

Exhibit A – Executive Summary

State of Tennessee

ExhibitA_Phase2_ExecutiveSummary.pdf

The third largest river in the world, the fabled Father of Waters, the mighty Mississippi River fuels industry, recreation and tourism, creates a livelihood for thousands who live along or near its banks and has inspired countless writers and musicians. But it also wreaks havoc on those same lives and communities through flooding. It is West Tennessee's biggest asset and biggest challenge. The 2011 floods and severe storms in rural West Tennessee were no exception. Much of this flooding was in rural areas and had a significant impact on low- to moderate-income citizens.

In response to the impacts caused by the historical floods, the State of Tennessee has developed a comprehensive approach, titled Rural by Nature, to address the needs of rural Tennessee. The Rural by Nature project combines federal, state and local partners in a collaborative effort to create resilient rural communities in these often ignored areas. These projects not only will proactively minimize loss from future flooding and related natural occurrences but will also help to create communities that can successfully manage other disasters and build their economy on their assets. Great attention is being given to developing plans that are replicable and scalable and that can be used in rural areas along all of our major rivers across the country, particularly as climate change increases the likelihood of significant flooding events beyond what has been historically forecasted.

While they generally receive less attention in disaster planning, these rural areas are the heartbeat of America. Although 80 percent of Americans live in suburbs or cities, they only represent 10 percent of the country's landmass; the remainder is defined as rural. Rural communities formed the foundation upon which our country was built. They also contain some of our most vulnerable citizens and have high levels of poverty and unemployment. Rural children, in particular, have been disproportionately affected by the recent economic downturn.

This is particularly significant since child poverty often has an impact that carries throughout a lifetime.

Funding for the projects chosen for Rural by Nature will enable the state to proactively reduce flood losses that will inevitably occur; to preserve the natural environmental and water resources that make the communities who they are; reduce the impacts of flooding downstream; promote economic development, tourism, agriculture and recreation and to strategically deploy available resources to make the most significant impact. The result will be economically viable communities that will be able to attract and support businesses, weather natural disasters (including floods and earthquakes) and endure the impact of climate change. This requires a comprehensive planning process to ensure that the progress already made is leveraged and the area continues to offer strong opportunities for recreation, tourism and agriculture, currently the mainstays of these communities.

To create a comprehensive, regional program, the needs have been grouped into four categories: Water/Wastewater, Floodways and Trails, Connectivity and Transportation, and Education. The following table provides the total benefit, lifecycle cost, BCR, and total funding request.

State of Tennessee HUD			
Phase II NDRC	Total Benefit Cost	Lifecycle Cost	BCR
Rural by Nature Project	\$555,149,400	\$233,723,473	2.38
	Total Funding Request	\$109,830,306	

All of the target areas contain needs that must be addressed to improve living conditions for the vulnerable citizens of this area. Attacking the work in a comprehensive manner across the West Tennessee Region will provide the most effective and efficient use of funding. Lessons

learned can be shared across the State of Tennessee, and indeed, in other communities facing similar challenges. This approach begins with the basics required for a resilient community – a solid infrastructure that can withstand natural disasters and a community that can attract businesses and workers as well as tourist dollars, while preserving the rural heritage of the area. Operating at the state and local level, activities that will contribute to the well-being of all Tennesseans and that have no unintended consequences will be promoted.

Funding the Rural by Design projects will provide a solid foundation for growth and development of an area that is struggling and whose residents don't have access to services readily found in urban areas, even during times of flooding and related disasters. It also will help to create a template for rural river communities across the country.

Exhibit B – Threshold Requirements

State of Tennessee

ExhibitB__Phase2_ThresholdRequirements.pdf

General information that applies to all Target Areas. Eligible applicant. The applicant is the State of Tennessee. **Eligible activity.** Funds will be used solely for the necessary expenses related to disaster relief, recovery and resiliency. All activities proposed in Phase II are eligible according to Community Development Block Grant (CDBG) rules and regulations, state and federal laws, the Stafford Act, etc. **Proposal incorporates resiliency.** All activities proposed in Phase II have incorporated resiliency to future flooding, climate change, earthquakes and other potential disasters. Tennessee has developed a partnership including other state and local departments, non-profits and faith-based organizations for this application that will continue to work together to determine how future projects can incorporate the themes of resiliency.

National objective. With respect to activities expected to be assisted with CDBG–NDR funds, the Application has been developed to give the maximum feasible priority to activities that will benefit low- and moderate-income (LMI) families. All projects meet a national objective.

Overall benefit. The aggregate use of CDBG–NDR funds will principally benefit LMI families in a manner that ensures that at least 50 percent of the grant amount is expended for activities that benefit such persons, unless waived by Housing and Urban Development (HUD) based on a finding of compelling need. **Tie-back.** Each target area and each project proposed in Phase II ties back to the disaster that occurred in an approved target area in 2011. **One application per applicant.** This is the only application that will be submitted by the State of Tennessee.

Certifications. Tennessee Department of Economic and Community Development (TNECD) will comply with the certifications included in Attachment C and signed as a part of the electronic SF424.

In Phase I, The Rural by Nature project was composed of nine target areas in West and Middle Tennessee. During the development of the Phase II application, TNECD held multiple

stakeholder meetings and consulted with professional engineers, educators, and other partners to determine the most affected areas and where the National Disaster Resilience Competition (NDRC) dollars could make the greatest impact. During these meetings it was determined that the focus for Phase II would be the 6 target areas in West Tennessee. Five of the target areas border the Mississippi River and the sixth has tributaries flowing to the Mississippi River; all are subject to regular flooding and experience other similar threats including the impacts of climate change and the risk of flooding and other damage from earthquakes and tornados. These are the most distressed and most impacted areas affected by the disasters that occurred in Tennessee in 2011 and early 2012. ([Project Area Map](#)). Below are the overviews of our target areas.

Target Area 1 – Dyer County

Eligible county: The eligible county is Dyer County.

Most impacted and distressed target area: The target area census tracts are 9643, 9644, 9646 and 9648. ([Target Area 1 Dyer Co Map](#))

MID URN Information:

Impact – Infrastructure. The flooding in the City of Dyersburg caused damage to the sewer system in excess of \$4 million. ([Target Area 1 Dyer Co PER](#))

Distress – Disaster impacted low- and moderate-income (LMI) households. The census tracts that make up the target area contain 51.25% LMI households. ([Most Distressed Characteristics](#))

Distress - Disaster impacted an economically fragile area. The unemployment rate in the target area is 9.45%, which is 152.4% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Infrastructure. At least \$4M in unmet infrastructure need that cannot be funded through other sources is documented in the target area. ([Target Area 1 Dyer Co PER](#))

([Target Area 1 Dyer Co Sources and Uses](#))

Narrative: The Forked Deer River runs through downtown Dyersburg to the Mississippi River and the wastewater treatment plant is located in this area. Dyersburg has revitalized their downtown over the last few years. By becoming a Main Street community, working with grants from the Mississippi River Corridor and other state and federal funds and increasing community involvement, the downtown has become a vibrant part of the county with many government and basic need services and small businesses. The community has enhanced the streetscapes with new lighting and sidewalks, developed a farmer’s market and started work on the Dyersburg River Center with greenspace and a planned boat dock, outdoor classroom and trails. Just on the other side of the Forked Deer River from the area traditionally recognized as downtown is the part of the community that regularly floods. This area has several small businesses that closed or moved after the floods of 2010 and 2011, and low-income housing was torn down and not rebuilt. This is the main entrance to the city when traveling from the county airport or any community south of town. With proper flood control and the development of recreational opportunities, this area would become a part of the revitalized downtown and would provide greenspace for the community, an opportunity for low-income people to access services, health benefits and would continue the progress that the community has begun in a way that is safe during floods. The community has a [Master Plan](#) that includes the redevelopment of this area.

Target Area 2 – Lake County 1 (Reelfoot Lake)

Eligible county: The eligible county is Lake County.

Most impacted and distressed target area: The target area census tract is 9601. Lake County was a presidentially declared disaster in three events in 2011, FEMA-1979-DR, FEMA 1978-DR, FEMA 1974-DR. ([Target Areas 2-3 Map](#))

MID URN information:

Impact – Economic Revitalization – Other harm to the economy due to the disaster. Since the floods in 2011, there has been a drastic decrease in fishing licenses, hotel-motel tax revenues, and overall tourism revenues in the area.

Year	3-day Preservation (fishing) license revenue	Annual Preservation license revenue
2010	\$9,451	\$7,977
2011	8,221	6,470
2012	8,488	6,689
2013	8,127	6,894
2014	5,913	5,992
	2014 was 62.6% of 2010	2014 was 75.1% of 2010

Year	Hotel-Motel Tax Revenue from resorts
2010	\$36,654
2011	34,294
2012	31,409
2013	28,248
2014	26,832

	2014 was 73.2% of 2010
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Distress – Disaster impacted an economically fragile area. The unemployment rate in the target area is 12.8%, which is 206.2% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Economic Revitalization – Continuing unmet economic revitalization. Based on the decrease in tourism revenues for the county and the closure of a resort on the lake, the target area has unmet economic needs. ([Target Area 2 Lake Co Economic Impact and Need](#))

Narrative: Reelfoot Lake is the primary economic driver in Lake County, other than the Northwest Tennessee Correctional Facility. The county relies on tourism revenues, and there are 10 resorts on the Lake - 5 in this target area. The floods in 2010 and 2011 allowed water from the Mississippi River to flow into the Lake; since that time, partly because of an increase in Asian Carp in the Lake, tourism has decreased. At least one resort closed completely. Other resorts have seen significant decreases in revenue, and the nearby businesses that cater to the tourists, such as restaurants, have also seen a decline in revenue. Protecting the lake from flooding and developing tourism through investment in tourism assets and recreational opportunities around the lake will ensure that one of Tennessee’s most important tourist destinations remains viable.

Target Area 3 – Lake County 2

Eligible county: The eligible county is Lake County.

Most impacted and distressed target area: The target area census tract is 9602. Lake County was a presidentially declared disaster in three events in 2011, FEMA-1979-DR, FEMA 1978-DR, FEMA 1974-DR. ([Target Areas 2-3 Map](#))

MID URN information:

Impact – Infrastructure. The flooding in Lake County caused damage of more than \$30M to the Sheep Ridge Levy ([Target Area 3 Lake Co Infrastructure Impact](#))

Impact – Economic revitalization. The breach of the levy caused permanent damage to farmland in the target area ([Target Area 3 Lake Co Economic Impact and Need](#))

Distress – Disaster impacted LMI households. The census tract that makes up the target area contains 53.16% LMI households. ([Most Distressed Characteristics](#))

Distress - Disaster impacted an economically fragile area. The unemployment rate in the target area is 16.2%, which is 261.29% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Economic Revitalization – Based on the impacts to farmland from the Sheep Ridge Levy failure, the area has continued unmet economic needs. ([Target Area 3 Lake Co Economic Impact and Need](#))

Narrative: Lake County is an extremely rural part of the state. It is on the New Madrid fault line and the Mississippi River. In 2011, the Sheep Ridge levy failed and the river changed course and caused an 80-foot deep hole that covered over 5,000 acres – 40% of the Mississippi River flowed through the area. That was prime farmland along the river that has since been largely abandoned. The tax assessor reassessed properties in the area and decreased the acreage and land values for more than 20 properties. This has resulted in lower tax revenues for the county and loss of income for the property owners. Currently the majority of this land is not being used for farming. Between the decrease in tourism noted above and the decrease in agriculture production, Lake County has suffered from repeated disasters. By focusing on protecting the community from future flooding, developing the Mississippi River as an economic development asset, providing recreational opportunities and developing tourism assets, this county can rebound from the

disaster, be a model for other communities for resilient development, serve as a job center for northwest Tennessee and diversify their economy.

