Briefing for the Town of Seven Springs, NC: Land Suitability Analysis for Post-Disaster Housing Relocation

Hurricane Matthew Disaster Recovery and Resilience Initiative
September 2018

Note: This Appendix complements the Technical Memo for Land Suitability Analysis and contains the relevant details and results specific to the Town of Seven Springs.

Overview

Hurricane Matthew's heavy rainfall in October of 2016 led to record flood levels on the Neuse River, impacting all but a few of the 49 homes as well as Main Street, where the most of the local businesses reside. The flooding also significantly damaged the Town Hall, local fire station, and a County Emergency Services structure. Even before Hurricane Matthew, the town was dealing with challenges associated with a declining and aging population leading to a reduced tax base, the lack of affordable housing, and difficulty in affording the management of water and sewer systems. The resilience of the town's residents and local leaders has certainly been tested, yet again.

Through a long-term recovery planning process led by HMDRRI, Seven Springs has established a community vision for recovery (Figure 1), been awarded a number of grants (via Community Development Block Grant – Disaster Recovery [CDBG-DR][1], the Golden LEAF Foundation, etc.) for reconstruction, repair and relocation of facilities, and is exploring opportunities for integrating downtown floodproofing and regional eco-tourism while working to address the immediate needs of the residents most heavily impacted by the storm.

Figure 1. Proposed Community Vision for Seven Springs Recovery.

Recover from Hurricane Matthew and create a more resilient community that has a vibrant Main Street, affordable housing in areas safe from flooding, and an ecotourism economy linked to the natural beauty of the surrounding area, maximizing the town's access to the Neuse River and Cliffs of the Neuse State Park.

[1] CDBG-DR funds may supplement, but cannot duplicate, funding available from FEMA or other federal agencies. CDBG funds must be approved by Congress. These flexible grants, administered by the U.S. Department of Housing and Urban Development (HUD), can be used to assist disaster recovery and resilience efforts by local governments, states, or tribes. CDBG may be used to fund a broad range of activities so long as they meet at least one of three national objectives: 1) benefit low- and moderate- income persons, 2) help prevent or eliminate slums or blight, or 3) address urgent risks that pose a serious and immediate threat to the health and wealth of the community where other financial resources are unavailable (U.S. HUD, 2016).

With over 20 buyout participants expected through FEMA's Hazard Mitigation Grant Program, the town is concerned about losing a large portion of its tax base should individuals relocate outside of municipal boundaries, which is likely given the lack of affordable housing options. To minimize this loss and save an important part of the town's history, the Housing section of the Seven Springs Recovery Plan recommends that several historic homes in the 100-year floodplain be relocated to higher ground by the end of 2020 using information derived from the Land Suitability Analysis (LSA) and HMDRR HomePlace document (see Technical Memo on Land Suitability Analysis and Appendix A for details). The plan also recommends identifying areas where new replacement housing can be built. However, getting from the LSA to the reality of flood survivors living inside safe and affordable homes will take a significant amount of time, energy, investment, and planning on the part of the town officials, their recovery partners, and of course, the survivors themselves. HMDRRI has facilitated taking many of the first steps in a long recovery process, including the creation of the LSA which is intended to inform resilient housing development strategies for the town.

Linking Home Buyouts, Relocation and Greenspace Concepts

A major output of HomePlace for Seven Springs, a component of the broader Relocation Strategy, is a Greenspace Concept (Figure 2) that illustrates a set of potential recovery strategies. The concept includes actions such as: clustering homes and structures into a new village core along both sides of Main Street, relocating some historic homes to higher ground across Highway 55, and transforming former residential areas over time to support a

