties can serve as a form of soft infrastructure that can provide flood reduction, increased landscape performance, education on flood risk and floodway processes, as well as environmental and ecological function. The design scenarios highlighted above take into consideration the potential of a Pocket-Park scenario buy-out properties to contribute to flood reduction, flood hazard mitigation, while also benefiting the public realm and open space networks. In order to design end-uses that provide multiple benefits, both programmatic requirements as well as land-based analysis is required. While programmatic requirements differ from community to community: dog parks, community gardens, event lawns, etc. Land-based analysis is more fixed and depends on the specific properties of the natural environment including soil type, elevation, geological conditions, and ecological conditions.

The design scenarios also take into account the significant spatial differences between contiguous buy-out lots compared to scattered buy-out lots. Contiguous lots have the advantage of being larger in scale, which is beneficial for ecological and hydrological functions. For example, green space continuity is more easily achieved with contiguous lots; however, the reality of volunteer buy-outs tends to result in more scattered site properties. The disadvantage of scattered sites is that they are smaller in scale and more challenging to relate to one another. The schematic designs considered for this study, however, make a case for even the smallest of scattered sites, because the scale of implementation can be more feasible from a financial point of view. Green infrastructure projects implemented on small lots are still beneficial to a localized watershed. Providing a range of schematic designs / design concepts that highlight the range of possibilities is one way from buyout program designers to begin to conceptualize how the use of buyout sites may change over time.

Conclusions

Despite the potential benefits that well-conceived buyouts can provide, no clear method for identifying how to use vacant land after a buyout currently exists. Some communities have done well to incorporate buyouts seamlessly into the open space or conservation planning. However, some communities may feel the task of visioning a future for post-buyout land too daunting to manage. There is also limited guidance on how properties should be evaluated for use potential, the parameters for analysis, and the costs associated with implementation.

The purpose of this project was to develop a select number of uncertainty scenario planning exercises for adaptive reuse of vacant land acquired through voluntary property acquisitions (buyouts) based on different certainties and uncertainties that program managers may face. We faced some significant limitations due to the length of time it took to receive public data transfer and the scale of the area we originally intended to examine. Likewise, it was very difficult to determine how previous buyout programs had decided what to do with their parcels due to a lack of publicly available project data, difficulty contacting program managers due to high turnover in staff and a lack of institutional memory for decision making. These constraints speak to the need for better best-practice sharing amongst program managers and designers, especially in regard to partnership development and funding end use implementation.

Although this project has been more difficult than originally imagined due to the lack of a specific site with constraints and opportunities we could explore, we were able to generalize to a certain degree to go through the process of selecting critical certainties and uncertainties from a literature review and case study analysis. Then, applying this exercise to one of our scenarios yielded some useful design results.

As buyouts grow in popularity as a policy and planning response to increasing climate hazards, we hope that this investigation can contribute to a much needed conversation around the opportunities, and not just the challenges, that buyout programs present. We hope that this introductory element can ground a landscape-based approach that honors a mindful and deliberate approach to planning for voluntary property acquisitions as climate impacts like sea level rise and storm surges intensify. As funding remains a critical barrier to implementing buyout programs to begin with, let alone create new resilience, recreational, or conservation amenities, greater attention to the proactive visioning process of post-buyout landscapes may inspire much-needed private sector investment and partnerships to ensure that buyout programs can truly benefit the communities that must implement them in the decades to come.

Future Research

There is a significant amount of research potential from this preliminary investigation. One useful comparison is learning from vacant land revitalization programs in cities like Detroit after industrial decline. Adaptively reusing buyout properties is not the first time cities have had to deal with the challenge of vacant land: in fact, there are a wide variety of similar planning tools for reusing vacant land which are worth exploring for application to buyout programs. Future research could highlight the specific tools, programs, and methods that vacant land revitalization programs have utilized to address the reuse potential of vacant lots without reinventing the wheel.

Likewise, we believe that geomorphology and a landscape-scale approach to buyout parcel end use planning is currently undervalued in the literature. The Long Island shows that using GIS analysis to identify potential strategies for reuse is an area worth exploring. Likewise, examining other landscape-scale patterns to identify flood mitigation strategies could be a useful endeavor. In doing so, it may be possible to develop additional design strategies for a variety of contexts across the country. Lastly, it is worth continuing to explore the use of exploratory scenario planning for buyouts due to the novel approach for dealing with uncertainty and even normative scenario planning in an area with more buyout interest. Scenario planning will likely be useful for communities who are facing increasing flood risk but face many unknowns regarding when to acquire properties and what to do with the land that gets left behind. It would be helpful to go through this exercise with communities currently considering buyouts and test the assumptions we have made through the literature analysis to see if XSP can truly be a tool for creating meaningful parcel reuse programs that improve communities' resilience to future climate impacts.

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Bay County, FL

Funding source: HUD (CDBG-DR)

Use of land: Open space (green space, flood management systems)

Type of flood: Storm surge

Number of properties: Unknown

Key Opportunity: Possibility for collaboration between buyout program and other programs (e.g., Private Property Debris Removal Program [PPDRM]); incentives in the form of “housing replacement assistance”

Prioritization: N/A

Bay County’s buyout program was advocated for after Hurricane Michael struck the state of Florida in 2018, disproportionately striking the Florida panhandle (where Bay County is located).¹ Florida’s Department of Economic Opportunity (DEO) awarded \$4.4 million to Bay County.² Buyout funds— a total of \$5 million— were also given to Panama City; the money awarded to Bay County was meant to assist those living in unincorporated parts of the County.³

Bay County officials conduct certified appraisals to determine pre-disaster market value of the home and land of interested parties; this income assessment generates additional housing replacement assistance in addition to the buyout offer amount for those who choose to relocate within the county.⁴ Offering this assistance serves as an incentive for buyout participation.

Bay County’s buyout program exists in an ecosystem of other Hurricane Michael-related programs, the most unique of which being the Private Property Debris Removal Program (PPDRM), administered by FEMA.⁵ Between April 2019 and March 2021, over 300 properties, 4,500 hazardous trees, and 104,000 cubic yards of vegetative debris have been removed. The program is implemented on behalf of Bay County by Tetrattech, a private subcontractor.⁶ Though the program has been criticized for its slowness in implementation, there is arguably a potential opportunity for collaboration between this program and the buyout program. Disaster-related debris removal sometimes requires demolition; if PPDRM’s subcontractors work alongside those facilitating the Bay County buyout program, innovative end-use planning ideas could easily develop. A potential drawback to such collaboration, depending on the actors involved, is that the buyout could take even longer than already anticipated.