Target Area 4 – Lauderdale County

Eligible county: The eligible county is Lauderdale County.

Most impacted and distressed target area: The target area census tracts are 501, 502, 503, 505.04, 505.05, 505.06 and 506. ([Target Area 4 Lauderdale Co Map](#))

MID URN information:

Impact – Infrastructure. The flooding in Lauderdale County damaged roads and bridges across the county. Over \$3M in damage is documented. ([Target Area 4 Lauderdale County PER](#))

Distress – Disaster impacted LMI households. The census tracts that make up the target area contain 51.32% LMI households. ([Most Distressed Characteristics](#))

Distress - Disaster impacted an economically fragile area. The unemployment rate in the target area is 17.71%, which is 285.58% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Infrastructure. At least \$3M in unmet infrastructure need that cannot be funded through other sources is documented in the target area. ([Target Area 4 Lauderdale County PER](#)) ([Target Area 4 Lauderdale County Sources and Uses](#))

Narrative: The floods in 2011 covered more than 52% of Lauderdale County’s land. The farmland near the river collected sand deposits that resulted in the loss of the crops that had been planted that year and continues to affect the production of the land including the need for irrigation systems for previously fertile land that never needed them before. Roads in the western half of the county were underwater and continue to be degraded and require weekly maintenance. The Cargill Hale’s Point facility had recently begun a \$25M project to upgrade the

facility to accept more grain. This has resulted in three times as much traffic leading to the facility on roads that remain degraded from the floods. Additionally, sewer treatment facilities were damaged when the facilities and infrastructure could not handle the amount of water from the floods. The low-income communities cannot afford the road and wastewater repairs that are needed; however the projects in this community propose to create a place for the water to go, make resilient repairs to infrastructure and develop tourism, and provide educational and recreational opportunities in the community.

Target Area 5 – Tipton County

Eligible county: The eligible county is Tipton County.

Most impacted and distressed target area: The target area census tracts are 401, 402, 404, 406.01 and 407. ([Target Area 5 Tipton Co Map](#))

MID URN information:

Impact – Infrastructure. The flooding in Tipton County caused damage to the roads and bridges in excess of \$2.1M as shown in the FEMA Project Worksheets ([Target Area 5 Tipton Co Project Worksheets](#)).

Distress - Disaster impacted an economically fragile area. The unemployment rate in the target area is 16.46%, which is 265.53% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Infrastructure. At least \$500,000 in unmet infrastructure need to increase resiliency of a bridge that has been repaired that cannot be funded through other sources is documented in the target area. ([Target Area 5 Tipton Co PER](#)) ([Target Area 5 Tipton Co Sources and Uses](#))

Narrative: Tipton County is one of the fastest growing counties in the target area. As people move out of Shelby County, the population of Tipton County is growing, and the area will soon not be a rural community. However, this area is at a high risk of flooding. In the 2011 floods, over 18 miles of roads and 3,000 acres of farmland were completely submerged. Crops that had already been planted for the year were lost. Because of changes in the river's path, a portion of the county is now located on the west side of the river; all of this area was underwater in 2011. Additionally, a stream that runs through downtown Covington, the county seat, flooded and affected access to businesses in the area. Sewer systems throughout the county were inundated with inflow and infiltration and continue to experience problems today. Citizens who were not on public sewer systems experienced dangerous problems with their septic systems which were especially difficult for residents in the target area who are predominantly low- and moderate-income. The development of a regional wastewater treatment plant will eventually allow communities in the area to connect to this plant and allow those who cannot currently be served by a public sewer system to connect to the system. This wastewater treatment plant can also serve an existing industrial megasite in an adjoining county that has the potential to create thousands of jobs that will benefit the low-income citizens in this target area. ([West Tennessee Floodplain Map](#))

Target Area 6 – Madison County

Eligible county: The eligible county is Madison County.

Most impacted and distressed target area: The target area census tracts are 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14.01, 14.02, 17, 18, and 19. ([Target Area 6 Madison County Map](#))

MID URN information:

Impact – Infrastructure. The flooding in Madison County caused damage to the sewer system in excess of \$8M. ([Target Area 6 Madison Co PER](#))

Distress – Disaster impacted LMI households. The census tracts that make up the target area contain 52.16% LMI households. ([Most Distressed Characteristics](#))

Distress - Disaster impacted an economically fragile area. The unemployment rate in the target area is 17.49%, which is 282.11% of the national unemployment rate. ([Most Distressed Characteristics](#))

Unmet recovery need – Infrastructure. At least \$10M in unmet infrastructure need that cannot be funded through other sources is documented in the target area. ([Target Area 6 Madison Co PER](#)) ([Target Area 6 Madison Co Sources and Uses](#))

Narrative: The South Jackson and southern Madison County area has a history of severe flooding. In 2011, several businesses in the area flooded and the sewer system was damaged by the water; during the storm events the plant treated 32.2 million gallons per day (MGD), which is significantly higher than their average daily flow of 9.3 MGD. The wastewater treatment plant in the area serves downtown and most of the industry in the county; it handles 95% of the county's industrial waste and serves more than 200 industries. Repairing the damage to the plant and the interceptor as well as making improvements to the surrounding community that allows the rivers and streams to expand when needed will allow for continued redevelopment in the area. This target area is the most populated area outside of Shelby County in West Tennessee. It serves as a job, culture and entertainment center for the rest of the area, and many people travel to Madison County for work each day. Repairing the sewer system and making it more resilient to flooding, allowing the streams and natural areas around them to return to previous states when they did protect against flooding and protecting the downtown from flooding will allow this community

to continue to serve as a job center and to serve as a model for resilient development for other communities in West Tennessee and across the state.

Exhibit C – Threshold Requirements

State of Tennessee

ExhibitC_Phase2_Factor1_Capacity.pdf

Past Experience of Applicant

Tennessee Department of Economic and Community Development (TNECD) has an extensive history of understanding, planning for, and assisting with the implementation of disaster recovery and economic revitalization programs throughout the State of Tennessee. As documented below, TNECD and all identified partners are well versed in the requirements needed to successfully launch, manage and maintain the Rural by Nature Program and other resilient efforts that will grow from this opportunity.

General Administrative Capacity

Project management and logistics - TNECD currently oversees the Community Development Block Grant (CDBG) and CDBG Disaster Recovery (CDBG-DR) Programs for all cities in Tennessee through the Office of Community Programs. The department has successfully completed more than 200 CDBG projects through their “regular round” funds in the past three years. Specific tasks under this program include issuing and managing contracts, approving plans and specifications, monitoring for Davis-Bacon, procurement, environmental review compliance, etc. Actual results that have come through these funds included improvements to sewer systems in hundreds of communities across the state, building health and community centers and fire stations, improving water quality and completing housing rehabilitations. The annual allocation is approximately \$25 million. Another example strong Program Management is the use of federally allocated CDBG-DR funds received from disasters in 2008 and 2010. These budgets have been drawn down by more than 76% with no audit or monitoring findings from Housing and Urban Development (HUD). The staff has completed HUD training, attended conferences on HUD programs and, as a team, has more than 65 years of direct program management

experience with the CDBG program. The department also manages numerous other federal grant and loan programs.

Procurement – TNECD and the Office of Community Programs understands and strictly follows the State of Tennessee’s procurement policies. These policies match, or in some cases exceed, federal procurement policies. Over the past three years, TNECD has followed these procedures to award more than 250 grants to communities across the State. These grants cover a wide range of projects including both professional services and construction. Knowing how much knowledge has been attained through these procurements; TNECD developed a [manual](#) that contains all of the policies, procedures and best practices that are to be followed by each grantee. Additional assistance for any procurement comes from TNECD legal and contracting staff. Staff also have specific experience in the development of Request for Proposals (RFPs) and understand how the RFP process can be fast-tracked if necessary.

Contract Management – The TNECD team has also successfully managed contracts of more than \$130M in disaster funding over the past six years. A multi-disciplined team approach has been used to manage each contract, making sure that details of each contract such as funding type, task breakdowns and insurance needs, are all met. TNECD’s overall contract management approach is optimized to deliver focused service to meet each requirement. For this Program, activity teams will be individually responsible for the development and implementation of each particular section, yet all teams will be coordinated and integrated with consistent program management and quality assurance / quality control (QA/QC) approach.

Financial Management - TNECD regularly awards grants to sub recipients including the local governments participating in this project through the Community Programs office and other grant and loan programs for economic and community development. Currently, TNECD has

more than \$235M in grant and loan funding under management; Community Programs manages \$70M of that. Community Programs also works with non-profits through grant programs, particularly with the Appalachian Regional Commission (ARC) and has experience on projects with other states through the ARC and Delta Regional Authority (DRA).

Accountability, Quality Control/Quality Assurance, Monitoring Internal Audit – TNECD has an internal auditing division that works with each division to implement policies and procedures, risk assessments guidelines, monitoring plans and other policies to promote compliance with programmatic regulations and local, State and Federal laws. Auditing and other Program staff has received specific training on the Office of Management and Budget's (OMB's) guidance on Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, which has been titled the “super circular.” TNECD complies with auditing all requirements. This is substantiated through all of the regular CDBG program reviews by HUD which have not found any major violations. The department has a monitoring plan for all grantees, and attempts to implement similar processes for each project (i.e. grantee) to promote consistent QA/QC and further enhance the programs accountability.

Rapid Program Design and Launch - TNECD developed the HUD Natural Disaster Resilience Competition (NDRC) Phase I application without any outside assistance; however, when the Phase II application began, it was quickly understood that additional help would be required. Recognizing this, and the need to quickly launch the Program if successfully awarded, led TNECD to hire Stantec Consulting Services Inc. (Stantec) through a competitive RFP process. As described in later parts of this application, Stantec has a history of successful program execution for numerous Federal Programs, State initiatives and local projects. They have been an active partner on the development of this Phase II application. With a proven partner already in

place that understands the Program, this application, and each of the potential activities; TNECD will be able to quickly launch this Resilience initiative. TNECD will apply and rapidly adapt its CDBG and CDBG-DR experience. TNECD has staff that work on large-scale special projects as well as staff on the ground in the communities that are a part of the application to assist with quickly getting projects off the ground and with monitoring the projects and measuring success.

Determining, Tracking, and Evaluating Project or Program Outcomes – TNECD, with assistance from Stantec, will implement a Program Management approach guided by the best management principles identified through the successful management of other CDBR programs.