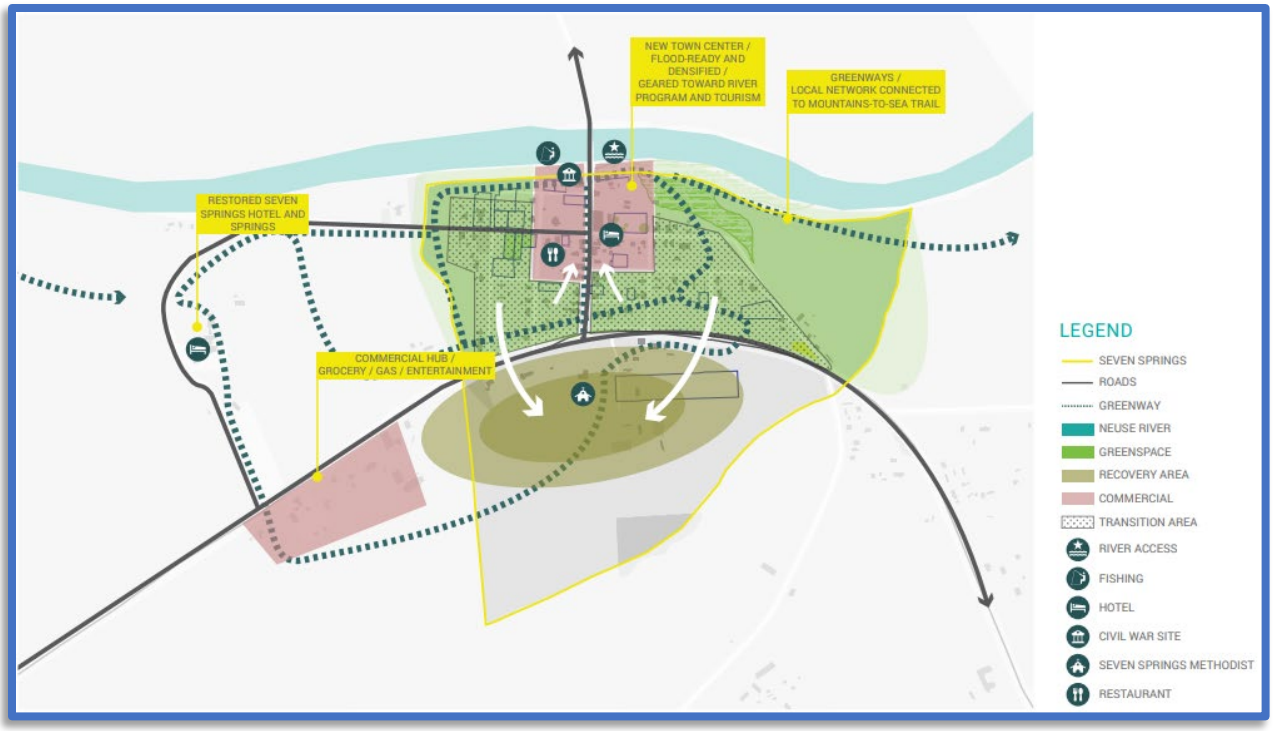

Figure 2. Seven Springs Greenspace.

network of interconnected trails through the Neuse River floodplain (HomePlace, 2017). The Greenspace concept shows a general 'recovery area' which correspond to locations outside the floodplain and the Recovery Plan includes a "homes relocation concept." The LSA highlights on a parcel by parcel basis the most suitable locations based on a larger set of variables and thresholds. While the town's Recovery Plan has identified eight major issue areas, including infrastructure, public facilities, and economic development, among others, one of the greatest challenges is to encourage flood survivors who were displaced from their homes to permanently relocate in areas within the community that are desirable to live in and are not vulnerable to future flooding. The LSA and Relocation strategy aim to help address not only some of Seven Springs' long-term recovery needs but support the town's long-term resilience.

LSA Variable Description and Weighting

The selection of variables to include in the LSA began with a broad review and consideration of 36 variables of various types such as proximity to community services, transportation, environment and topography, planning, and flood risk (Appendix X). Since many variables were not applicable in Seven Springs (i.e., proximity to hazardous waste sites, sea level rise vulnerability) or may not be major determinants of a sites' development potential (i.e., bus stop proximity, park proximity, etc.), members of the HMDRRI team prioritized the top 8-10 variables based on past LSA experience and available knowledge about flood risk. A comparison of each member's interpretation of the variables led to strong consensus on the most important factors to focus on to conduct a preliminary LSA. Described in further detail below and in Table 1, some of the key variables included the designated 100- and 500-year flood zones, proximity to existing water and sewer infrastructure, land/building vacancy, parcel size, and zoning.

Many variables such as the municipal boundary or 100- and 500-year flood zones apply Boolean logic (binary in/out or yes/no) and therefore, had simple criteria for point attribution. Other factors such as parcel size and zoning contained a range of quantitative and qualitative values, and needed criteria and thresholds established. These were determined after further exploration of the variability of each factor and discussion with HMDRRI team members about what planning and development concepts were most applicable. Descriptions and justifications of each variable, its associated thresholds, and data sources are explained below and summarized in Table 1.

Table 1. Seven Springs LSA Variables and Criteria Thresholds.

