Factor 2 – Need/Extent of the Problem

Exhibit D

RESILIENT SHELBY

Shelby County, Tennessee

Greenprint for Resilience

National Disaster Resilience Competition

Phase Two – October 27, 2015

ExhibitDNeedShelbyCOTN.pdf

EXHIBIT D: FACTOR 2 – NEED/EXTENT OF THE PROBLEM

a. Unmet Recovery Need and Target Geography. Shelby County experienced a series of three powerful storms in April 2011 resulting in Presidential disaster declarations: FEMA 1974-DR, 1978-DR and 1979-DR. Noting the extent of most impacted and distressed characteristics, HUD pre-qualified Shelby County as an eligible applicant for the NDRC. Despite a substantial recovery, Shelby County - the target area - still faces URN for housing, infrastructure and environmental degradation caused by the 2011 storm events. Census block groups for the target geography can be found in Exhibit B (ExhibitBCensusBlockGroupShelbyCOTN.pdf).

Housing – During the 2011 storms, 198 homes in Shelby County flooded and there has been no allocation of CDBG-DR funds for home repair. On February 5th, 2015 Shelby County completed a windshield survey of homes with remaining damage from the declared disaster. The survey found 80 homes with unmet repair needs due to the 2011 storms, and 37 vacant lots adjacent to these damaged properties that regularly experience flooding. Further, county staff collected 26 homeowner signatures certifying they were unable to repair storm-related damage to their homes. Following Phase 1, Shelby County reached out to neighboring Crittenden County, Arkansas and DeSoto County, Mississippi to understand URN from the 2011 storms. DeSoto County reported no remaining URN in the Lake View community. However, the City of West Memphis, Arkansas supplied a database of damage reports to approximately 375 housing units from 2011. Shelby County conducted a windshield survey and determined 98 units appeared to have remaining flood damage, for a total of 26% of surveyed units in West Memphis with URN.

The cost of unmet housing recovery needs exceeds available CDBG-DR and other resources such as FEMA and SBA. The list of 80 addresses from the Shelby County windshield

survey and 26 certifications, photos of the homes, and data from the West Memphis survey can be found in the Housing Dropbox Folder**.**

Infrastructure – The 2011 storms caused damage to infrastructure across Shelby County. During Phase 1, the county identified URN for infrastructure in completing repairs and rebuilding of the Raleigh-Millington Road Bridge. Since Phase 1, the State of Tennessee has worked with Shelby County to fill the remaining funding gap with existing unobligated State CDBG-DR. This commitment has been formalized, and the documentation regarding this can be found in the Infrastructure Dropbox Folder.

Through continued investigation into URN, an additional $2,828,632 in URN was identified for Rodney Baber Park along the Wolf River in Memphis. Rodney Baber Park has been flooded numerous times over the decades. The 2011 event left water up to 7 feet deep and destroyed all electrical services for the sports fields. The park remains unusable. The existing ground elevation of the park perpetuates flooding and has prevented the development of this park into a true neighborhood asset. Documentation on Rodney Baber Park can be found in the Infrastructure Dropbox Folder.

Environmental Degradation **-** The 2011 storms damaged President's Island, affecting an industrial area, farmlands, and wildlife refuge. The flooding caused erosion and damage to habitat and recreation areas. The Army Corps of Engineers has invested $32.1 million in construction of a rock levee along the Mississippi River and bank stabilization for the Port of Memphis, but this investment has not restored the island from the 2011 storms due to insufficient resources available. The ETI Corporation assessed damage to President's Island at $8,956,775 to address this URN. The President's Island Dropbox Folder contains (1) the 2011 ETI damage assessment certifying damage, (2) a certification from February 2015 stating the 2011

assessment of $8,956,775 is still needed to address the damage, and (3) a letter from the Memphis and Shelby County Port Commission certifying damage to the Island and its impact on the region. Flooding from the 2011 storms resulted in bank destabilization and stream/creek bed damage in Bartlett, Germantown and Collierville. The total cost of repairing the Fletcher Creek bed in Bartlett; Laterals C, D and G in Germantown; and the Center Street stream in Collierville is estimated at $4,447,000. See Municipalities Dropbox Folder for certified engineering letters.

To determine areas for intervention within the project, the county conducted a spatial analysis of the extent of URN in the highest hazard areas, concentration of LMI households, and connectivity to the GREENPRINT network. To address URN identified in Phase 1 relating to housing, infrastructure, and environmental degradation, Shelby County's proposed Greenprint for Resilience Project is comprised of activities that will be implemented within three of the most impacted and distressed geographies including: the Big Creek area of the city of Millington, the Wolf River corridor running east-west through North Memphis, and a neighborhood in Southwest Memphis along South Cypress Creek in Memphis.