A Project Management Tool Box will be used for this Program and will include:

- Microsoft Project Schedule
- Program Management Plan
- Activity management plans
- Quality management plan
- Communication Plan
- Project Reporting and change control plan
- Risk Management Plan

Each plan outlined above will have specific targets, either schedule or cost measures, and the TNECD will utilize established earned value management (EVM) indices to track and evaluate the overall health of the Program. Stantec will provide assistance in this monitoring.

TNECD and Stantec have the proven management skills necessary to successfully meet the requirements of this Program.

Technical Capacity

The TNECD Team, Stantec and all Activity Leaders all have extensive technical experience in the services requested for this Phase II application. The overall program team is committed to doing what is right by demonstrating social, economic, and environmental responsibility, and by actively advancing a culture of health and safety for team members and stakeholders. Through our broad partnership, the TNECD Team can cover all aspects of resiliency planning and disaster management while balancing what's important to the environment, each individual community, and the State. Our team of engineers, scientists, and other experts will lay the groundwork for infrastructure improvements, while our planners will create designs using knowledge of local regulations to navigate all required approvals. Our environmental scientists will restore and preserve natural resources, while our public participation experts will engage stakeholders to build consensus. Our landscape architects will help to create spaces that respond to the land and people who use them. TNECD brings with it the full capacity of Stantec and number partners which account for over 15,000 team members that have experience with the following:

- **Planning**
 - Regulatory permitting assistance
 - Residential, commercial, institutional, mixed use & brownfield land development
 - Site remediation
- **Engineering**
 - Drainage & storm water management
 - Infrastructure design
- **Landscape Architecture**
 - Site planning & design
 - Urban design

- Parks, open space & recreation design
- **Surveys/Geomatics**
 - Pre-Development Site preparation
 - Geographic information systems (GIS)
- **Transportation Planning**
 - Traffic impact assessment
 - Transportation master planning
- **Environmental Infrastructure & Management**
 - Flood Insurance Study (FIS) and Floodplain Management
- **Resilience Planning**
 - Impact and asses planning for extreme weather and natural disasters
 - Federal Disaster Program Management, including home acquisition and buyouts

Specific examples of this technical capacity include:

- Work on the first hospital in California awarded Leadership in Energy and Environmental Design (LEED) Silver Certification
- Assistance in reclaiming over 240 acres of former industrial land for community use
- Over 9 million people impacted through our partnership with the Tennessee Valley Authority (TVA)
- Experience on over 500 impoundment structures for federal, state, and municipal governments and industrial clients
- Over 470 Federal Emergency Management Agency (FEMA) compliant hydrology and hydraulic studies
- Development of over 8,000 FEMA Flood Insurance Rate Map Panels

Community Engagement and Inclusiveness

To determine the areas of greatest need and potential benefit, TNECD representatives have held town hall meetings across Tennessee and met with community leaders and elected representatives as well as non-profit representatives to determine the areas of greatest need and opportunity. During the development of this Phase II application, public meetings were held in each target area through the Region. The focus and goal for each meeting was to solicit feedback for the application.

The TNECD Team has been assembled based on their various areas of expertise. Tennessee has never had such a wide-ranging group focused on disaster recovery and resiliency. While the individual partners have experience working together, this is the first time they have joined together for a specific purpose. Bringing together leading agencies, non-profits and community groups from across the State will make sure the funds acquired will be used throughout the region, and that everyone will work collaboratively rather than at cross purposes. The team assembled is unlike any other in Tennessee history in terms of breadth and commitment.

To direct this initiative, a Statewide Resiliency Council has been developed to facilitate a regional approach that is both scalable and replicable. The Council is overseen by TNECD and is managed by the State partners. The Resiliency Council is important as the realization grows that a key component in disaster planning is to help vulnerable citizens and communities plan together. This requires a broad team effort and a shared responsibility among local governments, communities, businesses and individuals.

In addition to the State Resiliency Council, there are plans to establish Regional Councils for each of Tennessee's three regions. The West Tennessee Region already has been formed its

council (the West Tennessee Resiliency Council), which will be led by the West Tennessee Healthcare Foundation (WTHF). All funding partners will serve on the West Tennessee Resiliency Council as well as other local organizations with the expertise and capacity to help build more resilient communities. Local governments in each activity area will also serve on the Council. Many governments have assisted with public outreach and conducted public meetings in coordination with TNECD staff. Each group is committed to promoting resiliency in their communities. Partner letters are included in Attachment A. Additionally, three local development districts will be represented on the council. These development districts work daily with the local governments to acquire grants, assist with local planning initiatives, and promote intergovernmental cooperation. They have experience with grant management and will assist with project management. Finally, through partnerships with organizations such as Reelfoot Rural Ministries (RRM), TNECD is reaching into the heart of each impacted community to work with citizens deeply rooted in the area and committed to improving the lives of the most vulnerable residents.

Listed below are some of the identified partners for the entire Resiliency Program:

Tennessee Department of Transportation (TDOT): TDOT maintains and constructs the state's transportation network. The Office of Long Range Planning is in the process of completing a study on extreme weather and how it will affect the state.

Tennessee Housing Development Agency (THDA): THDA serves as the State's housing finance agency and works to promote and produce affordable housing. THDA is a Consolidated Planning partner with TNECD.

Office of Governor Bill Haslam: The Governor's office will participate in the planning efforts and project development and will expand the ideas and policies throughout the State so that the efforts impact more than the proposed project area.

The Center for Earthquake Research and Information at the University of Memphis (**CERI**): CERI is committed to understanding the causes and consequences of earthquakes and addresses needs through research, education, seismic networks and dissemination of information. Their involvement is key because of the likelihood of earthquakes in the affected regions.

Tennessee Emergency Management Agency (TEMA): TEMA is the state's disaster response and recovery department. They manage FEMA funds for disaster response, recovery and mitigation; coordinate the State departments and resources during an emergency or disaster; assist with disaster response and recovery; and serve as the state's hazard mitigation planners. TEMA has extensive experience, including 7 presidentially declared disasters since 2010.

Tennessee Department of Environment and Conservation (TDEC): TDEC's mission is to protect and improve the quality of Tennessee's air, land and water. They manage federal funding from the EPA and state funding and develop and implement programs and initiatives that protect human health and the environment and support economic development and quality of life.

U.S. Department of Agriculture, Rural Development (USDA-RD): the USDA-RA has a presence in each of the target areas through their area offices. They are involved with housing, energy, business development and community facility programs. Their mission is to improve the economy and quality of life in rural America. Their loan and grant programs will serve as leverage for several projects.

Natural Resource Conservation Service (NRCS): the NRCS provides farmers with technical assistance to incorporate conservation into their farming and planning. They are helping landowners along the Mississippi River put property into Wetland Reserve Easements.

U.S. Army Corps of Engineers (USACE): the USACE has a long history of projects along the Mississippi River that have shaped the river systems and prevented flooding in the area. They will work with the team to assess new approaches, provide data and implement projects in the project area and across the state that support the team's goals.

Tennessee Valley Authority (TVA): TVA provides electricity across the State and provides flood control, navigation and land management for the Tennessee River System and assists the state and local governments with economic development initiatives. They manage 33 reservoirs, 170,000 acres of public land, a visitor's center, seven campgrounds, 30 dams, and seven locks serving 110 ports and terminals.

Delta Regional Authority (DRA): the DRA is a federal partnership with 8 states along the Mississippi River that promotes economic and community development. They work to make their 252 (21 in Tennessee) counties more resilient to disasters. They are implementing a training program across the region to help communities plan for, better respond to, and recover more quickly after natural disasters. The TNECD Chief of Staff and the Office of Community Programs Director serve as the Governor's designee & alternate to the DRA Board of Directors.

West Tennessee Healthcare Foundation (WTHF): WTHF is the charitable arm for West Tennessee Healthcare, a self-supporting, public hospital that is one of the top ten largest not-for-profit healthcare systems in the county. A 501(C)(3) organization, WTHF is well positioned to coordinate the planning and projects of the almost two-dozen partners who will be participating in this project. For example, after tornados devastated West Tennessee in 1999 and 2003,

WTHF served as a primary donation collection and distribution center for the region. It is a trusted organization for the management of funds and for disaster response and recovery.

The American Red Cross of West Tennessee: A key partner that can provide broad expertise in dealing with disaster preparation and response. Over the past year, the Jackson Area Chapter has assisted more than 400 people with immediate emergency after disasters such as fires and floods.

Management Structure

Existing Management Structure: The Rural by Nature project will be led by TNECD, and Brooxie Carlton will serve as the overall Program Manager. Brooxie has 6 years of experience managing similar sized grants and programs. While TNECD will manage the funding for the Rural by Nature project, the State has contracted with Stantec to assist in the overall Program Management and technical oversight tasks. A 60-year old multinational company, Stantec provides professional design and consulting services in planning, engineering, architecture, landscape architecture, surveying and project management offering professional services throughout the entire infrastructure and facility lifecycle. Recognized as a world-class leader and innovator in the delivery of sustainable solutions, Stantec carries out projects funded by all the major international funding institutions as well as for private sector clients including utility and large multi-national companies. Their team of more than 15,000 employees has completed more than 60,000 projects for 6,000 clients in more than 100 countries. Stantec will provide management support to insure resiliency and quality are adhered to within each activity. An overall project organization chart is attached. The Stantec Program Manager will be Steve Field, PE. Steve has 20 years of experience managing projects in Tennessee, including a recently completed TVA project that involved raising 4 dams in Tennessee to revised probable maximum

flood (PMF) protection level. The program ran for three years and had an approximate total project cost of \$138 million. Steve's resume is attached. All of the activities envisioned in the overall project have been divided into 5 technical disciplines: Floodways and Trails, Railroad, Water/Wastewater, Social/Housing and Education. Each discipline has an assigned Subject Matter Expert (SME) who is licensed Professional Engineer (PE) and will oversee the activities that fall under their area of expertise. George Athanasakes, PE will serve as the SME for Floodways and Trails. George's resume is attached. Gene Davies, PE will serve as the SME for Railroads. Gene's resume is attached. Paul Thomas, PE, will serve as SME for Water/Wastewater. Paul's resume is attached. Ashley Smith, PE will serve as SME for Social/Housing. Ashley's resume is attached. Additionally, Marc Pearson, a Certified Floodplain Manager (CFM) will serve as SME for the Multi Hazard Mapping and Education. Marc's resume is attached.

Stantec assist TNECD by utilizing an established Program Management framework to create cost containment and promote quality control throughout the entire Program. Stantec will employ the same framework for each of the Program activities presented in this application. The overall vision of the Program Management philosophy is to:

- Create an organizational structure that provides efficient management of resources
- Provide clear and consistent communication between all team members and stakeholders
- Establish cost-effective project methods and procedures
- Perform quality assurance and quality control (QA/QC) throughout the project

To accomplish this vision, Stantec will assist TNECD to employ a 10-point Program Management Framework, which represents the requirements of an ISO 9001 Quality Management System. A Project Plan will be required for all activities under this Program. Each

plan will be used to monitor overall progress and will be “living” documents that are updated throughout the Program. Each Project Management Plan (PMP) will include:

- A brief summary of the activity, goals and objectives
- Activity team assignments with roles, responsibilities and work breakdown structure
- A work plan
- Budget information
- Activity schedule
- An assessment of any known or identified risks

Each PMP will describe the intended scope, budget, resources, deliverables, and schedule. Once a PMP is established and approved by TNECD, Stantec will monitor the plan to track each activity and make sure they are completed, on time, and within budget.