Category	Variable	Criteria Thresholds	Points	Max
Jurisdictional Boundaries	Municipal Limits	Out	0	1
		In	1	
Proximity to Infrastructure	Water Line (0.25 mi. buffer)	Out	0	1
		In	1	
	Sewer Line (0.25 mi. buffer)	Out	0	1
		In	1	
Parcel Size*	Development Potential	< 3,000 ft^2	0	2
		3,000 ft^2 - 20,000 ft^2	1	
		20,000 ft^2 - 100,000 ft^2	2	
Building/Land Vacancy	Vacant/Abandoned Building	Occupied - FP	0	4
		Vacant - NO FP	4	
	100-yr Floodplain (Zone AE)	In	0	4
		Out	4	
	Hurricane Matthew Flood Extent	In	0	2
		Out	2	
Areas of Future Development	Current Land Use	Institutional, Industrial	0	2
		Commercial	1	
		Residential	2	
			Total:	17

Vulnerability to Flooding/Flood Risk

Source: NCEM, 2017

(100-Year Flood Zone; and Hurricane Matthew Flood Extent)

Perhaps the most crucial set of factors for the Relocation Strategy and LSA are related to flood risk and vulnerability. The 100-year floodplain (Zone AE) or base flood elevation delineates the area that is expected to be inundated by a 1% annual chance flood. Hurricane Matthew's Flood extent is also relevant as the flood of record for the town and generally followed boundaries in between the 100- and 500-year floodplains. The event's flood extent represents areas that officials and residents have actually seen flood versus mapped floodplains which are calculated using hydrology and statistics and included a certain amount of uncertainty/inaccuracy.

Together, these flood risk variables account for both estimated flood risk that is tied to various regulations and programs as well as the lived experience which is easier to understand from the public's perspective. These factors provide a range of possible flood elevations, a more

comprehensive view of a property's vulnerability to future flooding and meets a main goal of the Relocation Strategy, which is to develop in safer areas.

Jurisdictional Boundaries

Source: Wayne County, 2017
(Municipal Limits)

Municipal governments in North Carolina have control and influence both within their corporate boundaries and its Extraterritorial Jurisdiction, or ETJ (see Owens, 2013). For a number of reasons, it is important for the Land Suitability Analysis to extend its view to include the ETJ. In order to promote orderly development and the efficient investments in infrastructure and the provision of services, the most common practice is to annex land prior to development. Where that does not happen, the ETJ helps avoid problems by applying municipal development standards, zoning, and proper layout of subdivisions for residential, commercial and industrial development. Following a disaster in which buyouts occur on flood-prone land, for example, there may be insufficient property within the community to find relocation sites not hampered by hazard vulnerability, requiring an assessment of lands outside the community but within the ETJ. The Land Suitability Analysis concept, in combination with the Relocation Strategy, is well suited to this purpose. For the reasons cited above, annexation prior to development is the best practice but planning prior to annexation is fully appropriate, and this aligns with the planning support provided by the LSA. While the Seven Springs Recovery Plan emphasizes residential relocations, it may serve as a useful tool to inform commercial and industrial business developments as well.

Proximity to Existing Infrastructure

Source: NC OneMap, 1997
(Water Distribution System; Sewer System)

New housing development is much more cost-effective when it's located near existing water and sewer infrastructure. These factors are key to identifying suitable areas for infill development. One limitation of these data is that it is outdated (1997). The use of a 0.25-mile buffer helps to address some of this uncertainty.

Parcel Size

Source: NC OneMap, 2017
(Infill Potential; < 3,000 sq. ft.; between 3,000 and 20,000 sq. ft.; and between 20,000 and 100,000 sq. ft.)

Some lot sizes are only suitable for development of single-family homes or lower densities. The thresholds were selected based on size of existing single-family home building footprints and lots sizes within Seven Springs. The smallest existing lots in the town that have single family homes on them are at least 3,000 sq. ft. and the median parcel size found within

the town limits is about 21,000 sq. ft. Therefore, any parcel less than 3,000 sq. ft. would not be considered suitable while the other two categories already do or could support a small- to medium-size single family home and larger homes for which existing lots did not exceed 100,000 sq. ft. Square feet was used instead of acres because some lot sizes were so small that multiple decimal places would've been required to display variability.

Land Vacancy

Source: NC OneMap and NCEM, 2017
(Building Footprint Present: FP or NO FP)

A proxy was created to determine which lots were vacant and had no building footprint because they would be the easiest to develop, whereas if there is a building footprint (FP), it may or may not have to be demolished. The latest building footprint data was obtained through North Carolina Emergency Management and used to identify properties that do not have a building footprint on them. The following categories listed from lowest to highest relative suitability include: Occupied - FP and Vacant - NO FP.

Areas of Future Development

Source: Wayne County, 2017
(*Land Use: Commercial, Industrial, Residential, Institutional*)

Zoning determines what can be built today and in the future. It may be more difficult to develop replacement housing on properties that have existing land use or zoning for something different from residential, such as 'industrial' whereas a property already being used for and is zoned for residential, will not require a rezoning, variance, or other procedural action. Land uses of greatest interest for the RS and LSA include Commercial and Residential, both of which would require little to no extra administrative burden. Developing housing in areas whose future land use is designated as agricultural may go against prior planning goals and require rezoning.