¹ [Hurricane Michael 2018 - Tallahassee](#)

² [Combination of \\$9.4 million awarded to Bay County and Panama City for Voluntary Home Buyout Program](#)

³ [Bay County to buy back Hurricane Michael-damaged homes](#)

⁴ [Hagerty PowerPoint Template](#)

⁵ [Bay County program to remove Hurricane Michael debris from private property nears end](#)

⁶ [Bay County private property Hurricane Michael debris removal deadline Friday](#)

Monroe County, FL

Funding source: HUD (CDBG-DR)

Use of land: Park amenities, flood storage, open space

Type of flood: Storm surge

Number of properties: N/A

Key Challenge: Highly structured end-use parameters given by funding source

Key Opportunity: County-funded with city partnerships

Prioritization: LMI households prioritized with the following subcategories: >62 and <18 residents in home; lack of flood insurance; “primary” home (as opposed to “secondary”)

The buyout program in Monroe County, Florida’s formation was spurred largely by the aftermath of Hurricane Irma, a Category 5 hurricane that struck Florida in September of 2017.⁷ In its wake, the Florida Department of Economic Opportunity (DEO) allocated \$75 million of CDBG-DR funds received to buyout programs across the state.⁸ It is unclear how much funding went to Monroe County given documentation discrepancies: one document⁹ states that Monroe County received \$10 million while another claims that they received \$15 million.¹⁰

CDBG-DR-funded buyout programs require specific patterns and parameters to be followed, and Monroe County’s program is no exception. There is a publicly accessible paper trail of public meeting transcripts, as well as Monroe County Budget meeting transcripts, available. Florida’s DEO developed a CDBG-DR Action Plan, which included a scoring system that prioritizes homeowner applications based upon a number of federal criteria (i.e., income, age of those living in the home, possession [or lack thereof] of flood insurance, etcetera).¹¹ Monroe County developed county-specific prioritization measures in addition to the federal prioritization criteria set out by HUD; their local prioritization strategy uses a point system. Points can be awarded for homes that endured substantial damage from Hurricane Irma, are located in the “V Zone” as determined by FEMA, are repetitive loss structures, have high probability of sea level rise, and are primary residences at the time of Hurricane Irma.¹² A Citizen Participation Plan is also available online for consultation.¹³ The county has an online interest survey for homeowners who would like to participate in the program.¹⁴

Implementation-wise, cities and towns within Monroe County appear to have a choice as to which agencies to engage in the acquisition process. This speaks to the strength of coordination between state and city levels in the buyout program. For example, one city in Monroe County, Marathon, engaged the City of Marathon Planning Department as a liaison for selling buyout

⁷ [Hurricane Irma Local Report/Summary](#)

⁸ [Voluntary Home Buyout Program](#)

⁹ [CITY COUNCIL AGENDA STATEMENT Meeting Date: August 13, 2019 From: George Garrett, Planning Director Through: Chuck Lindsey, Ci](#)

¹⁰ [Voluntary Home Buyout Program | Marathon, Florida](#)

¹¹ [Resolution to Approve Local Project Prioritization Criteria](#)

¹² Ibid.

¹³ [Sample CP Plan](#)

¹⁴ [Interest Survey: Rebuild Florida Voluntary Home Buyout Program](#)

properties.¹⁵ On the county level, no agencies aside from the Florida DEO were mentioned in any documents found. At this time, there is no additional information about concrete implementation or program results available for the public to access.

In terms of ethos, the buyout program is set up to encourage “managed retreat.” This is largely attributed to the funding source of the buyout program, as funds are allocated to grantees that use CDBG-DR funds to buy properties with the specific intent to demolish the structures and create park amenities, open space, or flood storage areas.¹⁶ CDBG-DR specifically disallows redevelopment. At this time, no specific information is available regarding which avenues were taken in Monroe County.

¹⁵ [Voluntary Home Buyout Program | Marathon, Florida](#)

¹⁶ [Disaster Recovery Buyout Program](#)

Miami-Dade County, FL

Funding source: HUD (CDBG-DR)

Use of land: public parks, public open space

Type of flood: Storm surge, inland

Number of properties: 10

Key Challenge: Checkerboard effect; uncoordinated and poor communication; these potentially stem from a lack of unified governmental/agency-wide oversight

Prioritization: LMI households

Due to the effects of Hurricane Irma, a buyout program in Miami-Dade County, Florida has been advocated for by the Florida DEO; Miami-Dade County submitted an application to the state in September of 2019.¹⁷ Ten properties were ultimately proposed as eligible for the buyout, with the ultimate goal of turning these properties into public parks or managed open space.¹⁸ Unlike flood events that occur due to the presence of rivers, Miami-Dade County's flooding occurred as a result of indirect inland flooding due to sea level rise: coastal sea level rise impacts groundwater by pushing it up, even if miles away from the shore.¹⁹

Prioritization was given to low-moderate income (LMI) households. As of September 2020, no homeowners in Miami-Dade County have received buyout funds; no publicly accessible information appears to be available on the program's progress. Though the rationale for end-use was directly determined by HUD, an interesting feature of these ten buyout properties is that they are inland, and in unincorporated Miami-Dade. Despite the fact that Miami-Dade County boasts a population of over 2 million residents, no cities within the county applied for the buyout program; this introduces a challenge, given that it is difficult to put together a comprehensive end-use plan in unincorporated areas.²⁰ The proposed buyout properties are thus not geographically close together, which introduces the "checkerboard effect", a common challenge that arises from buyout parcels in a given area being non-contiguous. This absence of contiguity may stem from the short time window that was available for residents to apply, coupled with a lack of centralized authority spearheading the application process.

An anecdotal report from a community member highlights a lack of awareness about the buyout program, despite Miami-Dade County following CDBG-DR protocol for communication ("I knew they were going to sell the house, but I didn't know it was the government that was going to buy it").²¹ This lack of communication exacerbates the negative effects of buyouts that occur in unincorporated territory within a given county.

¹⁷ [Hurricane Irma voluntary home buyout program October 8, 2019](#)

¹⁸ [Deadline for Miami-Dade Home Buyout Program is August 15th](#)

¹⁹ [Proposed Miami-Dade Property Buyouts Come To Unexpected Places](#)

²⁰ [Study shows rich counties more likely to use FEMA buyouts](#)

²¹ [Proposed Miami-Dade Property Buyouts Come To Unexpected Places](#)

Douglas County, GA

Funding source: FEMA (PDM, HMGP)

Use of land: open space, recreational, wetlands management

Type of flood: Riverine, inland

Number of properties: 18

Key Opportunity: Multiple funding streams, phased approach; possible “co-benefits” for Water and Sewer Authority

Prioritization: location within 100-year floodplain; “substantial” damage

In September of 2009, many regions in Georgia experienced catastrophic levels of flooding. The floods, statistically speaking, were extremely rare; Douglas County’s Dog River had a peak stage nearly 20 feet higher than the 500-year floodplain estimate. Of ten fatalities, six were in Douglas County.²² This resulted in FEMA declaring 23 counties in Georgia as disaster areas, including Douglas County, making them eligible for FEMA funding.²³ Buyouts in Douglas County occurred in two phases. In the first phase, FEMA funded acquisitions and demolitions of six vulnerable homes via a PDM grant of approximately \$866,000, obtained through an application put forth by the Georgia Emergency Management Agency. In the second phase, FEMA’s HMGP awarded the county funds to purchase 12 additional homes totaling \$2 million.²⁴ In order for homes to qualify for the money, they had to be located within the 100-year floodplain with “substantial” damage.²⁵

Similarly to HUD-funded projects, FEMA does not allow redevelopment on buyout parcels. Post-buyout, homes were set to be demolished; local governments were required to maintain the areas in ways which are compatible with open space, recreational, or wetlands management practices. Despite the severity of the flooding that occurred in Douglas County, there is shockingly little available information on a local level regarding on-the-ground end-use planning practices. To begin the process, the Douglasville-Douglas County Water and Sewer Authority (WSA), a publicly owned utility company, generated flood condition studies and updated floodplain maps to reflect future flood hazards. The WSA coordinated with the Georgia Emergency Management Agency to apply for a (now defunct) FEMA Pre-Disaster Mitigation grant; Georgia’s Department of Natural Resources has played a role in reviewing the metro area’s 100-year flood map, which includes Douglas County among others. It is important to note that the WSA has a mandate for a watershed protection program.²⁶ It is possible that the WSA would have access to other types of funding due to its status as such, and an investigation of whether such funds could be used for buyout-related expenses would be worth undertaking, and vice versa. In these ways, it is possible that using FEMA funds to acquire flood-affected properties could maximize co-benefits of both hazard mitigation and watershed protection. This is merely one example of how a home buyout can accomplish other objectives based on the organizations and agencies that play a part in implementation.

