

# Briefing for the Town of Fair Bluff, NC: Land Suitability Analysis for Post-Disaster Housing Relocation

Hurricane Matthew Disaster Recovery and Resilience Initiative  
September 2018

*Note: This Briefing complements the Technical Memo for Post-Disaster Housing Relocation and contains the relevant Land Suitability Analysis details and results specific to the Town of Fair Bluff.*

## Overview

Hurricane Matthew's heavy rainfall in October of 2016 led to record flood levels on the Lumber River, impacting more than 100 households and 84 percent of the commercial square footage within its downtown where the water was 4 feet deep in some buildings. The flooding also significantly damaged a number of key public facilities located downtown including the Town Hall, Visitors Center, U.S. Post Office, Senior Center, and Fire Station. Even before Hurricane Matthew, the town was dealing with challenges associated with a declining and aging population, lack of affordable housing, residents in poverty, and difficulty in affording the management of water and sewer systems.

Through a long-term recovery planning process led by HMDRRI, Fair Bluff has established a community vision for recovery (Figure 1), been awarded a number of grants (via CDBG-DR<sup>1</sup>, Golden Leaf Foundation, etc.) for reconstruction, repair and relocation of facilities,

*Figure 1. Proposed Community Vision for Fair Bluff Recovery.*

**Recover from Hurricane Matthew and create a more resilient community that once again has a vibrant downtown, a diverse and affordable housing market, and a local economy that continues to serve the needs of the surrounding agricultural community and promotes an eco-tourism economy tied to services and facilities that draw upon the beauty and recreational assets of the Lumber River.**

<sup>1</sup> 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).

and is exploring opportunities for integrating downtown revitalization and eco-tourism while working to address the immediate needs of the residents most heavily impacted by the storm.

With about 34 buyout participants expected through the HMGP, town leaders are concerned about losing part of the tax base should individuals relocate outside municipal boundaries. To minimize this loss, the Housing section of the Fair Bluff Recovery Plan recommends that about 60 new single-family and/or 40 rental housing units be built by the end of 2019 using information derived from the Land Suitability Analysis and HMDRRI HomePlace document. However, getting from the writing of the LSA to the reality of flood survivors living inside dozens of new affordable homes will take a significant amount of time, energy, investment, planning and determination on the part of the town officials and staff, their recovery partners, and of course, the survivors themselves.

The challenges and opportunities seen in Fair Bluff are numerous and varied, but the town is taking steps to reinvent itself in a way that makes it more resilient to future flooding. HMDRRI has facilitated taking many of the first steps in a long recovery process, including the following LSA which can inform future resilient housing development strategies for the town.

## **Linking Home Buyouts, Relocation and Greenspace Concepts**

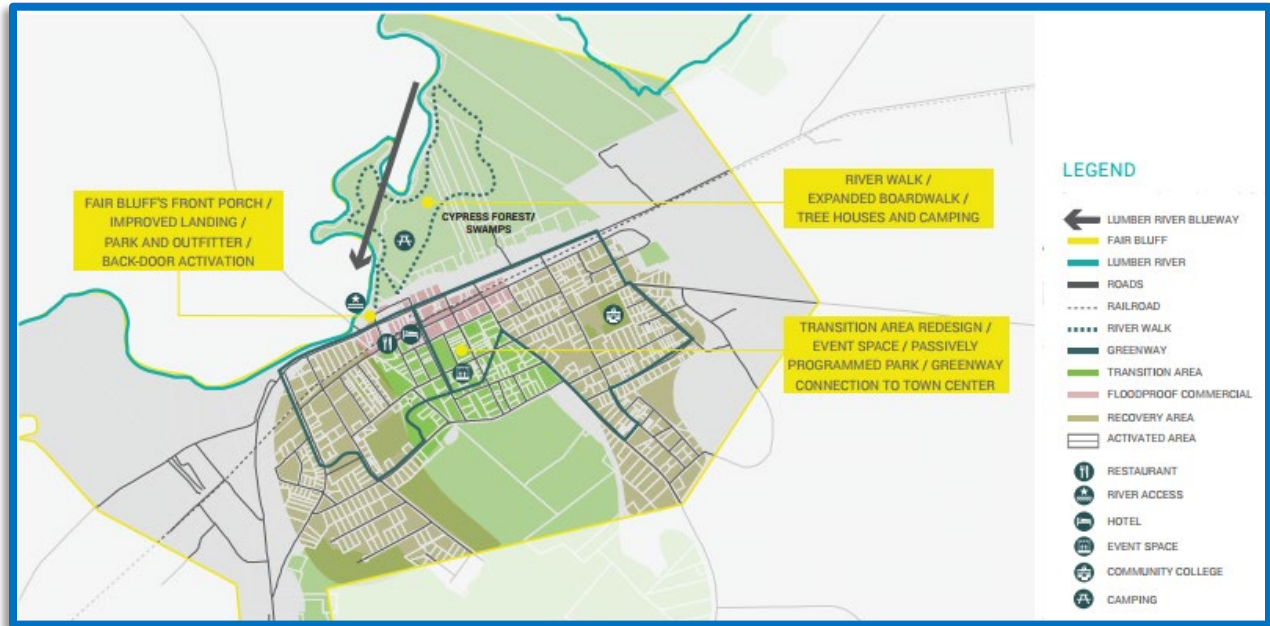
A major output of HomePlace for Fair Bluff is a Greenspace Concept (Figure 2) that illustrates a set of potential recovery strategies and includes two major components:

- An expanded trails network that takes advantage of the community's location on the Lumber River, and
- Additional greenspace east of the downtown resulting from voluntary relocation and residential buyouts.

Along with addressing housing needs, Fair Bluff is focused on repairing and revitalizing its commercial downtown which is in the floodplain and was severely damaged by several feet of water after Hurricane Matthew. The Green Space Concept involves a combination of strategies including: floodproofing and beautification of commercial downtown that would connect with existing river walk; transforming buyout properties into a programmed park/event space that connects to future greenways and trails; and the relocation of homes outside of the 100-year floodplain (HomePlace, 2017). The Greenspace concept also shows "recovery areas" that correspond to locations outside the floodplain, and represent general areas of potential relocation or redevelopment. The LSA, however, highlights the most suitable locations on a parcel by parcel basis 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, affordable and are located in an area that is less susceptible to future flooding. The LSA and Relocation Strategy aim to help address not only some of Fair Bluff’s long-term recovery needs but also support the town’s overall resilience.

Figure 2. Fair Bluff Greenspace Concept.



## 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 (Technical Memo). Since many variables were not applicable in Fair Bluff (i.e., proximity to hazardous waste sites, sea level rise vulnerability) or may not be major determinants of a site’s development potential (i.e., bus stop proximity, park proximity, etc.), members of the HMDRRI team prioritized the top 8 to 10 variables based on past LSA experience and available knowledge about flood risk issues. Comparison of each member’s interpretation led to consensus on the most important factors on which to focus during development of a preliminary LSA. Described in further detail below and in Table I, 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 have thresholds of Boolean nature (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 required that criteria and thresholds be 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. Fair Bluff LSA Variables and Criteria Thresholds.

Category	Variable	Criteria Thresholds	Points	Max
<b>Jurisdictional Boundaries</b>	Municipal Limits	Out	0	1
		In	1	
	Extraterritorial Jurisdiction (ETJ)	Out	0	1
		In	1	
<b>Proximity to Infrastructure</b>	Water Line (0.25 mi. buffer)	Out	0	1
		In	1	
	Sewer Line (0.25 mi. buffer)	Out	0	1
		In	1	
<b>Parcel Size*</b>	Infill Potential	< 3,000 ft <sup>2</sup>	0	2
		3,000 ft <sup>2</sup> - 20,000 ft <sup>2</sup>	1	
		20,000 ft <sup>2</sup> - 100,000 ft <sup>2</sup>	2	
	Multi-Structure Potential	100,000 ft <sup>2</sup> - 500,000 ft <sup>2</sup>	1	3
		500,000 ft <sup>2</sup> - 1,000,000 ft <sup>2</sup>	2	
		> 1,000,000 ft <sup>2</sup>	3	
<b>Building/Land Vacancy</b>	Vacant/Abandoned Building	Occupied - FP	0	3
		Vacant - FP	2	
		Vacant - NO FP	3	
<b>Vulnerability to Flooding</b>	100-yr Floodplain (Zone AE)	In	0	4
		Out	4	
	500-yr Floodplain	In	0	1
		Out	1	
	Hurricane Matthew Flood Extent	In	0	2
		Out	2	
<b>Areas of Future Development</b>	Zoning	Comm., Manuf., Cond Use Comm/Manuf.	0	2
		Agr. Mixed Use Res, Cond. Use Mixed Use Res.	1	
		Res.	2	
*Each parcel, based on its size will fall into infill potential or multi-structure potential with possible totals of 23 and 24 respectively			Total:	23/24