Coordination and communication are key elements to successfully managing projects. As each project begins, Stantec will facilitate the following communication:

- Monthly Project Coordination calls with TNECD, State officials and partners. These will promote communication and provide a mechanism to identify potential issues with each activity.
- Monthly Contract calls with HUD and TNECD. These will review any contractual issues, period of performance status, and discuss potential change requests.
- Monthly Invoicing and project summaries. Included with each monthly invoice will be a summary of the work completed during that performance period, what is anticipated to be completed during the next period, and it will identify any issues with each activity.
- Daily emails and phone calls will occur as necessary to discuss project status, make decisions and communicate issues that arise.

Stantec may additionally draw upon its Major Projects Group. The Major Projects Group was established within Stantec to assist in the execution of projects in excess of \$25 million or delivered on an alternate project delivery, non-traditional basis. The Major Projects Group can:

- provide oversight, leadership and advice in development, setup and execution of Major Projects
- provides input into staffing of project management positions
- determines the appropriate leadership and project controls
- lead development of recovery plans for troubled projects.

A Quality Management Plan (QMP) is another key element for this Programs success. For each activity executed through TNECD's program, a unique QMP will be developed and an appropriate independent technical review (ITR) team will be assigned based on the type of project. Since the projects vary in type (wastewater systems, levees, trails, floodplain management, etc.) the QMPs will vary as well to follow industry standards for each type of project just like the team assigned to execute the project an appropriate ITR team will be assigned. Stantec will be available to serve as ITR teams and perform technical reviews as needed, including the review of documents, designs, drawings, and deliverables.

Activity Partners

The State will manage the overall grant funds and activities with the assistance of Stantec as the Program Manager; however, there will also be multiple agencies who will take on the task of the day-to-day design, engineering and on the ground project management. For the purposes of this grant, we refer to them as Activity Partners. There are 10 activity partners and the State has signed agreements with each. Some of the Activity Partners will manage more than one activity. All Activity Partners have managed grant dollars and projects similar to the size and

scope of the ones proposed in this Phase II application. Below is a brief overview of each Activity Partner.

Northwest TN Port Authority: The Northwest TN Port Authority will manage the construction of the Rail Spur to the Port of Cates Landing identified as Activity 1 in the soundness of approach section. State of Tennessee Fast Track funds are being used to secure the Surface Transportation Board permit to construct the rail right-of-way. The Authority's strategic partners, Lake County, the Reelfoot Area Chamber of Commerce, the Northwest Tennessee Regional Port Authority (NWTNRPA), and Forcum-Lannom, successfully sited, funded, and constructed the Nation's newest inland port. Their 12 years of experience constructing the port proves their capabilities for this HUD activity.

Tipton County: The Tipton County Government will be managing the construction of the Tipton County Regional Sewer Plant identified as Activity 2 in the soundness of approach section. The Tipton County Government has extensive experience in applying for and managing multi-million dollar grant projects. In the summer of 2015, Tipton County opened a new Emergency Management Agency Building funded with a grant through the TNECD with local funding from Tipton County Government. The total project cost was \$1.3 million. Additionally, Tipton County is currently managing a grant to add additional classrooms to Atoka Elementary School totaling \$1.0 million. Tipton County has an annual operating budget of \$123 million and has managed FEMA grant dollars of excess of \$3.0 million in the last three years.

Jackson Energy Authority (JEA): The JEA will manage the construction of the Jackson Energy Authority Sewer identified as Activity 3 in the soundness of approach section. The JEA is a public utility created under a private act passed by the Tennessee Legislature. JEA is responsible for the providing over 40,000 customers with reliable electric, gas, propane, water,

wastewater and broadband services within the City of Jackson and Madison County. They are responsible for the operations and management of an annual budget of \$245 million and have demonstrated their ability to manage projects through the use of State Revolving Loan funds from TDEC, having completed an \$11.1 million SRF Loan within the past year. JEA should receive approval of another \$10 million loan in October 2015 to continue work on the sewer rehab program. They have also has completed two Economic Development Administration grants for a total of \$3,5 million, a \$1,7 million CDBG grant, and a \$9.8 million sewer system improvement. The sewer system improvements had a direct impact on the JEA's ability to be more resilient to future disasters. JEA is also in the process of construction or bidding out an additional \$3.4 million sewer system improvements. Finally, JEA is securing \$10,000,000 for additional sewer system improvements from the State Revolving Loan Program.

Dyer County: Dyer County will manage the Dyer County Sewer Rehabilitation Activity 4 and the Dyer County Wetland and Recreation Fields identified as Activity 8 in the soundness of approach section. The City of Dyersburg, along with their consultant Smith Seckman Reid, has proven staff to manage both of these activities. Example of this experience include the Reagan Trail to South Town Improvements which included approximately \$4.7 million dollars in improvements. This project directly helped south Dyersburg by including green infrastructure and park improvements to help mitigate the impact of flooding. These helped improve the quality of life by converting abandoned or blighted properties that were impacted by the 2011 flood, to parks and greenspaces. Dyer County has managed multiple projects similar to the ones proposed in this application.

TDEC - West Tennessee River Basin Authority: The TDEC, West Tennessee River Basin Authority (WTRBA) will manage the Henning Sewer Restoration, Activity 5, Middle Fork

Forked Deer Restoration, Activity 9, City of Jackson Urban Flood Control, Activity 10, and Lauderdale County Cold Creek Chute Activity 11 all identified in the soundness of approach section. WTRBA is well suited to implement and handle these activities as a State agency whose mission is to establish stream and floodplain restoration in west Tennessee. To date, the WTRBA has completed 15 similar projects from concept through the construction and maintenance phase. The WTRBA has staff, equipment, engineering consultants and contractors in place to construct and manage each of the activities listed above. Two specific project examples for the WTRBA include:

- **Crooked Creek Stream and Wetland Restoration Project:** The WTRBA constructed a 2-mile meandering channel restoration project and coordinated wetland restoration on 600 acres of adjoining floodplain. A final mitigation monitoring report was submitted to TDEC for final approval. The project has been judged a success and is in the process of being transferred to the Tennessee Wildlife Resources Agency (TWRA) for use as a waterfowl refuge and small game wildlife management area. The WTRBA will manage this property in conjunction with the TWRA.
- **Stokes Creek Stream and Floodplain Restoration Project:** The WTRBA constructed a 2 mile meandering channel restoration project and coordinated wetland restoration on 200 acres of adjoining floodplain. The project was constructed on 2 private property owners and a TWRA Wildlife Management Area. Conservation Easements were procured on the 2 private landowners. Seasonally ponded oxbows were created and bottomland hardwood timber was established as a part of this project. The WTRBA manages this project.

Lake County and the Lake County Levee Board: Lake County and the Lake County Levee board will work in concert with the WTRBA and to manage the Permanent Pumps for the Mississippi River Levee identified as Activity 6. The two partners maintain the USACE's mainline Mississippi River Levee. During "flood fights," such as the one experienced in May 2011, Lake County, the Levee Board and the WTRBA all provided portable pumps to evacuate water from the Tiptonville side of the levee. This "team" effort was coordinated effectively by the Levee Board in concert with USACE. A permanent pumping station will be much easier to manage than coordination this type of effort. Additionally, a permanent pump station is more reliable and less likely to "fail" during "flood fights."

TDEC – State Parks (TDEC-SP): TDEC-SP will manage the Reelfoot Seawall Restoration, Activity 7 identified in the soundness of approach section. Over the years at Reelfoot Lake, TDEC-SPs have built partnerships with local and statewide contractors, which have allowed them to maintain a vision for protecting the natural resource in the Region. They have a highly trained maintenance staff and the equipment needed for any and all upkeep of past and future projects. They have successfully obtained funding for new cabins at Reelfoot Lake which are currently being built and have successfully obtained grants for new canoes and kayaks through the Department of Health Project Diabetes for a healthy lifestyle. They recently obtained grants from the Mississippi River Corridor for two new Pontoon boats that have provided visitors the opportunity to explore Reelfoot Lake. Another project that is ongoing and recently approved is an \$180,000 grant from Tennessee Recreational Parks-Trails and Greenways to improve one of areas impacted from the 2011 floods by installing a .55 mile paved walking trail and installing playground equipment. They are also receiving a grant from the Mississippi River Corridor for a new \$2.5 million interpretive center which will begin construction in the next 6 months.

Mississippi River Corridor – Tennessee (MRCT): The MRCT will manage the construction of the Lauderdale County Overlook identified as Activity 12 in the soundness of approach section. The MRCT is a 501(C)(3) nonprofit Tennessee corporation whose mission is to identify, conserve and enhance the region’s natural, cultural and recreational resources to improve the quality of life and prosperity in West Tennessee. This organization is dedicated to the economic development, land conservation, environment and wildlife preservation within the six counties that comprise the Corridor: Shelby, Tipton, Lauderdale, Dyer, Lake and Obion. With over a decade of experience, the MRCT has evolved into a significant educational resource and economic driver for west Tennessee counties located along the Mississippi River. They have successfully expanded their community development efforts to create an eco-tourism corridor which highlights *authentic* visitor destinations for tourists traveling along the National Scenic Byway. This has helped to increase economic growth in many of the rural areas.

Reelfoot Rural Ministries: Reelfoot Rural Ministries will manage the Reelfoot Rural Ministries Program identified as Activity 13 in the soundness of approach section. Reelfoot Rural Ministries, Inc. has been serving the poor, elderly, and at risk population of Northwest Tennessee for more than 52 years. The ministry is committed to serving this area with love and respect. Donors and volunteers from throughout the region, along with 17 full and part-time staff members make the ministry possible. The Home Rehabilitation aspect of Reelfoot Rural Ministries, Inc. was born more than 30 years ago as a response to occasional needs for low-income senior citizens. As relationships with the poor and the elderly in the service area were cultivated through other programs, home repair needs for this population became apparent. This ministry has grown to include major repairs like roofing, restoration, and new construction. Reelfoot Rural Ministries, Inc. has overseen the rebuilding, restoration, and new construction of

hundreds of projects throughout Northwest Tennessee in recent years.

University of Memphis: The University of Memphis will be managing the Multi Hazard Mapping and Education program identified as Activity 14 in the soundness of approach section.

The University of Memphis has a proven history of successfully managing large, multi-year grants from a variety of federal agencies including the National Institutes of Health, the National Science Foundation, the Department of Defense, the U.S. Geological Survey, and the U.S. Department of Education. In addition, the University has managed large awards from the State of Tennessee related to human services, education, and transportation. Each identified activity lead will be supported by personnel in their departments who provide services to assist with the administrative and financial tasks required, including reporting. These departments include the Office of Sponsored Programs, Grants Accounting, Legal Services, Procurement, Accounting, Human Resources, and Financial Services.