²² [Buyout Brings Peace of Mind | Georgia Emergency Management and Homeland Security Agency](#)

²³ [Epic Flooding in Georgia, 2009](#)

²⁴ [Buyout Brings Peace of Mind | Georgia Emergency Management and Homeland Security Agency](#)

²⁵ [Money for flood buyouts coming to metro area](#)

²⁶ [Safeguarding municipal water supplies at the source](#)

Clive, IA

Funding source: City of Clive financial reserves (unspecified)

Use of land: Open space

Type of flood: Riverine

Number of properties: 13

Key Challenge: Limited funding available

Key Opportunity: High autonomy in shaping the program given low # of actors

Prioritization: flood insurance > no flood insurance; homeowner > renter; residential > commercial

The city of Clive, Iowa approved a voluntary buyout program after repeated flooding was observed in the vicinity of Walnut Creek, which flows directly through the city center. The flooding has repeated with increasing frequency and intensity in the years 2008, 2010, 2015, and 2018.²⁷ The goal of the program is to improve floodplain function, as well as to increase stormwater conveyance and management. Thus far, the program has undergone two phases of buyouts. Clive uses its financial reserves to fund the program; taxes and fees on residents are not planned to increase.²⁸ It is difficult to ascertain whether the City of Clive is the only entity involved in the buyout program's facilitation and maintenance, or if there is simply a lack of publicly accessible information available on the program.

The city's reserve funding is limited; given this, the City has chosen to focus available acquisition resources on properties that fulfill a set of prioritization criteria.²⁹ For example, the City explicitly seeks to avoid patchwork-style acquisitions, and is careful not to become involved with properties that suffer from environmental contamination.³⁰ The City of Clive's ability to tailor such criteria can be viewed as a benefit, as no extensive negotiations with external parties are required for the program to function. However, these choice prioritization criteria may lessen the buyout program's reach to vulnerable populations, putting the equity of the program in question. This is particularly a possibility in relation to contaminated areas, as those who are lower income are usually more likely to live in these areas.

Clive's limited funding bears disadvantages, the most obvious one being that only a small portion of properties can be acquired. This makes the program's impact on its residents relatively minor, particularly given the large area of land that is affected by the Walnut Creek floodplain.

²⁷ [Clive, Iowa approves flood buy-out program | NEWSRADIO 1040 WHO](#)

²⁸ [Flood Prone Property Buyout Program](#)

²⁹ Ibid.

³⁰ [City of Clive 2018 Flood Prone Property Buyout Program](#)

Cedar Rapids, IA

Funding source: HUD (CDBG); FEMA (HMGP); local-option sales tax

Use of land: Flood protection system; greenway; open space

Type of flood: Riverine

Number of properties: 1356

Key Challenge: Lack of clarity/transparency following funding protocols

Key Opportunity: Ability to appraise initial value permitted; holistic post-disaster planning

Prioritization: Varied, depending on area

The voluntary buyout program in Cedar Rapids, IA was planned almost immediately after the June 2008 Iowa Flood, which caused severe riverine flooding along the Cedar River. Though flooding occurred throughout the state, its impacts were most heavily felt in Cedar Rapids, affecting residential and commercial properties alike. In the planning stages of the buyout program, the Cedar Rapids City Council worked with a team including the US Army Corps of Engineers, Iowa State Homeland Security and Emergency Management, the Federal Emergency Management Agency, and the River Corridor Redevelopment Plan consultant group to divide all eligible properties into three areas for end-use. They were respectively termed “Greenway Acquisition Area(s)”, “Construction/Study Area(s)”, and “Neighborhood Revitalization Area(s)”.³¹ The agencies listed above denoted lists of eligible addresses for each area. Greenway Acquisition areas were funded by FEMA’s HMGP, and the other two areas were funded through CDBG funding. A local-option sales tax derived from city funds was utilized in instances where properties did not qualify for federal funds. Property owners were offered 107% of pre-flood assessed value; post-funding distribution, the City Council permitted those individuals unsatisfied with assessments to appeal and seek their own appraisals. These decisions, though costly, ultimately increased participation in the program.³²

A study conducted by Tate et al. used a social vulnerability index (SVI) composed of 12 different Census data indicators, encompassing racial demographics, disability, vehicle access, rentership, age, linguistic isolation, and employment.³³ These indicators were sorted into three broad categories, and weighted poverty, race, land tenure, and age more heavily than the others. Upon aggregation, Tate et al. concluded that socially vulnerable neighborhoods were targeted directly by the buyout program.³⁴ Despite the positive nature of the program’s ethos and outlook on flood management, there was a definitive lack of clarity regarding the program’s ability to abide by funding guidelines. In total, the program cost upwards of \$125 million; a citizen complaint alleging fraud drew suspicion from HUD, resulting in a federal audit of the buyout program. Ultimately, no fraud was detected.³⁵ Despite this, it is still important to flag such an occurrence, given that other reasons cited for suspicion included the involvement of private firms to administer the buyout program, as well as a lack of advertising of program bid proposals. HUD did find that the State of Iowa did not monitor the city’s program in accordance with its Disaster Recovery action plans, and requested that the State update its monitoring checklists

³¹ [Voluntary Property Acquisition \(Buyout\) Program](#)

³² [Cedar Rapids flood buyout is history](#)

³³ [Flood recovery and property acquisition in Cedar Rapids, Iowa](#)

³⁴ Ibid.

³⁵ [Federal audit finds no fraud in Cedar Rapids flood buyout program](#)

accordingly.³⁶ This was not the first instance of the HUD office inspecting Cedar Rapids flood-disaster funding: a March 2010 report criticized a lack of documentation in distributing over \$10 million in forgivable loans administered by a local private company to upwards of 300 Cedar Rapids businesses.

³⁶ [The State of Iowa CDBG Disaster Recovery Program](#)

Des Plaines, IL

Funding source: FEMA (HMGP)

Use of land: Open space

Type of flood: Riverine

Number of properties: 68

Key Challenge: Program technicalities, resource constraints lead to prohibitively long wait times; “state budget stalemate” caused delay in first phase of buyout

Key Opportunity: Buyout program exists alongside other flood control efforts spearheaded by the city, such as “Levee 50”

Prioritization: N/A

The voluntary buyout program in Des Plaines, Illinois was formed as a response to repeated flooding of the Des Plaines River. This is unsurprising, given that 1,200 acres of the community is located in a FEMA-designated floodplain.³⁷ After a flood event in 2013 triggered a declaration of disaster by the federal government, Des Plaines applied for funding through FEMA’s HMGP, with the state and Metropolitan Water Reclamation District of Greater Chicago serving as the non-federal match sources. Permanent deed restrictions mandated by FEMA ensure that post-buyout land use is restricted to maintenance of open space.³⁸ As a preventative measure, all new construction planned in a floodway or floodplain requires a development permit from the Community and Economic Development department.