## **Vulnerability to Flooding/Flood Risk**

**Source: NCEM, 2017**

***(100-Year Flood Zone; 500-Year Flood Zone; and Hurricane Matthew Flood Extent)***

Perhaps the most crucial set of factors for the Recovery 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 0.1% annual chance flood. The 500-year floodplain represents the area of inundation experienced by a flood with a 0.2% annual chance of occurring. Hurricane Matthew's Flood extent is also relevant as the flood of record for the town and generally followed boundaries between the 100- and 500-year floodplains. The event's flood extent represents areas where officials and residents have actually seen flooding versus designated floodplains which are calculated using hydrology and statistics and therefore include a certain amount of uncertainty or inaccuracy.

Together, these flood risk variables account for both estimated flood risk that is tied to various regulations and programs as well as recent flooding events which are easier to understand from the public's perspective. These factors provide a range of possible flood elevations and while it is somewhat duplicative to include all four, they provide a more comprehensive view of a property's vulnerability to future flooding and this helps meet a prime goal of the Relocation Strategy to develop in safer areas.

## **Jurisdictional Boundaries**

**Source: Columbus County, 2017**

***(Municipal Limits; Extraterritorial Jurisdiction (ETJ))***

Municipal governments in North Carolina have control and influence both within their corporate boundaries and an additional area designated as its Extraterritorial Jurisdiction, or ETJ (see Owens, 2013). For a number of reasons, it is important for the Land Suitability Analysis 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 land 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 extended purpose. For the reasons cited above, annexation prior to development is ideal, but planning prior to annexation is fully appropriate, and this aligns with the planning support offered by the application of LSA methods. For the post-Matthew recovery plans, the emphasis is on residential relocations. In

the future, the application of an LSA may be useful to inform the relocation of 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 is 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: Columbus County, 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 suitable only for development of single-family homes or lower densities. The thresholds were selected based on the sizes of existing single-family home building footprints and lots within Fair Bluff. 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 ETJ 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 support 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. The square foot unit was used instead of acres because some lot sizes are so small that multiple decimal places would have been required to display variability.

**(Multi-Structure Potential: between 100,000 and 500,000 sq. ft.; between 500,000 and 1,000,000 sq. ft.; and >1,000,000 sq. ft.)**

Larger lots may be suitable for development of multiple detached single-family structures or apartment buildings. This form of development could be more attractive to developers or investment partners that seek to build multiple units. Thresholds were selected based on the size of larger parcels within town that had multiple housing structures on them.

## **Building/Land Vacancy**

**Source: NC OneMap and NCEM, 2017**

**(Structure on Parcel: 'Yes' or 'No'; Building Footprint Present: FP or NO FP)**

Two sources of data were used to create a proxy to distinguish vacant lots versus lots with vacant buildings because vacant lots would be the easiest on which to develop relocation housing, whereas if there is a building footprint (FP), it may or may not have to be demolished. NC OneMap standardized parcel data includes a field describing the parcel use as either

“occupied” or “vacant” along with intended use (i.e., “vacant residential”). A proxy was created because it was observed that numerous properties listed at “vacant” appeared to have building footprints on them when overlaid in GIS. The latest building footprint data was obtained through North Carolina Emergency Management, therefore four categories could be created with the goal of identifying properties listed as vacant that do not have a building footprint. The following categories listed from lowest to highest relative suitability include: Occupied - FP; Occupied - No FP; Vacant - FP; and Vacant - No FP.