The eight variables represent the factors that determine a parcel's composite suitability for housing development or relocation. The factors and thresholds inform the results of the LSA which can guide decisions that meet the goals of the HMDRRI RS to reduce flood risk, retain flood survivors within their communities, and minimize construction costs.

While this analysis was done for siting the relocation of historic homes and potential construction of replacement housing, the results are also useful to address the lack of affordable housing in general. Additionally, a similar method could be used by the town for other planning objectives such as siting future park/greenspace, other public facilities or commercial structures. Further description of these possibilities is provided in the Technical Memo for the LSA.

LSA Results and Interpretation

The results of the LSA reveal significant spatial variation in the total suitability score within the town's ETJ. For instance, there are areas in close proximity to one another, but with major differences in suitability, most likely a result of the irregular shape of the floodplain boundary and its relative weight and influence on the scoring. Of the parcels analyzed that fall within town limits, there are about two dozen parcels that received a 'high' suitability score, generally located south of NC 55 Highway on higher ground near Church Street and the Seven Springs United Methodist Church seen in Figure 6.

These suitable areas are distinctly separate spatially from the lower scoring, low-lying areas adjacent to the Neuse River which contains nearly all of the homes and businesses in town (Figure 6). Properties off of Spring, Main and Simmons Street all scored in the 'low' or 'lowest' suitability category. Properties that were previously acquired through FEMA's Hazard Mitigation Grant Program are shown and considered not suitable because of the federal restrictions on development. An additional layer depicting town-owned properties reveals that there is one somewhat larger property of high suitability east of the Church that could support relocation of historic homes or a new housing development.

Seven Springs should use these findings to dive deeper into potential suitable properties for infill or larger housing development and consider additional factors not included in this analysis such as property ownership, land value/acquisition cost, proximity to downtown or other key community assets.