The bulk of the challenges with the Des Plaines buyout program revolved around its programmatic technicalities. FEMA requires that buyout properties cannot have deficiency judgements or tax liens; Des Plaines had to work with homeowners in the community with issues such as negative equity and back taxes stemming from the foreclosure crisis of the late 2000s.³⁹ Paradoxically, homeowners who face such obstacles are likely more in need of the financial assistance required to relocate. Simultaneously, many homeowners near the Des Plaines River actively refused buyouts even when given the opportunity.⁴⁰

Despite these challenges, massive potential for infrastructural changes exists in Des Plaines given a larger network of flood control efforts already underway. Apart from being an active participant in the National Flood Insurance Program for over thirty years, the City also sponsors the Rand Park Flood Control and Multi-Use Project, also called “Levee 50.”⁴¹ Initiated by the U.S. Army Corps of Engineers, the goal of the Levee 50 is to alleviate damages caused by Des Plaines River flooding events, as well as to add flood control measures along the River. The U.S. Army Corps of Engineers has led a plethora of additional projects, including streambank restoration, the study of seventeen sub-watersheds in the vicinity of Des Plaines, and drainage projects near O’Hare Airport. They have engaged the Illinois Department of Natural Resources and the Office of Water Resources to sponsor the Army Corps projects and to assist in construction. All of this indicates that there is a pre-existing ethos of flood mitigation in Des

³⁷ [Blueprint of a Buyout: Des Plaines, IL](#)

³⁸ [Repetitive Loss Area Analysis](#)

³⁹ [Blueprint of a Buyout: Des Plaines, IL](#)

⁴⁰ [Facing floods again, residents near Des Plaines River determined to stay](#)

⁴¹ [Floodplain Information](#)

Plaines; should further need for a buyout display itself in the future, the city should feel confident that seeds have been planted to have widespread support.

Fort Wayne, IN

Funding source: HUD (CDBG), local taxpayer dollars

Use of land: Redevelopment into 78-bed women's shelter

Type of flood: Riverine

Number of properties: 17

Key Challenge: Redevelopment can lead to reintroduction of vulnerability to a community

Key Opportunity: A lack of federal requirements introduces potential for end-use flexibility

Prioritization: Unknown

The buyout program in Fort Wayne, Indiana is unique in the context of these case studies given that it is one of the few to actively pursue redevelopment of a given area. This occurred following buyouts funded in 1982 by a HUD CDBG grant. The grant cost taxpayers approximately \$350,00. A lack of federal requirements for land use development led to a transfer of ownership in 2002 to a private individual, who sold the land for a profit with the explicit intention of redevelopment.⁴²

Though there is very little information available on the buyout's implementation and operations and maintenance, a few key lessons can be learned from the Fort Wayne case; almost all of them center around the challenges and opportunities that arise from a lack of federal restrictions on land use due to private ownership, at which point any land use choice is theoretically achievable. The choice of the individual owner in question to place a women's shelter is arguably counterintuitive to the original buyout's purpose, given that those living in such a shelter would likely be the very individuals most vulnerable to climate change-related disasters.

On the other hand, one can use this case as a chance to reflect upon the potential for local governments and partners to create public memory around flooding events. There was a roughly 20-year period between the buyout itself and the redevelopment that followed, introducing the possibility for a flooding event to be forgotten as a municipality's population shifts and changes. In future scenarios, keeping the memory of a flood alive could potentially reduce the chances of counterintuitive redevelopment measures being put forth.

⁴² [ZavarHagelman_2016 - Land use change on U.S. floodplain buyout sites, 1990-2000](#)

Lexington, KY

Funding source: FEMA (HMGP); local grants

Use of land: Open space

Type of flood: Riverine

Number of properties: 67

Key Opportunity: When buyouts occur within cohesive communities, those living there have the power to influence end-use; informal land uses can improve perception of neighborhood(s)

Prioritization: N/A

Lexington, Kentucky's buyout program stemmed from significant flooding that occurred in 1992 and 1997 along the Wolf Run Watershed.⁴³ In response, the Lexington-Fayette Urban County Government (LFUCG) applied for and received FEMA funding via HMGP to buy out 67 properties in five distinct neighborhoods within Lexington. Some neighborhoods applied for local city grants to finance landscaping and tree planting occurring in the buyout parcels.

Friends of Wolf Run, a nonprofit, assisted with planting native species and installing no-mow zones along the creek.⁴⁴ To this day, this nonprofit works alongside the Wolf Run Watershed Council, Fayette Urban County Government, and the Kentucky Division of Water to maintain high-quality water for those living along the Wolf Run Watershed. The specialized knowledge of Friends of Wolf Run in maintaining the property likely contributed to the public's overall positive response to the open space left behind post-buyout. A study conducted by Elyse Zavar (2014) demonstrated that those living in the five neighborhoods were able to generate end-uses for the open space that suited their unique needs, even if outside of the official parameters of FEMA funding. Land could be occupied in ways that cannot be done on private property; the open spaces can be used to congregate, connect with neighbors; some respondents referred to the spaces as "parks" even if they were not officially such, noting the pleasure they experienced from being able to connect to nature in a new way.⁴⁵ This demonstrates the massive potential that open space can have, even if no grand plans are made at the local government level.

⁴³ [Zavar 2014 - Residential perspectives: the value of Floodplain-buyout open space](#)

⁴⁴ [Wolf Run Watershed Management Plan](#)

⁴⁵ [Zavar 2014 - Residential perspectives: the value of Floodplain-buyout open space](#)

Austin, MN

Funding source: FEMA (HMGP); HUD (CDBG); local option sales tax

Use of land: Parks, trails, restored habitat

Type of flood: Riverine

Number of properties: 375(+); ongoing

Key Challenge: Balancing funding sources: varying percentages (between local sales tax and through FEMA) will generate different post-buyout land use outcomes

Key Opportunity: Local funding provides greater flexibility in use of lands acquired, proactivity community involvement via FACTS, Cedar River Watershed District, etc.

Prioritization: Varied

Austin, Minnesota's buyout program stemmed from repeated riverine flooding events along the Cedar River over the course of three decades, beginning in the late 1970s. In 1978, concerned citizens formed the Floodway Action Citizens Task Source (FACTS) to investigate the flooding, frequently meeting with the Austin City Council, Turtle Creek Watershed Board, Department of Natural Resources, Governor's office, and other state and local agencies. The City of Austin introduced the U.S. Army Corps of Engineers to the conversation, where they conducted a study and determined that flood control projects would not be cost effective for the city. This led the City's Housing and Redevelopment authority to obtain a CDBG grant, whereby 58 properties along the Cedar River were acquired. Future buyouts in 1983 and 1993 were funded by FEMA's HMGP, where Minnesota's Departments of Natural Resources (DNR) and Trade and Economic Development (DTED) provided a 25% funding match.⁴⁶ Over time, the presence of local groups such as the Minnesota Clean Water Fund, Cedar River Watershed District, and the Mower County Soil and Conservation District have contributed to nuanced and multifaceted habitat restoration strategies for the city.⁴⁷ Whenever possible, cleared buyout parcels are deeded back to the City of Austin and are incorporated into Austin's Linear Park System. The Park System has enabled Austin residents to still enjoy the land while also allowing for flood control.⁴⁸ This provides an excellent example of the ways in which citizen enjoyment and open space-based flood control can go hand in hand.