Activity Partners Organizational Structure

Northwest TN Port Authority – Lake County – RR Spur Activity 1 – Organizational Structure attached

Reference:

Marcia P. Mills

130 S. Court Street

Tiptonville, TN 38079

Tel: 731-253-8144

Email: Info@reelfootareachamber.com

Tipton County, Regional Sewer – Organizational structure attached

References: The Tipton County Mayor, Jeff Huffman has 29 years of experience as Mayor. The Tipton County Finance Director has a double major in finance and accounting. Furthermore, Tipton County has received a letter from the Tennessee Department of Economic and Community Development indicating their satisfaction in how the county managed the Emergency Management Agency building grant.

Jackson Energy Authority – Organization structure attached

References: Listed below are 3 project references for similar projects that JEA has completed in the last 3 years that involved grant dollars and are similar to size and scope of the activity proposed in the grant application.

1. Sewer System Line Replacement – Riverside Interceptor

SRF – 313 - \$ 8.5 million – Bagher Sami- TDEC – bagher.sami@tn-gov 615-532-0199

EDA – 04-79-06605 - \$1.5 million – Bertha Partin – EDA bertha.partin@eda.gov 404-730-3002 – Disaster of 2010

2. Sewer line Replacement –

SRF – 313 - \$2.5 million – Bagher Sami – TDEC – bagher.sami@tn-gov 615-532-0199

3. North Water Treatment Plant -

EDA 04-79-0628 - \$1,875,000 – Bertha Partin – bertha.partin@eda.gov - Tornado Disaster 2008

Dyer County – Organization structure attached

Our administrative staff at City Hall, including Stephen Anderson (treasurer), Greg Williams (purchasing), Bob Jones (recorder), is well versed in the processing of contracts, invoices, and reimbursements associated with grants from agencies like CDBG, EDA, FEMA, and HUD. Our Public Works and Engineering staff likewise has managed the design and construction of these

grant projects, in addition to millions of dollars in municipally funded projects in these three years including improvements to the WWTP and launching a comprehensive assessment of our aging infrastructure encompassing water, sewer, and streets. Our City Engineer, Smith Seckman Reid has a staff of 375 people, including 175 licensed engineers who have designed and managed projects as large as \$100M. Their expertise includes wastewater collection and treatment, roads and bridges, hydraulics and hydrology, green infrastructure and stormwater management, and athletic facilities.

References: Here are a few examples:

- City of Hernando Lagoon Reclamation Project- \$2.8M funded by Mississippi water pollution Control Revolving Loan Fund with a 20% subsidy from the EPA Green Project Reserve- construction substantially complete in December 2013.

SRF Contact

Sam T. Qarqish, P.E., BCEE, Engineering Coordinator MDEQ/OPC/SWD/Construction Branch
MDEQ Office of Pollution Control

Mail: P. O. Box 2261, Jackson, MS 39225-2261

Physical: 515 E. Amite St., Jackson MS 39201

Tel: 601-961-5046

Fax: 601-961-5187

Email: Sam_Qarqish@deq.state.ms.us

Owner Contact

Chip Johnson, Mayor

City of Hernando, Mississippi

475 West Commerce Street

Hernando, MS 38632

Tel: 662-429-9092

Email: mayor@cityofhernando.org

Airport Runway Improvements - \$4.3M combined TDOT grant

Jim Currey, P.E.

TDOT Aeronautics Division

607 Hangar Lane

Nashville, TN 37217

Tel: 615-741-1953

Fax: 615-253-1171

Mobile: 615-517-0928

Email: Jim.Currey@tn.gov

EDA Water Tank-\$1.8M grant

Stacey Mills

Construction Manager

Atlanta Regional Office

401 West Peachtree Street, N.W.

Suite 1820

Atlanta, Georgia 30308-3510

Tel: 404-730-3034

Email: smills@eda.gov

TDEC – West TN River Basin Authority – organizational structure attached

References:

TDEC – West TN River Basin Authority will be managing multiple activities.

Lake County Mayor Denny Johnson

Lake County Courthouse

229 Church Street

Tiptonville, TN 38079

Tel: 731-253-7382

Mobile: 731-445-6040

Email: denny.johnson@vcourthouse.net

Lake County Levee Board Chairman, William “Brad” Keiser, Jr.

300 N Headden Drive

Ridgely, TN 38080

Tel: 731-264-5794

Colonel Jeffrey A. Anderson

Commander - Memphis District

USACE Memphis District

167 N. Main St. Room B-202

Memphis, TN 38103-1894

Tel: 901-544-4109

TDEC – State Parks – Organizational structure attached

References:

Robert Richards-

Tennessee Department of Environment and Conservation—Greenways and Trails Coordinator

WR Snodgrass Tennessee Tower

312 Rosa L Parks Avenue, 2nd Floor

Nashville, TN 37243

Tel: 615-532-0753

Fax 615-532-0732

Mobile-615-483-2294

Email: Robert.richards@tn.gov

Diana Threadgill- Mississippi River Corridor (MRC) President and Executive Director

1503 Monroe Avenue

Memphis, TN 38104

Tel: 901-425-3450

Email: Dianathreadgil@comcast.net

Mississippi River Corridor – Organizational structure attached

Similar Projects:

Dyersburg River Center and Blueway

The MRCT Dyersburg River Center, Park and Blueway (water trail) projects were created to bring new public awareness of the Park’s riverfront assets, to increase regional economic development, provide health & wellness benefits, increase tourist dollars into the community,

add to local/state tax revenues and to promote additional restoration efforts for the Forked Deer and Mississippi Rivers.

This important economic and community development initiative involved the creation of a MRCT Dyersburg/Dyer County River Center, a custom boat dock/launch, a restroom/shower facility, walking trail and Blueway (water trail) on the Forked Deer River. Through the construction of these unique projects the MRCT, Dyer County, the City of Dyersburg, the Dyersburg Chamber Foundation and a multitude of community partners, will be able to engage and train students, serve individuals of every capability, provide new outdoor activities for local citizens, increase eco-tourism dollars and teach outdoor river advocates best practices for canoeing and kayaking on the Forked Deer and Mississippi Rivers.

References:

Dr. Karen Bowyer

President

Dyersburg State Community College

1510 Lake Road

Dyersburg, TN 38024

Tel: 731-286-3300

Email: kbowyer@dsc.edu

Mr. Jim Stark

Community Leader and River Advocate

1419 Lake Road

Dyersburg, TN 38259

Tel: 731-589-1776

Email: jhstark38259@yahoo.com

New Interpretive Visitors Center – Reelfoot Lake State Park – Tiptonville, TN

The MRCT will begin construction in October on a new state-of-the-art Interpretive Visitors Center at Reelfoot Lake State Park after receiving a \$ 1,890,000 grant award from the FHWA National Scenic Byways program, TDOT and TDEC. Located two miles from *Great River Road* – National Scenic Byway in Tennessee, Reelfoot Lake is the largest natural lake in Tennessee and was created by the New Madrid Earthquake in 1811-12. The Interpretive Visitors Center will tell the history of this unique region with highly interactive interior and exterior exhibits as well as providing an “outdoor classroom” for this amazing wildlife habitat and scenic paradise. It will also serve as a visitor orientation gateway for three states in the NW region of Tennessee and create a way station for hikers, bicyclists, birders, campers, historians and educators traveling along the ten-state Great River Road NSB.

Lake County, the home of Reelfoot Lake State Park, is located in the most economically challenged area within the State of Tennessee. The new Visitors Center is expected to bring thousands of additional visitors to the State Park and will provide a significant revenue increase for the citizens that live along the Mississippi River in Kentucky, Arkansas, Tennessee and Mississippi.

References:

Mr. Mark McAdoo

Tennessee Department of Transportation

Transportation Manager 1

Environmental Division

James K. Polk Bldg. – Suite 400

505 Deaderick Street

Nashville, TN 37243

Tel: (615) 741-0803

E-mail: Mark.Mcadoo@tn.gov

Mr. Brock Hill

TN Department of Environment & Conservation (TDEC)

Deputy Commissioner

William R. Snodgrass TN Tower

312 Rosa L. Parks Avenue – 2nd Floor

Nashville, TN 37243

Phone: (615) 532-0696

E-mail: Brock.Hill@tn.gov

Reelfoot Rural Ministries – Organizational structure attached

References:

Due to confidentiality agreements, contact information for past clients of the Home Rehabilitation Ministry may not be shared. In the future, for clients aided by the proposed grant funds will be asked to sign an information waiver to share with our partners in this grant

University of Memphis – Organizational structure attached

The following federal grants, similar in size to the proposed project, reflect the experience of the University of Memphis in successfully meeting the research, administrative and financial

requirements of providing the capacity and expertise to honor the investments made by Sponsors of the University's researchers.

<u>Agency/Award</u>	<u>Total Grant Value</u>	<u>Project Period</u>
National Institutes of Health* 1U54EB020404-1	\$1,975,968**	9/29/2015 – 8/31/2018
National Institutes of Health 5R01DC011027	\$2,272,427	3/3/2011 – 2/28/2016
National Institutes of Health* 5R01AA020829	\$2,105,614**	9/1/11 – 6/30/2017
U.S. Army Research Medical* Research and Acquisition Activity W81XWH-12-2-0020	\$1,888,098	4/1/2012 – 3/31/2016
U.S. Department of Education*	\$2,364,610	7/01/2009 -6/30/2014

* Project involves Subawards to University partners.

** Amount awarded to date. For grant IU54EB020404-1, the potential total funding is \$9,913,737 based on available Sponsor funding in future years. For grant 5R01AA020829, additional funding of \$573,043 will be awarded based on available Sponsor funding.

Exhibit D – Factor 2: Need/Extent of the Problem

State of Tennessee

ExhibitD_Factor2_ExtentofProblem.pdf

Unmet Recovery Need and Target Geography

The Rural by Nature proposal is a response to flooding and severe storm disasters that occurred across the state in 2011. In Phase 1 the team selected 3 project areas made up of 9 target areas to address for this funding opportunity. During the time between Phase 1 and Phase 2, the team the team studied all of the information available for these areas and consulted with stakeholders about what improvements would make the most impact for Phase 2. A decision was made to focus all of the efforts on the West Tennessee region. The target areas are encompassed within Dyer, Lake, Lauderdale, Tipton and Madison Counties. Principal among the unmet recovery needs are protection from flooding, infrastructure rehabilitation, and economic development. Unmet needs within these target areas include flood damage to sewer systems in Madison (Jackson), Dyer (Dyersburg), and Tipton (Henning) counties; Sheep Ridge Levy and surrounding agricultural land in Lake County; and Reelfoot Lake area economy in Lake County.

To identify specific activities within the target areas the Tennessee Department of Economic and Community Development (TNECD) held public meetings, targeted meetings with local governments, State agencies, universities, and non-profit and philanthropic organizations actively working within the target areas. These meetings were focused on identifying ongoing work already being accomplished that TNECD could build around and develop an inter-related group of activities to bring resiliency to the entire West Tennessee region and on developing innovative solutions to recurring problems that have not been solved by the same old solutions.