## Areas of Future Development

Source: Columbus County, 2017

(Zoning: Commercial, Manufacturing, Residential, CUP Residential, CUP Manufacturing)

Zoning reflects the community’s intent for use of that property, which is usually based on a number of factors. It may be more difficult to develop replacement housing on properties that have been zoned for something other than residential, such as Light Manufacturing – Wholesale whereas a property already zoned for residential development, will not require a rezoning, variance, or other procedural action. Fair Bluff’s zoning is fairly simple and consists of seven categories (Table 2). Zones of greatest interest for the Recovery Strategy and LSA include Neighborhood Residential, Medium Density Residential and Moderate Density Residential, all of which would require little to no extra administrative burden. Developing housing in zones such as light manufacturing – wholesale (LM-W) or highway service – business (HS-B) may conflict with prior planning goals and require rezoning.

Table 2. Fair Bluff Zoning Codes.

Zoning Code	Description
<b>CB-O:</b>	Central Business - Office
<b>MED:</b>	Medium Density Residential
<b>HS-B:</b>	Highway Service – Business
<b>MOD:</b>	Moderate Density Residential
<b>LM-W:</b>	Light Manufacturing – Wholesale
<b>LD-A:</b>	Low Density – Agriculture
<b>NC:</b>	Neighborhood Residential

The eleven variables represent factors that determine a parcel’s composite suitability for housing development or redevelopment. The factors and thresholds shape the results of the LSA which can inform decisions that meet goals of the HMDRRI Relocation Strategy of reducing flood risk, retaining flood survivors within their communities, and minimizing construction costs.

The LSA's goals, initial methods, variables and thresholds selected, relative weights, and results were shared and discussed with the community leaders at a Town Council meeting. They were generally receptive and acknowledged the value of LSA, eager to know more about its relationship to the rest of the long-term recovery plan that was being developed by HMDRRI. One town council member proposed incorporating flood depth and this is accounted for using the various flood risk variables since each of their areal extents represents a different magnitude of flooding event. The comment was valuable, because it suggests an idea for future LSAs to include another flood risk threshold such as "experienced less than 2 feet of flooding" which could inform a community's choice to elevate homes rather than acquire and demolish them.

While this analysis was done to assist in the siting of potential replacement housing, the results are also useful for addressing the lack of affordable housing in general. Additionally, a similar method could be used by the town for many other planning objectives such as siting future park/greenspace or other public facilities. A further description of these possibilities is provided in the Technical Memo for Land Suitability Analysis for Post-Disaster Housing Relocation.

## **LSA Results and Interpretation**

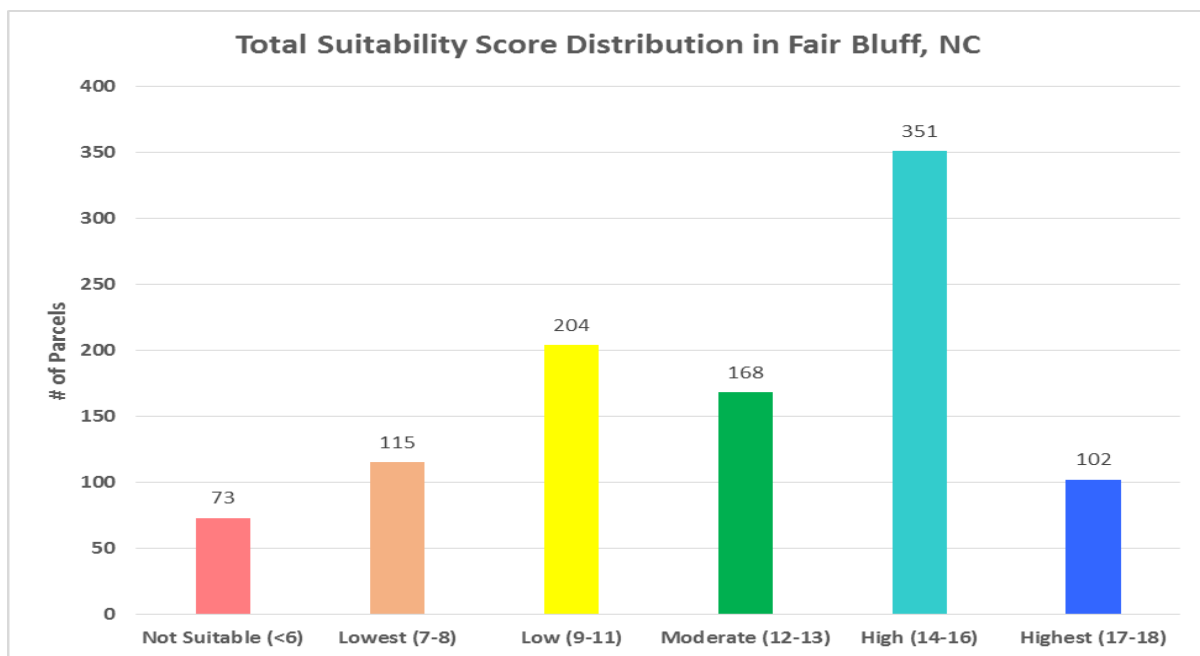
The results of the LSA reveal significant spatial variation in the total suitability score within the town's ETJ. For instance, there are areas in close proximity to one another, but with major differences in suitability, most likely a result of the irregular shape of the floodplain and its relative weight and influence on the scoring. Of the analyzed 1,012 parcels that intersected the ETJ, 102 were found to be within the 'highest' suitability category (Figure 3). Over 350 parcels received a 'high' suitability score, though this may be skewed upwards due to inclusion of three scores (14-16) as opposed to just two (17-18). Figure 12 illustrates areas in blue that are of highest suitability near the Minton St. – Gapway Rd - Holmes St. – Orange St. area and east of downtown near Waddell St. – Conway Rd. – Graham St. – Patterson St. area, which is centered on Fair Bluff Elementary School. These areas are on generally higher ground, about 66-72 feet above sea level (ASL) compared to the lower scoring, low-lying area south of downtown, known as Barden Bay, where elevations range from 62-65 feet ASL.