Since 2000, funding sources have greatly diversified: in 2007, Austin residents passed a 20-year, ½-cent local option sales tax to fund mitigation projects and property buyouts, generating approximately \$1.4 million annually.⁴⁹ As of March 2016, Austin's City Council hoped to fund an additional buyout of 18 properties via a proposed split between the Minnesota Department of Natural Resources and a local option sales tax. No further information can be found on the 2016 proposal nor its fruition at this time, but even the premise of such a split highlights the potential for end-use decision making to be varied depending on the ratio of each funding source. Funding more heavily through the local option sales tax would generate more potential for redevelopment, whereas the Minnesota Department of Natural resources would prohibit such redevelopment. Overall, Austin, Minnesota's buyout program shows what is possible for buyout

⁴⁶ [On the Move: A Minnesota City Creatively Battles Repetitive Flooding](#)

⁴⁷ [UNC 2016 - Austin, MN](#)

⁴⁸ [Loss Avoidance Study](#)

⁴⁹ [Funding Strategies for Flood Mitigation](#)

success when steady funding is generated, community involvement in end-use outcomes is consistent, and contiguous property is purchased.

Moorhead, MN

Funding source: FEMA (HMGP); state funds had a local match requirement (2% median household income × number of households)

Use of land: Habitat restoration and connectivity; recreation

Type of flood: Riverine

Number of properties: 264

Key Challenge: limited opportunities for recreational use due to lack of land contiguity

Key Opportunity: State and local funding strategies expedited buyout process significantly; provided far more than the minimum match required by FEMA

Prioritization: first targeted homes with the smallest difference between first floor elevation and the elevation of the highest adjacent grade; later transitioned to neighborhood-based approach

Moorhead, Minnesota's buyout program stemmed from repeated riverine flooding as a result of its location along the Red River. Such flooding has occurred in 1993, 1994, 1997, 2002, 2006, 2009, 2010, and 2011.⁵⁰ The program officially began in 2010; FEMA's HMGP funds were used to purchase the first two homes in the program, whereby the Minnesota Department Flood Hazard Mitigation Grant funds as well as other local matching funds acquired the remaining 262. With regard to prioritization, Moorhead first pursued an approach which targeted homes with the smallest difference between first floor elevation and the elevation of the highest adjacent grade; they later transitioned to a neighborhood-based approach. The City Engineers Office and the Planning Department played a role in operations and maintenance of the land post-buyout; Moorhead did not have programs that encouraged participants to relocate to other parts of the city, nor did it have the infrastructure to track where participants moved. Moorhead was able to optimize time on the buyout process via its procurement of state and local funds in addition to federal funds. Their resulting combination of funds promoted different end-uses in varying parts of the city (open space, recreation, wetland management for FEMA; public utility infrastructure and flood control where not regulated by FEMA).

A challenge that emerged upon program rollout was limited opportunities for recreational uses along the riverfront due to community reluctance or outright rejection of the buyout by a number of homeowners living there. Their reluctance created a lack of contiguity along the riverfront. It should be noted that this did not prevent habitat restoration from taking place, nor did it prevent Moorhead from establishing the Moorhead River Corridor Master Plan, which contains best practices to implement in the event of future flooding occurrences.⁵¹

⁵⁰ [Moorhead, MN](#)

⁵¹ [Moorhead River Corridor Master Plan](#)

East Grand Forks, MN

Funding source: FEMA (HMGP); HUD (CDBG); Minnesota state funds; forgivable loans and abatement programs; annual utility fee (for greenway)

Use of land: Parks, trails, athletic fields, greenways

Type of flood: Riverine

Number of properties: 507

Key Opportunity: Economic development from end-use; financial incentives; collaboration across city limits

Prioritization: Neighborhood-based

East Grand Forks, Minnesota (and its larger counterpart, Grand Forks) rests along the Red River. This area is significantly prone to flooding due to its extremely flat geography, as well as due to spring thaws that occur after blizzard conditions during the winter. This combination of factors resulted in a record-breaking flood in 1997, whereby nearly all homes in East Grand Forks (2274/2301) experienced some degree of flood damage. The almost \$400 million in damage ensued during this year made East Grand Forks implement measures to mitigate future harm; this included a buyout program.⁵² The City intentionally targeted neighborhoods in the 100-year floodplain; 95% of eligible homeowners participated in the buyout. Buyout parcels are now being managed and used for public amenities and habitat restoration; some of these public amenities, such as campgrounds, generate critical tourist revenue and economic activity for the City. The City utilized a combination of HMGP, CDBG, and Minnesota state funds for the buyout of 507 properties between 1997 and 2000. In addition, the City provided incentives for residents to buy a home or lot in East Grand Forks after being bought out, either in the form of forgivable loans or tax abatements. In the scenario where a resident did not wish to move, levees were built around their property. Incentive programs were meant to relocate residents behind the levees. As an additional protective measure, the City decided to install a removable 800-ft long flood wall in front of the business district.

Greenways Inc., a North Carolina-based firm helped design the greenway plan for East Grand Forks and Grand Forks. Public meetings were held to gauge community input around the greenway; the plan was finalized in 2001 and was updated in 2011, today covering over 2,000 acres of open space in East Grand Forks and Grand Forks combined. This greenway is actively managed by the City of East Grand Forks, the Minnesota Department of Natural Resources, the City of Grand Forks, and the Grand Forks Park District. The collaboration between these neighboring cities could present itself as a broader opportunity for larger and more comprehensive end-use projects to be completed in areas where there are multiple vulnerable neighboring municipalities next to one another.

⁵² [UNC 2016 - East Grand Forks, MN](#)

Montevideo, MN

Funding source: FEMA (HMGP); city-obtained grants

Use of land: Restored habitat; detention ponds; community garden

Type of flood: Riverine

Number of properties: 131

Key Opportunity: Third-party operations and maintenance

Prioritization: N/A

Montevideo, Minnesota is a small city located approximately 140 miles west of Minneapolis; it is positioned in a double river valley, at the convergence of the Minnesota and Chippewa rivers, and is surrounded by farmland, river valleys, and prairie land. The local climate has high variations between summer and winter seasons, resulting in a rapid thaw that almost inevitably causes flooding events. At least ten major flooding events have occurred since 1997.⁵³ The City of Montevideo has been actively mitigating and preparing for flooding threats since 1993, when its first acquisition program was enacted. Since then, numerous properties have been acquired with the express purpose of being converted into open space for the community. The buyout program is part of a longer-term plan, called the Chippewa County All-Hazard Mitigation Plan, which hopes to coordinate floodplain issues in the Chippewa and Minnesota River watersheds with regional planning efforts to offer greater protection from flooding and lower overall flood insurance rates.⁵⁴ Funding has been procured from FEMA's HMGP, as well as city-obtained grants.