Overall, these target areas are extremely distressed. According to the [Vulnerable Populations Data](#), there are higher percentages of young children, elderly and persons with disabilities in the target areas than in the state and nation. According to the [Social Vulnerability Index Report](#), the counties are in the medium to high range for vulnerability to environmental

hazards. Their growth rate is slower than the rest of the state ([Population Projections](#)); the poverty rates in the project area are higher than the region ([County Poverty Map](#)), as are the unemployment rates ([County Unemployment Map](#)). The region encompassing the target areas has the lowest unemployment rates in the State. The unemployment rate of the combined target areas is 16.2%, more than 260% of the United States rate of 6.2%, and eclipses the state rate of 10.1%. Even if the additional tracts in each county are included, the unemployment rate of 12.5% is still more than twice the national rate ([Most Distressed Characteristics](#)). These numbers are representative of the entire 27 county region, which has an unemployment rate of the 12.3%. Even more concerning is not one of the counties in this region has an unemployment rate within 125% of the national rate; the lowest is Crockett County at 9.4%, more than 150% of the national rate. In fact, only 5 of the 95 counties in Tennessee meet this threshold, and only 1 is actually below the United States unemployment rate ([County Unemployment Map](#)). Unemployment rates of the counties encompassing the target areas compared to the National rate are the following - 153.2% (Dyer), 230.6% (Lake), 272.6% (Lauderdale), 201.6% (Madison), and 206.5% (Tipton). Lauderdale has the third highest rate, behind Hardeman and equal with Hancock, of unemployment in the state and Lake County has the eleventh highest. While the disparities are not as great, poverty follows a similar trend. The national rate of poverty is 15.4%, while the rate of Tennessee sits about two points higher at 17.6%. The combined project areas have a rate of 18.8% and the region is over 20% ([County Poverty Map](#)). The amplification of these distressed characteristics at the regional level shows the prevalence of economically vulnerable populations and the need to for disaster resilience to reach beyond the target areas benefitting the region as well.

The most impacted target areas are representative of the overall region in terms of geography and characteristics of the watersheds as well as the distressed characteristics. The projects completed in these areas will be replicated in other parts of the region and in other states along the rivers. Other target areas could have met the Most Impacted and Distressed – Unmet Recovery Needs (MID URN) qualifications, but the project team thought that these were the most impacted and distressed and would allow for the development of projects that could be expanded throughout West TN, Middle TN and then the rest of the state. Additionally, any new Community Development Block Grant-Disaster Recovery (CDBG-DR) funds that are made available in the future will be focused on more regional approaches and on projects that promote resiliency as well as recovery.

West Tennessee Region: Mississippi River Flooding Area (Dyer, Lake, Lauderdale and Tipton Counties)

These counties border the Mississippi River and regularly experience flooding. As shown in the [Regional Watershed Boundaries Map](#), most of the water in West Tennessee – rainfall and the creeks, streams and tributaries – flows into the Mississippi River and through these target areas. These areas were flooded and declared major disasters in 2010 and 2011; these were some of the worst floods on record for these counties. NOAA tracked record-setting water levels of 48.35 feet, more than 10 feet above the flood stage for Lake County. ([NWS; Great Mississippi Flood of Spring 2011](#)) Additionally, the northern counties in this project area are closest to the New Madrid fault line and all of the counties in this project area will experience impacts due to an earthquake, with the most notable event happening the early 1800s when the Mississippi flowed backwards creating Reelfoot Lake. It is also known, that climate change is increasing the frequency and severity of weather related impacts (tornados and flooding) that will continue to

plague the West Tennessee Region. Pictures and articles on the destruction in this area can be found in the [Flood Impacts Publication](#) file.

These target areas are also some of the most distressed in the state. Each of the counties qualifies under the most distressed characteristic of unemployment levels of 125% of the national average and some of the levels in individual census tracts are as high as 400-600% of the national average. Almost all of the target areas are also recognized by Housing and Urban Development (HUD) as having an LMI population of more than 50%. According to the Delta Regional Authority, these counties are all considered distressed. According to TNECD, Lake and Lauderdale are Tier 3 and Dyer a Tier 2 county with Tier 3 being the most severely distressed based on the department's evaluation of distress and the level of incentives available for job creation in the county.

Even more than four years after the disasters, unmet needs can still be documented in these target areas. Tennessee received only \$4.2 million after the disasters in 2011 to be used outside of Shelby County. This was not enough to address the needs in the target areas and the other 65 declared counties. Applications from local governments were limited to a request of \$250,000. From target areas, TNECD received 10 applications requesting more than \$2.2 million. If all of these applications were funded, more than half of the available funds would be expended in 4 of the 69 eligible counties. Due to the limits on the application amounts, communities were not able to address all of their needs with the application; those can only be addressed through this funding opportunity.

See Exhibit B and the supporting documentation for additional data related to the MID URN qualifications for each of the 5 target areas that make up this project area.

Madison County

This county is part of the West Tennessee Region and is interconnected via the South Fork of the Forked Deer River, flowing northwestward to the Mississippi River, which also experienced severe flooding in 2011; see pictures in the Need new map? file. This area is the most urban of the project areas and the floods in Madison County affected more buildings, industries and people than in the other target areas. The flooding had the most impact in the South Jackson community which is highly distressed in terms of LMI populations and unemployment levels - 201.6% compared to National Rate (See Exhibit B). The areas most impacted by flooding have the highest numbers of vulnerable populations including small children, elderly persons and persons with disabilities ([Vulnerable Populations Data](#)).

Description of Needs

Tennessee is at risk of severe storms, floods, tornadoes, droughts and earthquakes and almost all of the risks are intensifying in strength and frequency due to climate change. The state has recognized that these disasters are already happening more often (particularly flooding) and that building back infrastructure and other impacted systems is not cost effective. In some cases the existing infrastructure has exacerbated flooding by trapping or routing flood waters causing more damage. Extensive research on the history and projections of risks, identification of previous success and failures in addressing these risks, and community perspectives on best practices and locally-identified needs will all be incorporated into project development to form a comprehensive approach. The Rural by Nature team brings together community planners, economic developers, policy planners, mitigation planners, engineers and others with a wide breadth of experience who can take a comprehensive approach to the risks and needs of the communities in the project areas. As mentioned, this is the first time that this group has partnered to look at the risks of disasters, plan how combined resources can be used to address the risks

and make the communities more resilient, look at social and economic vulnerabilities, and look at the effects of climate change on all aspects of this work.

These project areas were selected for several reasons. First, they represent counties connected via the Mississippi River on their west or on significant watersheds feeding into the Mississippi River (see the [Regional Watershed Boundaries Map](#)). While connected by water, each bring different needs and solutions for flooding and other disasters. Second, the target areas encompass extremely rural areas, areas with small towns and limited financial means, but all are at risk of earthquakes and tornadoes and will need different strategies to address these risks. Third, the areas vary in economic development drivers. Lake County has a high reliance on tourism through Reelfoot Lake; other counties along the Mississippi River are highly dependent on agriculture; crop production is the highest private sector employer in Tipton and Lauderdale counties and near the top in Dyer and Lake Counties. In Madison County, the main economic drivers are healthcare and manufacturing with 14% of the private sector workforce working in manufacturing where the average earnings are significantly higher than the national average. Lessons learned from the diverse target areas can be applied to similar areas across the region and across the state as well as the nation.

The needs of this Region fall into several distinct areas: Infrastructure, Social/Economic Revitalization, and Environmental Degradation.

Infrastructure – During the 2011 floods sewer and septic systems, roads and bridges in Dyer, Tipton and Madison Counties were damaged and funds are currently not available to fully meet the needs. In Dyer County, Dyersburg’s sewer system was damaged with repairs estimates of over \$4 million. In Tipton County, residents sewer and septic systems were inundated,

overflowed and continue to experience problems today. In Madison County, Jackson Energy Authority estimated the damage to their sewer system at over \$8 million.

Social/Economic Revitalization – Massive areas of agricultural land, state parks, and Reelfoot Lake were inundated with Mississippi River flood waters which have crippled the economy and in turn the social fabric of the area. In Lauderdale County, 52% of the county (596 parcels) was inundated. Planted crops were lost, sand deposits continue to affective the productiveness of the farmland. Access to Cargill’s facility at Hale’s Point were damaged and continue to need routine maintenance. In Tipton County 3,000 acres of farmland were submerged. In Lake County, the Sheep Ridge Levy failed and caused permanent damage to farmland when the flood waters created an 80 foot deep hole that covered 5,000 acres. Additionally, the Mississippi River overflowed its banks into Reelfoot Lake and with it and invasive species - the Asian Carp. This has affected the fishery significantly and the tourism economy of Lake County.

Environmental Degradation – All counties identified experienced degradation of the natural ecosystems within their boundaries. This includes the destruction of wetlands and stream banks due to the flood waters and debris, but secondary degradation comes from the damage to the sewer and septic systems that remain damaged and leak and spill into the soil and watercourses.

To address these unmet needs, the TNECD is pursuing 14 activities within the project areas that will repair, replace, revitalize and increased resiliency to the Region. In brief these activities include:

Infrastructure – rehabilitation of the Dyersburg, Henning, and Jackson Energy Authority sewer systems, construct a regional waste water treatment plant in Tipton County, repair the Cold Creek Chute spillway and develop a permanent pump station along the levee in Lauderdale County.

Social/Economic Revitalization – develop soccer complex, Regan levee trails, and South Town relocation and park in Dyer County, construct a railroad spur to the Port of Cates Landing, rebuild shoreline stabilization within the Reelfoot Lake State Park and make upgrades to the local tourist center, construct and overlook park along the bluffs in Lauderdale County, provide Reelfoot Rural Ministries funding to support their ongoing efforts meeting the needs of the residents throughout this region including a community center that will provide shelter during tornadoes and severe storms and a feeding station during recovery efforts, support the University of Memphis and Vanderbilt develop multi hazard maps and educational programs.

Environmental Degradation – Reconstructed wetlands in Dyer County and the Middle Fork Forked Deer Stream Restoration and recreational facilities and City of Jackson Urban Flood Control project in Madison County.

Resilience Needs Within Recovery Needs

Historically, Tennessee has addressed natural disaster from the view of post-disaster relief and how to get the affected communities back to a pre-disaster level of function as quickly as possible. In rural counties mobile homes and manufactured housing often exists in the low-elevation areas. Not only are the people living here at greater risk of flooding, but they are often low-income and are heavily impacted by displacement. TNECD is working closely with TEMA's hazard mitigations planners and the State NFIP Coordinator to reach out to and educate populations that are more vulnerable to the impacts of flooding and alleviate pre and post-disaster threats and hazards.

In each of Tennessee's project areas there exists a lengthy history of flooding, and the incidence and impact is only growing. Of the 62 federally declared disasters for the state since 1953, 45 of those disasters explicitly address damages caused by flooding; some of the other

disaster declarations including severe storms and heavy rains also likely resulted in flooding. Each of the eight counties containing the project target areas were affected by a minimum of ten of these disaster declarations, meaning these areas will be impacted by almost one out of every four flood-related federally declared disasters.