Figure 12 shows how much of the more densely developed parcels that make up downtown and lie in the 100-year floodplain are considered 'not suitable' for development. However, less than 0.1 miles east on Main Street are a few parcels with moderate to high suitability scores, which typically lie just outside the 100-year floodplain shown with a grey-filled hash pattern. The highest possible scores for parcels are 18 for infill potential (smaller sized lots) and 19 for multi-structure (larger sized lots) (Table 1).



The NC Housing Finance Agency is helping to fund a 36-unit affordable housing development east of downtown. The property is about 0.5 miles from the town’s municipal limits, but within the Extraterritorial Jurisdiction (ETJ) near Rough and Ready Road. The parcel is zoned for Low Density – Agriculture (Labeled on Figure 12). The parcel received a moderate suitability score because of its location outside of the town limits, its current zoning, and status as occupied with a building footprint. Because this is a significant housing development and is located about 1.75 miles from downtown, it could be considered a potential second, somewhat smaller “node” of activity for the town, depending on how many people eventually live there.

Figure 3. The color-coded distribution of total suitability scores for 1,012 parcels.



This addition of housing stock could satisfy some of the affordable housing needs of flood survivors but there still could be reasons to pursue infill development in areas of highest suitability, listed in Table 3, to capture the population who do not want to live in the new 36-unit building or cannot secure a unit if it were to become fully occupied in the short-term.

The 16 highest scoring parcels found in Table 3 all lie outside the 100-year flood zone, overlap less than 50% with the 500-year flood zone and Hurricane Matthew Flood Extent, are zoned for either moderate or medium density residential, are of adequate size for infill development (20,000 -100,000 ft<sup>2</sup>), listed as vacant, and do not have a structure located on them. Three of the properties slightly overlap either the 500-year flood zone (property # 18139), the Hurricane Matthew flood extent (property #17918), or both (property #87753)

meaning there is greater than 50% of each parcel that is not subject to flooding levels associated with those variables. While parcel ownership was not included as a factor with the LSA (due to the fact that there is not any vacant town-owned land which would be more suitable), knowing who owns land deemed suitable for development and their willingness to sell would be a key factor informing the potential pursuit of these parcels for new housing development.