Many acquired properties were incorporated by the Lowland Prairie Project, where native prairie grasses have been seeded to promote wildlife and open space. This project has yielded success, as many of the properties have demonstrated prairie grass growth. Presently, at least 26 acres of prairie grassland have been restored.⁵⁵ The Lowland Prairie Project continues to manage many of the parcels acquired through Montevideo's buyout program successfully; this type of collaboration takes the operational burden off of the City of Montevideo and instead gives them the opportunity to focus on other projects relevant to citizens' wellbeing.⁵⁶

⁵³ [UNC 2016 - Montevideo, MN](#)

⁵⁴ [Chippewa County All-Hazard Mitigation Plan](#)

⁵⁵ [Floodplain Buyouts for a Better Future](#)

⁵⁶ [Mitigation Prevents Disaster Declaration for Montevideo, Minnesota](#)

Arnold, MO

Funding source: FEMA (HMGP); HUD (CDBG); local funding

Use of land: Open space; passive open recreation (athletic fields, walking trails)

Type of flood: Riverine

Number of properties: 357 (1995) + 500 (2005)

Key Opportunity: Contiguous property enabled conscious usage of open space; “magnetic agent” within Arnold’s local government encouraged “aggressive” public participation

Prioritization: Primary homes

Arnold, Missouri is a city approximately 20 miles southwest of St. Louis that rests in the floodplain where the Meramec and Mississippi Rivers meet; this has made Arnold the target of many flooding events in the past century. One of the most catastrophic floods in recent memory was the 1993 flood, which damaged over 200 properties in the city.⁵⁷ Initially, residents were reluctant to relocate. After continuous flooding in 1994 and 1995 made it clear that conditions were persistently unstable for living safe from harm caused by flooding, 202 single-family homes and 155 mobile home slots were acquired with a combination of FEMA and CDBG funds. In 2005, another series of buyouts purchased 500 residences with FEMA and CDBG funds, as well as with other funding sources (it is unclear which those may have been).⁵⁸ In both cases, the program was administered by the Missouri State Emergency Management Agency (SEMA), who developed policies and procedures for allocating buyout funds across the state.⁵⁹ Prior to the 1993 flood, it was— for unknown reasons— the responsibility of the Missouri Department of Natural Resources to handle HMGP-funded projects. The 1993 flood caused SEMA to develop a Hazard Mitigation Officer position within its internal structure.⁶⁰

Most of the parcels purchased in the buyouts have been contiguous with one another, and also with the already existing Arnold City Park. This has made end-use planning conducive to extending the park in various passively recreational ways, including walking trails, athletic fields, and extensions of green space. This end-use strategy has proven successful in preventing further catastrophic impact to the City of Arnold: in 2011, when the Meramec River crested at an almost whopping 30 feet high, minimal impact was felt to Arnold property other than to that of the City Park. Local Public Works officials are prepared to regularly clean debris and disinfect the areas after every flooding occurrence.⁶¹

The presence of Arnold’s City Administrator, Eric Knoll, was instrumental in the buyout program’s eventual popularity. Knoll has been described as a “walking encyclopedia concerning river heights, flood control programs, state flood regulations, flood prevention, and ideas about making his town more secure from rising water.”⁶² Knoll ensured that Arnold was one of the first towns to participate in the early federal flood buyout program in 1980 (dubbed the “1362

⁵⁷ [Residential Buyout Program Eliminates Repetitive Flood Loss](#)

⁵⁸ [Flooding In Arnold Has Minimal Impact Compared To '93](#)

⁵⁹ [Success Stories from the Missouri Buyout Program](#)

⁶⁰ [Stemming the Tide](#)

⁶¹ [Flooding In Arnold Has Minimal Impact Compared To '93](#)

⁶² [Stemming the Tide](#)

program”),⁶³ over a decade before the flooding in question occurred. In addition, Knoll pushed for local legislation to be passed that requires developers to adhere to strict building codes and rigid easement regulations along the Meramec River shore. Since 1980, all new construction must have plumbing installed that prevents water system contamination and protects sewer lines during flooding events. Before the 1993 floods had a chance to begin, Knoll already had begun investigating the possibility of a buyout; he eventually was the one to initiate the application process, contacting owners by mail to inform them of the buyout option and to personally invite them to public meetings where the program could be discussed.⁶⁴ His strategy worked, and the ethos of the buyout program was popularized and seen in a favorable light.

⁶³ [From Floodway to Greenway | FEMA.gov](#)

⁶⁴ [Residential Buyout Program Eliminates Repetitive Flood Loss](#)

Charlotte-Mecklenburg County, NC

Funding source: Local stormwater tax

Use of land: Undeveloped open space to allow for floodplain functioning

Type of flood: Riverine

Number of properties: 400+ (ongoing)

Key Challenge: dependent on high annual local financial investment (~\$4 mil.); public involvement on the level of an individual is lacking

Key Opportunity: publicly accessible tools show program's progress (RARRT); joint decision making based on traceable data

Prioritization:

For many, Charlotte-Mecklenburg County's buyout program is seen as a standard, even a blueprint, for what a buyout program should look like. This is primarily due to its innovative funding source: instead of relying on federal funds, the County's buyout program relies on Charlotte-Mecklenburg StormWater Services (SWS), a joint county-municipal stormwater utility, for funds via a local stormwater tax. In 2003, the "Quick Buy" program and "Rainy Day" fund were established.⁶⁵ These decisions stemmed from failures caused by a previous reliance on FEMA-funded programs; in addition to federal funds being slow to disburse, prompting residents to rebuild instead of relocating, SWS realized that since much of the County's flooding could not warrant a federal disaster declaration, they would not be eligible for a large swath of federal funding. Dave Canaan, the current Director of SWS, made the decision to switch strategies in 1993. Canaan, as per Zavar's terminology, can be viewed as one of the key "magnetic agents" of the buyout program. He manages the program, Charlotte-Mecklenburg County's water quality, and does regulatory work for the County.⁶⁶ Under his leadership, SWS has successfully purchased over 400 flood-prone residential and commercial properties and has generated over 185 acres of undeveloped public open space to allow the floodplain to function during heavy rains.⁶⁷ At least \$27 million in losses have been avoided thus far, with a predicted future loss reduction of \$300 million.⁶⁸

Canaan is by no means the only actor facilitating the County's buyout program: in fact, the holistic ethos of the buyout program ensures that buyouts occur with the input and collaboration of many actors and agencies.⁶⁹ The StormWater Advisory Committee (SWAC), for example, makes recommendations directly to the City Council and County commissioners. The SWAC is made up of individual stakeholder groups appointed by other elected officials; there are strict guidelines on employment to make sure that representatives cannot attempt to stand for multiple stakeholders. SWAC works to develop and endorse an annual implementation guide as a mechanism for identifying possible future buyouts and flood damage reduction techniques in these areas. It is of note that large-scale grassroots participation is left out of the SWAC; the closest representation of such is a singular neighborhood representative. This representative is

⁶⁵ [Blueprint of a Buyout: Charlotte/Mecklenburg County, NC](#)

⁶⁶ Personal correspondence with Dave Canaan, August 2021.