Big Creek: The 2011 flood produced some of the worst flooding in recent years in Millington and the surrounding area. Storm water runoff caused streams and rivers to overflow their banks and caused major damage to infrastructure as well as residential, commercial and industrial properties. The qualifying event resulted in damages of approximately $5,000,000. Most of the Millington area consists of more than 50 percent LMI households (Activity1BigCreekFigure1.2.pdf). The flood damage not only displaced the LMI population but also disrupted livelihoods stemming from displacement, loss of income, and recovery needs still unmet today. The effects are worsened by recent storm events in this area measuring well over the 1,000-year rainfall occurrence.

Wolf River: Rodney Baber Park has $2.8 million in URN as a result of the loss to mechanical and electrical infrastructure during the 2011 flood. Several homes, largely rental, incurred damage and remain unrepaired due to lack of financial means. Most neighborhoods along the Wolf River are LMI areas (Activity2WolfRiverFigure2.12.pdf). As a result, the estimated cost to repair and maintain the properties can exceed the equity and market value of homes. Orchi Road, between Highland Street and Chelsea Avenue, demonstrated stormwater overtopping the road and inundating five residences. Three of those five structures have yet to be adequately addressed. Subsequent abandonment of low-valued, damaged properties has led to blighted conditions.

The ***South Cypress Creek*** neighborhood (Activity3SouthCypressCreekFigure3.1.pdf) experienced $5,000,000 of property damage in the 2011 flooding and disruptions such as power outage and road closures. Mitchell Road, a main connection for the surrounding area economy and one of two access roads connecting the City of Memphis to T.O. Fuller State Park, experienced flooding in 2011 and is at risk for future flood events. Following the 2011 flooding, many homes have remained or become vacant. A total of 29 properties, including some in the 100-year floodplain, exhibit URN. The neighborhood is a low income community, isolated from other parts of Memphis. Median income is $26,569 with 99% minority population. In 2012, HUD ranked Memphis sixth in the nation for rate of vacancy; 47% of properties in Memphis are vacant. In this area, over two-thirds of property is vacant. Current conditions, blight, and low property values for the region mean equity and market value of homes can often be exceeded by the estimated cost to repair and maintain the properties over time.

b. Resilience needs within recovery needs. As mentioned above, the 2011 disasters caused $2 billion in damages in Shelby County and left significant URN. The greatest impacts

were to infrastructure, environment and housing. Over 345,000 customers lost electrical power causing $7,000,000 in disruption. The Raleigh-Millington Road Bridge, an important connection between the cities of Memphis and Millington, was damaged by flood waters. Roads and other infrastructure were under water across the county. Many of Shelby County's most vulnerable communities experienced severe flooding and displacement primarily in areas that suffer from repetitive flooding. Approximately 80 properties were identified to exhibit remaining URN.

The disasters cost the federal government more than $60 million primarily for immediate response and long-term recovery needs from SBA, FEMA, HUD, Army Corps and DOT. This followed storms the prior year which caused significant damage to many of the same areas.

The major cause of disaster in these events was significant flooding from the County's main tributaries. Part of this flooding was exacerbated by continued environmental degradation along the river banks from agricultural runoff upstream. Resilient interventions such as flood protection infrastructure, improved wetlands and retention and detention ponds could vastly decrease the impact of future flood events on infrastructure and residents. Additionally, a tested method to protecting residents from repetitive flooding is to provide assistance to residents to relocate out of harm's way.

Had the extensive flood protection interventions proposed in the Greenprint for Resilience Project been in place at the time of the storms, it is estimated that impact of the flood events would have been significantly reduced in the region. As outlined in the BCA in Attachment F: Factor 2 – Benefit/Cost Analysis, had the Big Creek floodplain been constructed prior to the 2011 flood, most flooding in Millington would not have occurred reducing approximately $4.5 million of losses to residential property damage, facilities and lost jobs. Most importantly, the flood intervention would have prevented the loss of life that occurred.

Additionally, the watershed restoration and buyouts of flood-prone properties in the South Cypress Creek and Wolf River watershed are another intervention that would have prevented loss in the 2011 storms. Without the flood protection and buyouts, a 100-year flood event would be estimated to cause $2.2 million dollars of property damage and additional vacancy following the event. Residents with no other relocation options would be especially vulnerable to worsened living conditions following a flood event. Without this project, in each subsequent flood event, the damages and their associated costs will continue to accrue.

It is estimated that $113.5 million in resilient investments such as those mentioned above in the MID-URN area and additional projects in the target area of $128 million could have prevented the loss of life and property and had a significant costs savings to the county, state and federal government. Further quantification of the estimated overall impacts and the resilience needs are detailed in the BCA in Attachment F: Factor 2 – Benefit/Cost Analysis.