Table 3. Top 16 Highest Scoring Properties from LSA in Fair Bluff, NC.\* (fix acres column)

ID	Property #	Total Score	Total Value	Acres	Sq. Ft.	Zoning	Building/Land Vacancy	Matthew Extent %	500-Yr % Overlap
1	87753	18	\$ 19,100	0.76	33,304.43	MED	VACANT - NO FP	1.91	19.33
2	18139	18	\$ 10,300	0.72	31,379.41	MOD	VACANT - NO FP	0	38.93
3	17918	18	\$ 6,700	0.55	23,974.00	MED	VACANT - NO FP	0.24	0
4	18138	18	\$ 19,900	1.55	67,621.25	MOD	VACANT - NO FP	0	0
5	17357	18	\$ 9,200	0.54	23,400.33	MOD	VACANT - NO FP	0	0
6	17886	18	\$ 11,400	0.76	32,898.26	MED	VACANT - NO FP	0	0
7	18271	18	\$ 8,200	0.50	21,973.06	MED	VACANT - NO FP	0	0
8	63107	18	\$ 17,300	0.58	25,261.77	MED	VACANT - NO FP	0	0
9	82556	18	\$ 6,400	1.59	69,298.00	MOD	VACANT - NO FP	0	0
10	82895	18	\$ 3,900	0.50	21,799.79	MOD	VACANT - NO FP	0	0
11	85628	18	\$ 5,400	0.91	39,640.43	MOD	VACANT - NO FP	0	0
12	92300	18	\$ 3,000	0.50	21,799.86	MOD	VACANT - NO FP	0	0
13	93877	18	\$ 3,000	0.50	21,799.79	MOD	VACANT - NO FP	0	0
14	95258	18	\$ 2,500	0.50	21,799.99	MOD	VACANT - NO FP	0	0
15	96017	18	\$ 3,000	0.50	21,799.79	MOD	VACANT - NO FP	0	0
16	96072	18	\$ 3,000	0.50	21,801.06	MOD	VACANT - NO FP	0	0

\*An additional 86 properties had a total score of 17 (highest suitability).

Fair Bluff can use these findings to delve 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 airports, schools, grocery stores and other commercial activity centers.

### Other Perspectives: Highlighting the 100-year Floodplain

Additional maps or portrayals of land suitability were created at a smaller scale, focused on specific areas within the town to illustrate the parcels that may be considered partially developable based on their intersection or overlap with the 100-year floodplain, shown as cross-hatch pattern in Figures 5A and 5B. This is important because there are some larger parcels (i.e., south of Academy Street) that received lower scores because of the amount of overlap with the 100-year floodplain (>50%), but contain areas on the property that are at lower risk of flooding and therefore are potentially developable. Figure 13A also show a number of parcels with lower suitability (yellow) interspersed with several parcels with high or highest suitability (blue) which is likely the result of the fact that in the county's parcel boundary data record, each of those properties is legally linked through common land ownership to one of the largest parcels south of Meares St. (scored lower because it is mostly outside town limits

and zoned for low density – agriculture). This is an anomaly and leads to underestimation of potential high suitability properties.

This enhanced perspective allows the public and decision makers to see one of the key underlying factors of the LSA, the 100-year flood zone, superimposed on top of the general LSA. This could be done with other variables as well (i.e., zoning, infrastructure buffer, or parcel vacancy) to show the nuance involved with the LSA that gets lost or smoothed over when integrated into a composite score. If desired, similar exercises could be done for other variables such as zoning, property owner name, property value, etc.

Figure 4. Town-wide Land Suitability Analysis for Fair Bluff.