⁶⁷ [Flooding > Floodplain Buyout Program](#)

⁶⁸ [Understanding Flood Risk Reduction](#)

⁶⁹ [Charlotte-Mecklenburg Floodplain Buyout Program - Developing Urban Resilience](#)

unlikely to represent interests of all possible residents of the County, as an abundance of free time is necessary to participate in committee meetings.⁷⁰

Charlotte-Mecklenburg County has utilized technology to its advantage by developing the Risk Analyze Risk Reduction tool (RARRT), which keeps track of “risk points” that are meant to be reduced every year in order to maintain a “tolerable” level of flood risk for the County.⁷¹ Data points are continually updated on a publicly accessible website for any who may be interested in learning more about the buyout program’s current activities and rationale for performing them. To facilitate cross-agency collaboration, a quarterly Creek Coordination Community Meeting occurs, where GIS is used to figure out who to collaborate with on future projects.⁷² This, however, only works if one keeps the map updated and if money is saved for such projects.

This point about money-saving for projects introduces a major potential challenge to buyout programs like Charlotte-Mecklenburg’s, where local funding is solely depended upon: with an almost \$4 million current annual investment, any level of waning support for the taxation-based method of funding will have a major impact on what the buyout program is capable of achieving.⁷³

⁷⁰ Personal correspondence with Dave Canaan, August 2021.

⁷¹ [Understanding Flood Risk Reduction](#)

⁷² Personal correspondence with Dave Canaan, August 2021.

⁷³ [Blueprint of a Buyout: Charlotte/Mecklenburg County, NC](#)

Clyde, NC

Funding source: FEMA (HMGP)

Use of land: Combination of rebuilding structures and plot leasing (personal gardens)

Type of flood: Riverine

Number of properties: 45

Key Challenge: Large reliance on county government for technical and administrative support due to the size of the town; homeowner reluctance to sell properties led to inability to put forth a greenway plan

Prioritization: None: Neither the County Department of Parks and Recreation nor the city of Clyde itself has explicit prioritization of parcels for acquisition

Clyde, a town in western North Carolina, has suffered frequent perennial flooding throughout the twentieth and twenty-first centuries. Significant flooding occurred in 1961, 1962, 1977, 1994, 2004, and beyond. During most of these years, FEMA's HMGP did not exist yet, as it was founded in 1989. This influenced the trajectories of local responses to focus primarily on individuals within the community rather than the community as a whole; structures damaged or destroyed by flooding were often rebuilt.⁷⁴ During this time, there was no "managed retreat" in Clyde's ethos. The Haywood County Department of Parks and Recreation has played a disproportionate role in overseeing and managing properties both pre- and post-acquisition. Even after HMGP's formation, their strategies have not shifted significantly given community reluctance to sell properties.

Due to the small size of Clyde, both in terms of geography and population, county-level government bodies are depended upon for large amounts of technical and administrative support of the buyout program. Local entities could not be relied upon to act consistently (for example, during a key time frame of the FEMA HMGP application process in 2004, Clyde's Disaster Recovery Center was closed). The Haywood County Department of Parks and Recreation, a private consulting company hired by the county, and a former lawyer specializing in business law provided information to the county and property owners during end-use planning stages.

However, the presence of the Department of Parks and Recreation posed significant issues; this is because the Haywood County Board of Commissioners reinstated the county department in April of 2000 after a 22-year absence.⁷⁵ It is unclear why the County decided to make the Department defunct. Regardless of the reasoning behind such a choice, this meant that neither the Department nor the County had long-term planning mechanisms in place when disaster struck in 2004. Despite Department Director Claire Carleton's urging the development of greenway projects, and that a Master Plan has been drafted including comprehensive considerations for a greenway system, no such plans have been executed due to a lack of contiguous property post-acquisition. Instead, the Department has decided to lease acquired parcels to nearby homeowners for personal gardens or lawn space.

The high levels of active reluctance to participate in Clyde's buyout program should be studied carefully, as active refusal is an entirely different problem from passive ignorance or lack of

⁷⁴ [Clyde, North Carolina](#)

⁷⁵ [About Recreation & Parks](#)

information. This difference comes out quite clearly in the case of Clyde. Sentimental value of the homes considered for buyouts, as well as a significant Baptist Church group presence in Clyde, fueled the desire for homeowners to decline buyouts. Organizations such as the NC Baptist Men and United Methodist Men offered to make significant repairs on flood-affected homes. Presumably, the speed with which such groups could rebuild was much more expedient than waiting for funds to arrive from FEMA.

Kinston, NC

Funding source: FEMA (HMGP); HUD (CDBG); Clean Water Management Trust Fund; State Acquisition and Relocation Fund

Use of land: Undeveloped vacant property; dog park; skeet range

Type of flood: Riverine

Number of properties: 1000

Key Challenge: Dramatic checkerboard effect; buyout site contamination on actively used property introduces environmental hazard questions; program lack of affordability for those affected (difference in price between homes within and outside of floodplain requires reliance on state funding to cover gaps)

Key Opportunity: Cross-city collaboration for planning buyouts; GIS technology

Prioritization: None:

Kinston, North Carolina's buyout program was initiated as a result of Hurricane Fran, a Category 3 storm that hit southeastern North Carolina in September of 1996. The rainfall that ensued fell into the basin of the Neuse River, which runs through the city of Kinston. This resulted in catastrophic damage for the city, as the resulting flooding also inundated the Peachtree Wastewater Treatment plant and neighboring junk yards, thereby releasing raw and partially treated sewage, as well as oil, gas, and other toxic chemicals into the Neuse River.⁷⁶ The initial push for a buyout created a housing shortage in Kinston; amidst a cry for support from investors, developers, and residents, Hurricane Floyd hit in 1999.⁷⁷ This chain of events is particularly concerning given that Kinston is composed of a vulnerable aging population with a high poverty rate; very few properties in Kinston's hardest hit areas were insured by flood insurance. Kinston homeowners were eager to participate in a buyout program.

Due to the lack of both bureaucratic and physical infrastructure in Kinston, those enacting the buyout program were not able to realize a comprehensive end-use strategy. The scattered "checkerboard" nature of the parcels has made it so most remain vacant and undeveloped. However, this does not mean that certain members of local and state governments did not act with fervor to protect Kinston from further harm. Members of city staff reached out to officials from Grand Forks, North Dakota for guidance on the buyout process. This instance of cross-city collaboration— also seen in the East Grand Forks, Minnesota case study— presents a unique opportunity strategy for towns and cities with minimal planning infrastructure. Kinston's buyout program was managed by the City, as well as Lenoir County. A small team of "magnetic agents" within leading planning personnel utilized GIS resources to strategically apply for further HMGP funding. In addition, North Carolina Governor Jim Hunt acted quickly to approve state funding, and advocated for brownfield remediation in Lenoir County by utilizing the NC Clean Water Management Trust Fund.

Unfortunately, immediate relocation from flood-inundated properties to properties outside of the floodplain was difficult, even at pre-market value. Many homes became completely condemned after two hurricanes, and buyout participants struggled to afford properties outside of the

⁷⁶ [UNC 2016 - Kinston, NC](#)

⁷⁷ [How Hurricane Floyd severely affected Southeastern part of Kinston](#)

floodplain due to a difference in price. The state provided gap funds to cover the difference via the State Acquisition Relocation Fund, resulting in high participation in the buyout and a 90% relocation within city limits. Without state funding, many vulnerable populations within Kinston would have no exit route from a highly precarious and dangerous living situation. Even with this help, the incomes of those moving into the more expensive homes did not always cover the amounts required for the new home's maintenance; many residents have since gone into default on their mortgage payments. This introduces a key challenge of unaffordability for residents participating in buyout programs in areas with high poverty rates.