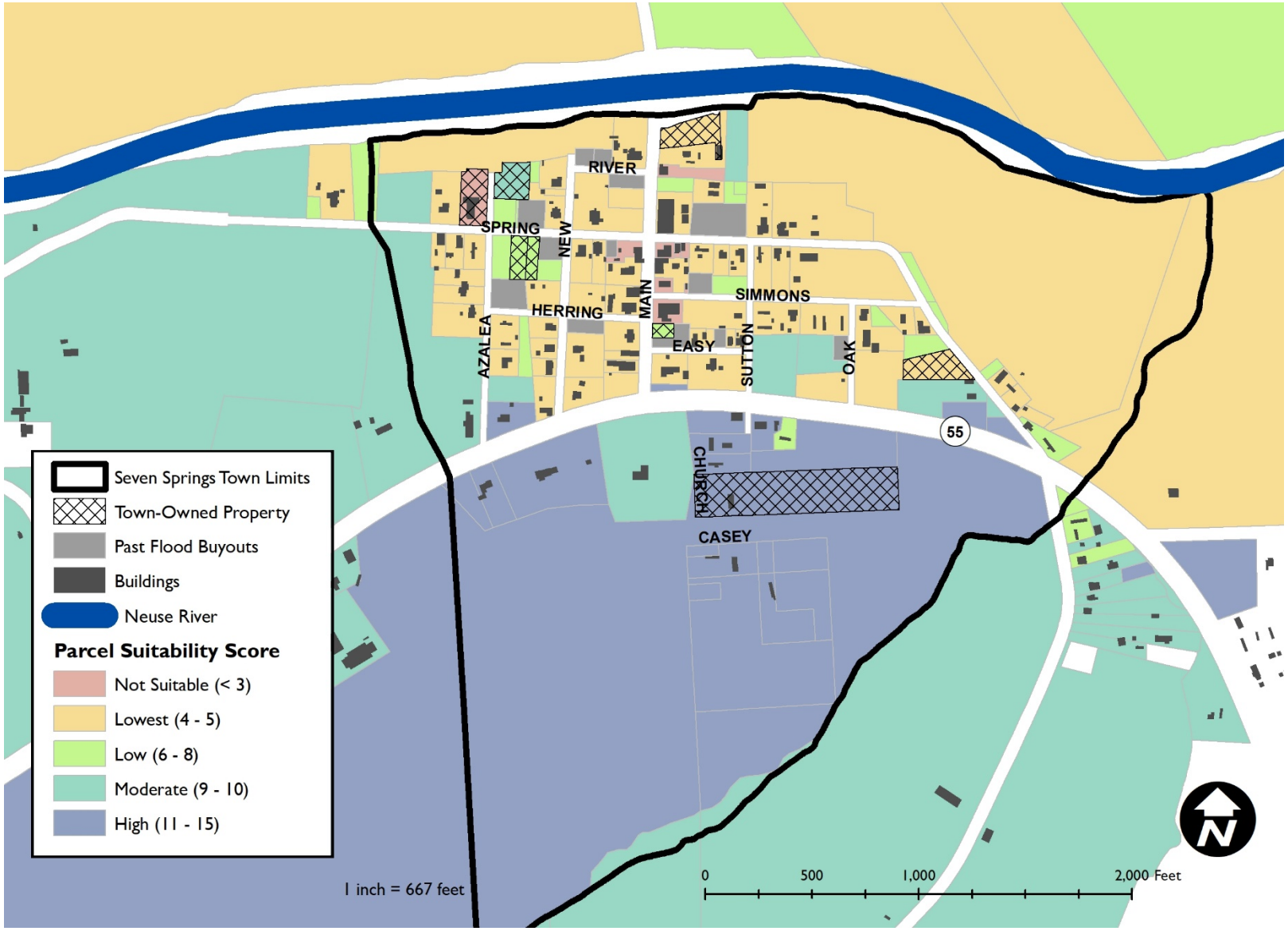

Figure 3. Seven Springs Land Suitability Analysis, Past Buyouts, and Town-Owned Property.

Conclusions and Next Steps

As a first step in utilizing the LSA results, community leaders in Seven Springs can further investigate and explore characteristics of the most suitable parcels. There are a few individual parcels within Seven Spring's town limits that are considered to have 'high' composite suitability, may be vacant and/or acquirable and could support multiple types of housing. Located primarily just south of downtown at a significantly higher elevation, a number of small-medium size vacant lots exist in areas of reduced flood risk that could support infill development of single-family homes. One larger parcel meets all the same criteria, is owned by the town and could support a cluster of single-family homes or denser multi-family apartment buildings that could help to alleviate the lack of affordable housing in the area.

Moving forward, the Town of Seven Springs may consider revising and expanding upon the LSA method for a variety of purposes in coordination with Wayne County and others. Suggested considerations for more general improvements to the process are listed in the concluding remarks of the Technical Memo on Land Suitability Analysis. Other potential steps for getting the most out of the LSA and its relevance to Seven Springs' Recovery Plan include:

- Exclude other non-suitable areas such as cemeteries, past and expected future buyout properties, land with poor soil conditions, or others to narrow the scope of suitable properties.
- Share LSA method and results with housing stakeholder groups (local/state housing finance agencies, religious groups, non-profits, and private foundations) to aid in discussing programs and funding mechanisms that support other housing recovery goals.
- Consider pairing the existing or revised results of the LSA with design-oriented public engagement activities during all relevant community plan development or update processes (i.e., Comprehensive Land Use Plan, Bicycle and Pedestrian Plan, Hazard Mitigation Plan, etc.).

Implications for Future Planning and Use of LSAs

Along with the devastation seen after Hurricane Matthew, the record-breaking 2017 hurricane season in the U.S. is a stark reminder of the great challenges we face in preparing for, responding to, and recovering from major natural hazard events. For many communities like Seven Springs, the rain came down harder, the wind blew faster, and the water levels rose higher than had ever been seen before. Along with recovery from these events, current and future generations are simultaneously trying to understand how to plan and invest more effectively knowing that in an era of climate change, these risks are only expected to increase. Major events like hurricanes Matthew, Harvey, Irma, Maria, and now Florence have produced a set of extremely difficult circumstances for the thousands of people affected. They have also brought people together in amazing ways. The human spirit often shines during response and recovery as everyday heroes emerge and local officials call for the need to 'build back better'. However, the physical and emotional trauma that transpires in the aftermath of an event often reveal the disproportionate impact felt by communities of modest wealth and communities of color who were struggling prior to the event. Opportunities to invest in alleviating these impacts are limited and at the federal government level, lean towards a reactive instead of proactive approach. Pre-event planning offers another opportunity to create positive change with and for those with the greatest levels of vulnerability.

Every year, more accurate data is collected, analyzed, and visualized through new tools that increase awareness and understanding of our country's natural hazard risks. Some tools are also getting better at linking together community goals and addressing multiple issues at once. HMDRRI's approach to the LSA is an example of how a tool can be flexible, yet powerful in its ability to inform a relocation strategy. Supported by the indigenous knowledge of a community, planning approaches like this can be used to guide a more resilient and equitable recovery.

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