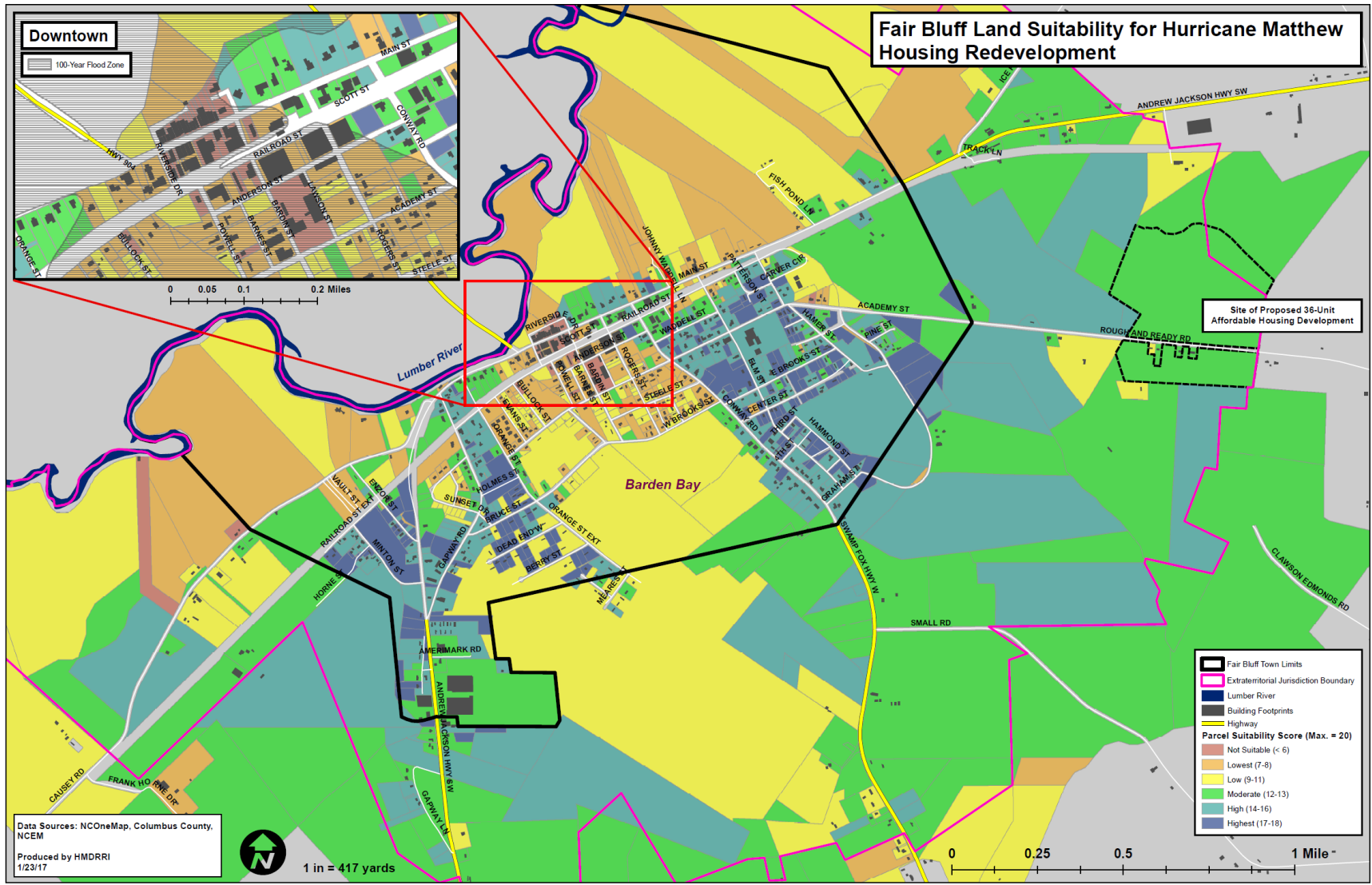
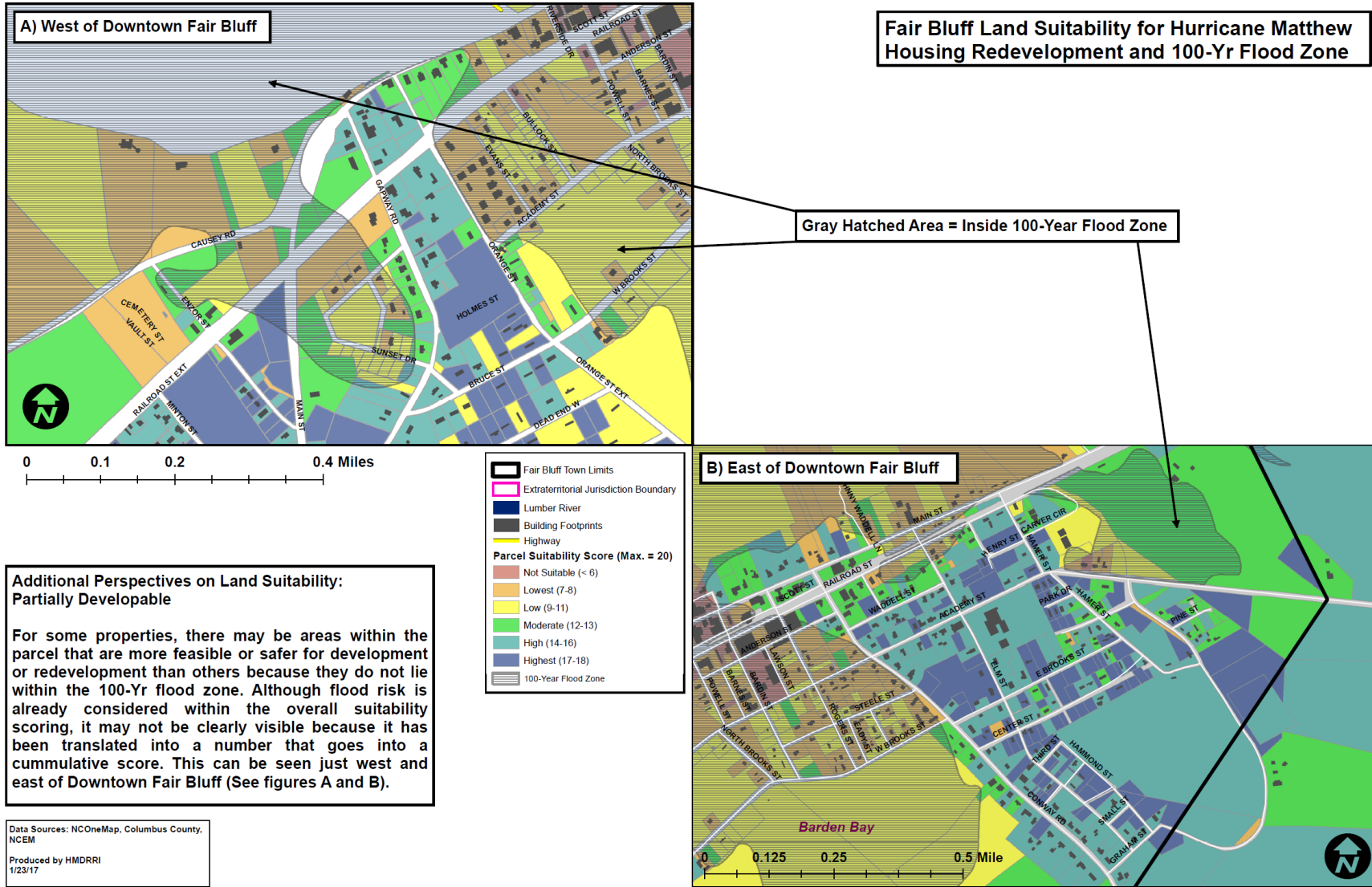