These target areas are especially vulnerable to repeat instances of flooding with the amount of existing floodplain. Based on the state floodplain data, approximately 10.5% of the state is covered by floodplain. In the counties where the target areas are located, 25.5% is covered by floodplain, and that number grows to almost 35% of the target areas themselves existing in floodplain ([Major Rivers Map DFIRM](#)). (Note: 9 of Tennessee's 95 counties have yet to be converted to GIS, and the preceding floodplain percentages would be greater if data were available for all counties). When combining the amount of floodplain with the frequency of major flooding in these areas, not to mention the countless instances that are not part of a federally declared disaster, the threat and vulnerability is greatly increased. A major concern and constant problem is the amount of debris and natural deposits that create blockages in many rivers in and around the target areas, which exacerbates the impact of flooding. Once flooding occurs, the relatively flat topography and soft, silty soils, especially in Mississippi River project area, do not allow the water to disperse quickly. Instead, the ground saturates quickly and holds water, slowly decreasing the water elevations over the course of several days.

In addition to the flooding caused by rain events, upstream events and severe storms, there is a serious risk of flooding due to an earthquake. According to the University of Memphis Center for Earthquake Research and Information (UM CERI) geologist Gary Patterson and the "Impact of earthquakes on the Central USA" report from the University of Illinois ([Impact of Earthquakes on the Central USA](#)), the New Madrid seismic zone (NMSZ) is the most active

natural source of U.S. earthquakes east of the Rockies. It produces 200-300 small earthquakes per year and has produced at least three sequences of large earthquakes over the last 1500 years including the series in 1811 and 1812 that created Reelfoot Lake.

According to the U.S. Geological Survey, there is a 25-40% chance of a 6.0 or larger earthquake occurring in the NMSZ in a 50-year time window and a 7-10% chance of a 7.0 or greater earthquake in that time window. This earthquake will impact all of West TN and Middle TN and will have the most impact on the MS River Flooding Area project area ([Earthquake Risk Map](#)). Large portions of the land in that area would be flooded due to liquefaction, which is the loss of soil stiffness and strength due to ground movement. A [report](#) prepared by UM CERl outlines damage that would be expected from a magnitude 7.7 earthquake. In the MS River Flooding Area this includes as many as 319 fatalities and the loss of more than 12,500 homes. These target areas are also threatened because of the vulnerability of the residents. All 9 target areas have a collective unemployment rate of 16.2%, 261.1% of the national unemployment rate of 6.2% ([Most Distressed Characteristics](#)). There is also a high percentage of elderly and persons with disabilities in the target areas ([Vulnerable Populations Data](#)). The Social Vulnerability Index also puts the majority of these target areas at medium to high risk ([SoVI Report](#)). These areas are heavily distressed, and when major flooding occurs, the timber and agricultural industries that these residents rely on are some of the first to feel impacts.

The general demographics, employment, and poverty information are derived from the American Community Survey 2013 5-Year Estimates. At the census tract level, the ACS provides the best available data for rural counties. Population projections were developed by Tennessee State Data Center. Center for Business and Economic Research Industry data has been gathered from the Census Bureau, Bureau of Labor and Statistics, and TNECD's Research

Department. Employment statistics are from Economic Modeling Specialists International (EMSI), the “2014.4 QCEW Employees, Non-QCEW Employees, Self-Employed, and Extended Proprietors” data set. The TN Business Enterprise Resource Office with the assistance of the TN Small Business Development Centers and the Tennessee Department of Agriculture assisted with the collection of data. Disaster impact data has been provided by the Federal Emergency Management Agency, the Tennessee Emergency Management Agency, the Tennessee Department of Environment and Conservation, CDBG-DR grant applications, engineering reports, and local governments. Climate change data came from the U.S. National Climate Assessment and the Intergovernmental Panel on Climate Change. The team compiled the data after the release of the NOFA based on the most recent data available. Many members of the project team are skilled researchers who guided the team to the most appropriate and up-to-date information.

According to both the U.S National Climate Assessment (NCA) and the Intergovernmental Panel on Climate Change (IPCC) ([Climate Change 2014 Synthesis Report SPM](#)) the global climate is warming and the frequency of heavy precipitation events is very likely to increase in the United States. The NCA also expects to see an increase in seasonal droughts, a decrease in water availability, and a decrease in crop yields in the future for the Southeastern U.S. All of these factors are incredibly important to the defined target areas. The increased frequency of seasonal droughts combined with the increased frequency and heavy precipitation events will reasonably result in greater instances of flash flooding and heavy runoff, which can increase pollution in the rivers from brownfield runoff and result in degradation of agricultural land.

Over the next 50 years, the eight counties in the project areas are collectively anticipated to grow by almost 108,000 people; however, over 85,000 people will reside in either Madison or Tipton County. The concentration of growth in these two counties is not surprising, as both are currently part of MSAs and are more urban or suburban in nature. Even with growth over 100,000 people and a collective growth rate of 36.74%, these eight counties fall well short of the 53.45% growth rate the state as a whole expects ([Population Projections](#)). In light of the relatively slower rate growth for the project area counties, with the exception of Madison and Tipton counties, major demographic and industrial changes seem unlikely. These counties will still be rural and likely still be dependent on agriculture and logging sectors. However, these industries are important to the state and the country as a whole and lessons learned from potential projects in these project areas can be replicated throughout the state and in other rural and agricultural-based communities across the country.

Appropriate Approaches

Currently Tennessee does not have any requirements for homeowners to carry flood insurance, except for federally backed mortgages. In many rural counties and communities floodplain restrictions are virtually non-existent, but in the larger, more urban areas policies and codes have been enacted to prevent or discourage development in flood zones. Part of the commitment of TNECD is to continue to educate the rural areas of the state to develop stronger policies concerning development in floodplains and to encourage involvement in the Community Rating System. The project team will reach out to insurance and re-insurance companies as they expand the partnership and will use their expertise to assist with project planning. Considering the expectation of a consistent physical and economic environment in the majority of these target areas, the need for disaster resilience and adaptability is only heightened.

However, these communities are presented an interesting opportunity and are positioned to adapt well to a changing climate. With the great amount of undeveloped agricultural and forested land available, these target areas have the opportunity to develop a resilient approach and system to cope with the increased flash flooding and decreased water availability by capturing and storing the water to limit damage and provide potential irrigation for agricultural use. These communities are ahead of the curve due to the relative lack of a built environment in some cases, meaning a “blank slate” for innovative flood control development and an ability to develop systems to deal with the floodwaters that will occur rather than focusing on trying to completely prevent flooding. By also developing entrepreneurs and the tourism industry as a part of this initiative, communities can leverage undevelopable land to combat poverty and unemployment. The Department of Tourism and the TNECD Retire Tennessee program both underscore the natural beauty and outdoor recreation that Tennessee has to offer. Preserving and converting land to become destinations for outdoor activities and families that wish to experience local culture through agritourism is an opportunity that can support not only the local economy, but the regional and state economies as well.

FEMA has estimated that floodplain in riverine environments will grow nationally 45% by 2100, and 70% of the 45% (or 31.5%) will be caused by climate changes, not population migration and the built environment. According to the USGS, the occurrence of a “100-year flood”, while statistically relevant, is really a game of chance ([USGS 100 Year Flood Handout](#)). When coupled with recent historical flood events, these target areas will flood again and likely more frequently. The “unknown” is when and how often. As previously mentioned, there is a significant chance that an earthquake that will affect this area. This is a disaster that cannot be

predicted with any certainty but that can be devastating to the economy and physical and social infrastructure of the project areas.

The major unmet needs for disaster recovery in this area are degraded quality of infrastructure, especially water and sewer systems, and the impacts on the agriculture and tourism industries. The floods and severe storms only exacerbated the existing issues with inflow and infiltration that their rural communities have been dealing with due to aging infrastructure. Many of these communities experienced sewer system overflows and system failure due to the amount of storm water that inundated the wastewater treatment systems. Roads and bridges were severely impacted in these storms. In some cases, the bridges were underwater for days or weeks and this followed a similar disaster just one year earlier. Because the storms occurred in the late spring, farmers already had crops planted. The flooding and sand deposits that resulted caused the farmers to have to clear their fields, repair the land and replant other crops in order to have income from that season. Some communities are still suffering from impacts of the storms and flooding; others have done some reconstruction, but only to the preexisting level of quality without being able to take future resiliency into account.

Being able to better handle the sheer amount of water during a flood will help these communities move toward to being more resilient to flood-related disaster events. The overall plan is to set the key infrastructure in place to manage the flooding so that capacity breaches and sewer system failures do not occur and so that roads and bridges can withstand the water and to make sure that disruptions do not always become disasters.

Because the disasters happened almost four years ago, most of the damage to houses or to businesses has been repaired or will not be repaired. As mentioned, infrastructure repairs have often been completed as much as possible to allow the systems to function. This funding

opportunity allows the communities to think about how continued recovery of infrastructure and the overall economic revitalization needs can contribute to the community being more resilient to future storms that will continue to impact housing and businesses.

The purpose and goal of this project is to make not only the target areas, but the region better prepared and more resilient in the face of a severe weather event. While risks are greater for some than others, those risks are location-based more than by a specific demographic class. This project is addressing riverine flooding so naturally residents and business-owners located more closely to a river or tributary are at greater risk of flooding. Special note is being made that low-income classes historically tend to live closer to flood zones due to the lower property value and a greater affordability of land. The residents in these rural areas are very tied to the land they own, and the result of this project is to slow the flooding and mitigate the impact, allowing these citizens to continue living on their property as much as possible. As shown in the [County Poverty Map](#) and the [County Unemployment Map](#), the target areas and the entire region (all of W TN and the counties on the eastern side of the TN River) have a lower per capita income, higher unemployment levels, higher poverty rates and higher levels of LMI populations than the state as a whole and the national averages. The co-benefits of this project that enhance entrepreneurship, tourism and recreational opportunities will help to bring the region closer to the levels of the rest of the country with lesser worry of potential flooding.

The rural communities in the target areas have an increased vulnerability due to the lower incomes, higher poverty, higher unemployment than other areas of the state and the nation, and high social vulnerability. Living in these small towns and rural counties is generational with very little population migration (northern Madison and southern Tipton Counties being the exceptions). Many businesses rely on natural resources in these communities, tying the vibrancy

and resiliency of the land to livelihoods of the people who live here. These communities are losing their bright young people to the cities because of a lack of opportunities outside of agriculture. Moreover, this disaster struck at the height of the great recession. Communities that were already seeing manufacturing plant closures in record numbers saw major impacts to agriculture that followed similar impacts from flooding just a year earlier.