Rocky Mount, NC

Funding source: FEMA (HMGP); Crisis Housing Assistance Fund (CHAF); State Acquisition and Relocation Fund (SARF)

Use of land: Trails, community forest, athletic facilities, dog park, barbeque park

Type of flood: Storm surge

Number of properties: 446

Key Challenge: contamination and environmental degradation from agricultural facilities; housing stock shortage

Key Opportunity: GIS capacities in government enabled efficient planning; inter-city planning (Greenville, Goldsboro)

Prioritization:

Rocky Mount is a mid-size city situated in the eastern part of North Carolina, with a median age higher than the state average and a nearly exactly median income in relation to North Carolina as a whole. Eastern North Carolina has a long history with destructive hurricanes: some of these include hurricanes Hazel (1954), Bertha (1996), Fran (1996), Bonnie (1998), Dennis (1999), Floyd (1999), Isabel (2003), and Irene (2011) among others. Given that Rocky Mount is located inland, these hurricanes cause storm surge flooding; this was particularly the case during Hurricanes Dennis and Floyd. The State of North Carolina, FEMA's HMGP, and supplemental state programs funded the program and encouraged more homeowners to participate in the program. Ultimately, buyout parcels were transformed into a combination of trails, community forest, athletic facilities, and designed for other recreational uses.

Simultaneously, Rocky Mount's city planning department had already been developing capacities to utilize GIS; this made buyout parcel end-use planning expedient. With the help of a community GIS team, the city's planning department was able to produce a collaborative map of the area that was used to visualize potential acquisitions. The planning department supplemented their knowledge by hiring a consulting firm that had knowledge about federal relocation standards; they also consulted with other cities in Eastern North Carolina, such as Greenville and Goldsboro, to compile best practices on buyout program management. Rocky Mount's decision to consult other cities represents one of a few case studies to do the same. Arguably, once planning for a buyout begins in one city, there is potential for buyouts to be spread to adjacent cities.

Harris County, TX

Funding source: FEMA (HMGP, FMA) HUD (CDBG-DR)

Use of land: Open green space; retention area

Type of flood: Storm surge

Number of properties: 60+

Key Challenge: Eminent domain; lack of community interest; checkerboard effect

Prioritization: Repeated flooding “hopelessly deep” within the floodplain (“Buyout Interest Area”); contiguous properties; percent publicly-owned; areas with environmental risks

Harris County, Texas has been engaging in home buyouts since the 1980s; the County manages an ecosystem of disaster mitigation projects under the umbrella of Project Recovery.⁷⁸ Unlike other municipalities discussed in this case study review, Harris County engages in a combination of mandatory and voluntary buyout programs.⁷⁹ The programs target homes that have been damaged by repeated flooding, particularly those affected by floods stemming from Hurricane Harvey in 2017.⁸⁰ Both types of programs have aligned their end-use goals to consist of maintaining open green space, prohibiting redevelopment, and developing retention areas. A combination of FEMA, HUD, and local funds are utilized to pay for buyout expenses.⁸¹

The voluntary home buyout program, dubbed the Harris County Voluntary Buyout Program, is operated by the same combination of actors (HCCSD; HCPRD; HCFCD): its prerogative is not to provide immediate flood recovery assistance, but rather to help prevent future damages to the county.⁸² Given that FEMA expenses are being used, the program has to remain voluntary, even when a negligible number of homeowners are interested in participating. This causes checkerboarding across the county, making it difficult to perform extensive hazard mitigation measures.

The lack of participation from the voluntary program, as well as from pressure to spend federal recovery aid given in the aftermath of Hurricane Harvey, inspired Harris County’s decision to create a mandatory buyout program.⁸³ The mandatory program is called the Project Recovery Post Disaster Relocation and Buyout Program (PDRB), and is jointly operated through the Harris County Community Services Department (HCCSD), the Harris County Engineering Department’s Real Property Division (HCPRD), and the Harris County Flood Control District (HCFCD). The properties are acquired via the County’s power of eminent domain and pursue litigation when disagreements on selling property occur. Property owners are eligible for relocation assistance benefits to help their relocation process.

There is an overall sense of dissatisfaction, confusion, and contention with the flood protection programs in the County, particularly in historically disinvested areas. Harris County utilizes

⁷⁸ [Programs - Harris County | Texas](#)

⁷⁹ [buyout-faq - Harris County | Texas](#)

⁸⁰ [Mandatory Buyout Program Guidelines](#)

⁸¹ [Funding Sources for Home Buyouts](#)

⁸² [Flood Control District's Home Buyout Program](#)

⁸³ [Progress on post-Harvey flood control efforts remains slow. Here's why](#)

unique and complex eligibility criteria, prioritizing buyouts in neighborhoods where flooding cannot be fixed through engineering and in areas that are “deep” in the floodplain. This makes homeowners reluctant to participate.⁸⁴ Much dissatisfaction comes with the slow speed at which buyouts are undertaken, as well as the stress that comes with maneuvering the bureaucratic aspects of the process.⁸⁵ Despite this, home buyouts seem to be moving the most quickly out of all of the programs under the Project Recovery umbrella.

⁸⁴ [Report: Flooded Home Buyouts in Texas' Harris County Less Than Strategic](#)

⁸⁵ [Progress on post-Harvey flood control efforts remains slow. Here's why](#)

Pierce County, WI

Funding source: FEMA (HMGP); state funds; local funds (sale of salvage)

Use of land: Forested floodplain with little-to-no-management

Type of flood: Riverine

Number of properties: 62

Key Challenge: Environmental contamination; holdouts/“piecemeal” nature of program (rebuild > relocate)

Prioritization: N/A

Pierce County, Wisconsin’s buyout program primarily focused upon a flood-prone community called Trenton Island and its surrounding communities, located in the middle of the Mississippi River. The County has experienced major flood events in 1952, 1965, 1969, 1993, 1997, 2001, and beyond. The floods in 1993 were the most catastrophic, pushing Pierce County’s infrastructure beyond its capacities; this caused environmental and drinking water contamination stemming from sewage leaks. This chain of events prompted the buyout program to form, with 75% of it being funded by FEMA and 25% between Wisconsin Emergency Management and the Wisconsin Department of Administration’s Division of Housing. In Trenton Island, the bought out properties were mostly contiguous. Salvage from the acquired properties was sold, generating additional revenue for the program. Those who chose to accept the buyout program were compensated with fair market value of their properties, as well as moving expenses and a state-required housing cost differential (made up of the difference between the acquisition cost and the “reasonable cost” to purchase a replacement, or the actual cost of the replacement dwelling).⁸⁶ Pierce County managed acquired properties until 2010, whereby ownership was transferred to Trenton Township. The land is managed as a forested floodplain upon which development is forbidden, and it is not explicitly managed for recreation or wildlife protection.

Pierce County’s buyout program utilized a unique flood-related ordinance, allowing renovation and repairs only if flood-related structural damage did not exceed 50% of the property’s value. Some property owners who did not wish to relocate and met these criteria chose to carry out repairs and flood-proofing measures; unfortunately, this did not spare these property owners from experiencing flood damage in 1997 and 2001. The contiguous nature of the properties acquired could have presented the opportunity for Pierce County to pursue active conservation measures, but the ordinance arguably played a major role in limiting their ability to do so given the property owners who chose to rebuild instead of relocation.

⁸⁶ [UNC 2016 - Pierce County, WI](#)