Figure 5. West and East of Downtown Fair Bluff with 100-year Flood Zone.



## Conclusions and Next Steps

As a first step in utilizing the LSA results, officials in Fair Bluff, along with recovery partners, can further investigate and explore characteristics of the most suitable parcels. There are at least 100 individual parcels within Fair Bluff's town limits that are considered to have the 'highest' composite suitability, may be vacant and/or acquirable and could support multiple types of housing. Located primarily just east and west of Barden Bay, south of downtown, dozens of small-medium size vacant lots exist in areas of reduced flood risk that could support infill development of single-family homes. A few larger parcels meet all the same criteria and could support a cluster of single-family homes or denser multi-family buildings that would supplement the planned 36-unit development near Rough and Ready Road.

Moving forward, the Town of Fair Bluff may consider revising and expanding upon the LSA method for a variety of purposes. 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 Fair Bluff's Recovery Plan include:

- Exclude other non-suitable areas such as expected future buyout properties, land with poor soil conditions, or others to further narrow the scope of suitable properties.
- Share the LSA method and results with housing stakeholder groups (local/state housing finance agencies, financial institutions, housing development businesses, engineers, architects, landscape architects, planners, real estate companies, 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, county, or regional plan development or update processes (i.e., Comprehensive Land Use Plan, Economic Development 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 as a civilization face in preparing for, responding to, and recovering from major natural hazard events. For many communities like Fair Bluff, 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 will simultaneously try 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 such as 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 disproportionate 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 in the future.

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