As discussed elsewhere in the application, the risks associated with the qualified disaster disproportionately affect LMI residents who reside in low-lying areas in the western portion of the county, closest to the Mississippi River. The Memphis MSA has the highest poverty rate in the United States among metro areas with population greater than one million residents, 20.3%. The county also has one of the highest unemployment rates in the country. The lack of resources exacerbates this vulnerability as Shelby County, Memphis, and surrounding jurisdictions struggle to address the needs of the population, businesses, and infrastructure. Shelby County has selected its three target areas that were most impacted by the 2011 events and home to some of the most vulnerable populations. The poverty rate in the activity areas ranges from 15% to almost 85% based on data provided by the MSCOS. Approximately 66 percent of the population in the three areas is LMI. The Big Creek/Millington area consists of more than 50 percent LMI households.

The average household income in the neighborhoods surrounding Rodney Baber Park is approximately 48% below the national average of $50,157, while the residents surrounding Kennedy Park are roughly 40% to 50% below the national average.[i] South Cypress Creek is made up of more than 66% LMI households, with 99% minority population.

These communities are often older neighborhoods with aging infrastructure, which have suffered disinvestment as development moved east and south, away from the urban core. Based on the Fair Housing & Equity Assessment conducted for the GREENPRINT, there is indication that risk of flooding may disproportionately affect individuals with accessibility challenges due to the limited housing options. It is estimated that more than $3 million is needed to offer voluntary buyouts and relocation housing in the target areas. Other risks such as extreme heat-island effect may disproportionately affect LMI individuals, aging population, and persons with disabilities due to negative health impacts.

Shelby County has made significant investments in resilience since the 2011 storms. The GREENPRINT provides a framework for resilient development that will not only improve health through recreation space and networks of active trails but will link underserved neighborhoods with increased economic opportunity. The county also designated the SCRC, described in Exhibit C, to coordinate the implementation of policies and programs with a focus on resilience values. However, continued environmental degradation along the tributaries, extreme heat, blight and vacancy, and distressed socio-economic conditions hinder disaster recovery and resilience of the county.

c. Appropriate Approaches. The foundation of Shelby County's resilience strategy framed in the Phase 1 submittal is the GREENPRINT. This resilience strategy is guided by the green infrastructure network and strategic directions of the GREENPRINT. The strategic directions

were informed by the Rockefeller Foundation's City Resilience Framework. Based on community outreach, resilience values established are: ***People*** (Health & Well Being): Protect lives, improve quality of life, and promote social cohesion, primarily accomplished through creation of wetlands and other flood storage to protect communities and create green assets; ***Organization*** (Economy & Society): Reduce community burden of vacancy and vulnerable housing by removing residents from homes at risk of continued flooding and developing an approach to reducing a 47% vacancy rate in Memphis; ***Place*** (Infrastructure & Environment): Build new and establish connectivity to opportunities and community assets, building on the Greenprint with nearly 30 miles of new trails or bike paths connecting green space, housing, and jobs; and ***Knowledge*** (Leadership & Strategy): Implement the regional sustainability plan by creating innovative, scalable, and resilient solutions for flood prone communities along Greenprint corridors and across the county and region.

One of the major goals of the project is to protect communities from flooding by allowing the river to bypass the area, moving LMI households out of the flood prone area, and lowering flood elevations by raising flood prone areas. Several flood control methods were considered in the implementation of the project including diversion channels, levees and dams, buyout programs, retention ponds, elevating areas above the floodplain, and the establishment of new wetlands. This goal will be met by incorporating these methods into each geographical activity areas based on the existing area topography, socio-economic conditions and community input.

Activities in each activity area will include community and environmental attributes such as new floodplain areas including recreational areas, multiuse trails, wetlands, boardwalks, community pavilions, community gardens, blight reduction, and camping areas. Newly planted trees and the creation of new green infrastructure will serve to reduce the heat island effect.

The Millington area was flooded multiple times when the level of the water in Big Creek exceeded the height of the protective levee. The resilient approach for this area includes the establishment of a large floodway between the existing levee on the north and the elevated highway to the South which will provide area for the flood waters to bypass the community. South Cypress Creek has frequently flooded the LMI community north of Weaver Park. The community has many vacant properties located outside the floodplain that can be used for redevelopment. The approach selected for this area is to re-use vacant lots for community purposes, offer voluntary buyouts to residents in the flood prone area, and establish relocation housing in the community. Along the Wolf River, community parks and roadways in the area will be elevated to protect from flooding. The activity will also establish new wetland and flood storage areas to compensate for the newly elevated areas and provide additional wetland storage areas.

Shelby County's project does not require the waiver of any requirements other than a request for a phased grant agreement process to accomplish completion by September 2019. Shelby County has not identified ineligible program types or inappropriate activities necessary to the project's success.

[i] ArcGIS Demographics Map with USA Median Household Income and USA Unemployment Rate