The West Tennessee River Basin Authority (WTRBA) works with 20 counties in West TN to help manage and maintain their rivers and streams. WTRBA also has been working to develop innovative river management solutions to enhance the resiliency of the region's waterways while reducing maintenance efforts and degradation and erosion. In the [Sandy Creek](#) Restoration project WTRBA restored a creek that was highly unstable, covered with invasive Kudzu, and was a threat to infrastructure existing downstream. The restoration included elements such as returning the stream to a natural state with ability to meander, reviving degrading wetlands and riparian habitats, reintroducing native plant species, and including infiltration basins. All of these elements are natural flood control measures that will benefit and natural environment and make the areas adjacent to the stream safer and more resilient. Other similar projects completed by WTRBA can be seen [here](#). The U.S. Army Corps of Engineers has a long history of working with communities in this area to understand and reduce the risks of flooding.

Currently, the available CDBG-DR funds are being spent on infrastructure and related needs in the communities affected by the storms in 2011. The infrastructure in the communities across the state is aging, and with the increase of flooding events these systems can easily become quickly inundated. With only \$4.2 million available for 68 counties affected by the six presidentially declared disasters from 2011, these funds are clearly insufficient to address all of the needs and vulnerabilities. They are a good start and are able to help the communities begin

the recovery process but are just a bandage to postpone the larger problem. TDEC is helping to further one the President's Climate Action Plan goals to preserve clean water sources for public health and environmental preservation by apply stricter discharge permits for wastewater systems. Unfortunately, many of these systems have been damaged by heavy flooding and severe storms and a grant for \$300,000 can only do so much to a system that needs \$3 million of repairs. The natural environment is important to the economy of Tennessee from farming to tourism to sustainable forestry, and building resilient infrastructure to preserve and enhance that environment is of the utmost importance.

Exhibit E – Factor 3: Soundness of Approach

State of Tennessee

ExhibitE_Phase2_Factor3_Soundness of Approach.pdf

Sound Approach Description

The State of Tennessee Rural by Nature application focuses on rural communities in West Tennessee that are in some of the most distressed and vulnerable areas of the country. Their economies depend primarily on agriculture, and the Mississippi River is their most valuable asset, providing fertile lands and tourist destinations. The river can also be their most dreaded enemy in times of flooding.

In Phase 1 of the application process, the State of Tennessee held multiple stakeholder and public outreach meetings. During the time between the Phase 1 and Phase 2 application submittals; the State, in consultation with their stakeholders, decided to focus its Phase 2 application on the West Tennessee target areas. This area is comprised of six target areas located on the east bank of the Mississippi River north of Shelby County (Memphis). Madison County (Jackson), located east of Memphis, is the urban center for commerce for the region and its river tributaries are also affected by the opportunities and threats of the Mississippi River. This entire region is vulnerable to multiple hazards including flooding, high winds and tornados. It also borders the New Madrid fault line making it an earthquake risk area. In Phase 2 application development, collaboration with the citizens in the Rural by Nature program communities has been important, with the team completing a series of public meetings and other consultations regarding this proposal. Please refer to the Consultation Summary in Attachment D for a complete listing of the consultations.

The project team was committed to involving the affected communities in the process of selecting the activities that would be included in this Phase 2 application. A series of five public meetings were held in the overall project areas in mid-2015 to obtain information on unmet needs and potential project activities, as well as to inform local leadership about the funding

opportunity. The meetings were attended by elected leaders, grant writers, EMS directors, Community Development Block Grant administrators, utility managers and local citizens.

As a result of these meetings and consultations, the State of Tennessee is proposing an overall Rural by Nature project with 14 activities. Each of these activities has been vetted by the individual communities and reviewed by resiliency experts at engineering consulting firms within these communities. In addition to the community involvement, the State has created a statewide Resiliency Council, made up of multiple state and federal agencies, which is responsible for disaster preparedness, recovery, and repair. This council reviewed all of the proposed activities and the overall project plan for resiliency in the target area. We believe the proposed project and activities are well suited for replication and scalability across all rural communities along the Mississippi River and beyond. The State of Tennessee project will consist of 14 activities that focus on unmet recovery needs in the following areas: necessary infrastructure repairs and upgrades, economic stability (diversifying the current agricultural economy with industry), tourism (promoting the natural beauty of the area) and education.

The activities within our overall project are shown on the “[Overall Map](#)”. The budget is \$151,463,581, which includes \$6,014,500 in program management, \$2,519,000 in planning costs, \$9,596,000 in engineering/design, \$126,149,625 in construction costs, and \$7,184,456 in grant administration costs.

Listed below are the 14 individual activities that comprise the proposed project for this Phase II application. Each section contains details about the proposed project, along with information about potential metrics, potential alternatives, how these increase resiliency and how these activities can serve as models for other areas of the State and the Nation.

Activity 1 – Port of Cates Landing Rail:

Connecting the Port of Cates Landing (POCL) on the Mississippi River by rail to the Northwest Tennessee railway system is important for several reasons: economic prosperity; fuel-efficient transportation; supply chain efficiencies; and enhanced flow of agricultural, industrial and commercial products, but most significantly as a primary mode for disaster recovery. Rail connections for the POCL will provide free flow of inbound and outbound relief and recovery materials for the immediate four-state region (Northwest Tennessee, Western Kentucky, the Bootheel of Missouri, and Northeast Arkansas).

The POCL was built above the 0.2% annual change flood hazard (i.e. 500 year floodplain) and the proposed rail connector will be constructed to the same level. This will allow the POCL to remain in continuous operation and permit the flow of supplies, heavy equipment, and other resources into and out of the port during the next disaster. Railroads are ideally suited for disaster relief due in part to their ability to haul heavy loads and to their ability to carry large volumes of materials in a single train unit.

The POCL was developed by grants from federal TIGER II funding and investments by the State of Tennessee totaling more than \$50 million to date. In its very young life, the port is already creating revenue; however, almost every industry that has looked at the port has requested rail access. There is only one lock and dam that a barge would have to cross to get to Asia and that is through the Panama Canal. This port has the capability to completely transform this region of West Tennessee.

Located in Northwest Tennessee, the proposed infrastructural development of the POCL will alter economic dynamics in the three-county region which includes Dyer, Lake, and Obion County. These counties have long been affected by the flight of manufacturing companies.

Currently, the region and each individual county are designated as economically depressed areas because (1) their historical unemployment rate has been higher than the U.S. average; (2) their annual average population growth rate is either zero (0) or below; (3) their per capita personal income is significantly lower than the U.S. average; and (4) their manufacturing base has significantly eroded over the past decade.

Evaluation Metric: Economic Revitalization

Evaluation: The immediate outcome of this activity will be realized when the rail connector is complete and the Mississippi River (via a trans-load system) and the POCL are connected to the U.S. rail network. When agricultural-based customers begin maximizing the port, it will strengthen regional economies around Cates Landing. When the next disaster strikes, the port and rail system will provide necessary relief and recovery materials for the entire region. To measure the successful of this activity, the Team will monitor the economic activity of the port and determine how the increase use of the port can be best used to have impacts upon several of the factors that have caused this area to become economically depressed. Specific targets could include an increase in region industries or an increase in the volume of cargo moved through this area.

Alternatives/Unmet Recovery Need/Increased Resiliency: During the 2011 flood events, citizens of Lake County and the surrounding region were cut off from jobs, emergency services, food, and transportation. Without the heroic efforts of the USACE and first responders, significantly more people would have been cut off from life sustaining assets. Had the POCL been operational and connected to the US railroad system, relief efforts could have commenced in a more timely and efficient manner.

Soon after purchase of Cates Landing, a manufactured homes company contacted the Lake County Industrial Board. They identified the POCL site as their primary site to build a plant, reasoning that Cates Landing would provide sound protection from future flood events and their operation would be able to load and transport fully constructed manufactured homes, similar to the ones used by Federal Emergency Management Agency (FEMA) during major disasters. The project never came to fruition; however, it provided a valuable lesson about the potential significance of Cates Landing.

National Objective: The rail connector activity will significantly and positively influence the region's Low-Moderate Income (LMI) populations. It will provide a much needed transportation asset when the next disaster occurs. Also, the entire POCL project, including the new connector, will be a key infrastructure asset for manufacturing and service jobs for the entire region. This will directly help boost the local economy and make the entire region more sustainable. It will give citizen a stronger economic base from which to stand back when stuck by nature. Jobs that would be created by facilities located in the industrial area and serviced by the POCL are typically blue collar type jobs and will draw manpower resources from the LMI groups.

Tennessee Department of Transportation's (TDOT's) 25 Year Long-Range Transportation Plan Focus Group rated the rail project as the #1 infrastructure project, and it is among Governor Haslam's key infrastructure projects for the current administration.

Vulnerable Populations: A community profile demographics report delineates the population characteristics of this area as having a large number of households and individuals that live on low to moderate income (Appendix A). Lake County is consistently among the nation's lowest income counties.

Model: The existing port provides the region of West Tennessee with a tangible import/export base that is not available in other parts of the region. Bolstering this port with rail access will provide the region with a proficient transportation alternative that will enhance the capabilities of the region, the state, and the country.

Feasibility: The POCL is making progress towards the develop of a rail connector. The Northwest Tennessee Regional Port Authority (NWTNRPA) and its construction managers Forcum Lannom Contractors, are in the final stage for approval of a permit from the Federal Surface Transportation Board (STB). No environmental issues have been identified. Full STB approval is expected by the end of 2015.

The only risk identified at this time in not obtaining an STB approval. In that unlikely event, the port will continue the rail connector development plan; however, the lack of approval would restrict ongoing financial support for federal maintenance and could have a negative effect on service to the port's commercial users.

Consultation: Lake County area governments hosted two public meetings about this Phase II application and the eligibility guidelines. The Lake County Mayor worked with several partners, including Reelfoot Rural Ministries and TennKen Railroad. Project updates have been included in County Court meetings and the proceedings are available to the public through the *Lake County Banner*.

Lake County takes strong advantage of its local, state and regional economic development partners. In 2002, the Reelfoot Area Chamber of Commerce developed an industrial marketing committee to market Lake County-owned industrial sites, including the Lake County Industrial Complex. Organizational members of this committee include over 10 different groups, including the NWTNRPA, Tennessee Valley Authority (TVA) Economic

Development, Tennessee Department of Environmental Conservation (TDEC) Community Development; TDOT and numerous others. Combining the assets and capabilities of these organizations has helped Lake County and the Reelfoot Chamber develop and implement high-quality industrial marketing and prospect development processes.

Map: A map of the activity can be found in [Attachment A1: Port of Cates Landing Rail Spur](#)

Scaling / Scoping: The project was scoped by Forcum Lannom Contractors at the direction of the NWTNRPA. The result was a phased approach, allowing full construction of both legs along with the lead to the loop track during initial construction. After service begins, additional industrial development can occur by branching of the lead without interruption to the loop track operation.

Budget: The budget for this activity includes:

Program Management	\$630,000
Planning	\$0
Engineering / Design	\$1,680,000
Construction Costs	\$21,000,000
Grant Administration (5% of Funding Request)	\$1,165,500
Total Activity Cost	\$24,475,500

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 6 months from kickoff

State and Funding Review: 3 months from Design Completion

Construction: 24 months from Approval of Plans and Specifications

Consistency with other Planning Documents: EIS document

Activity 2 –Regional Wastewater System: Tipton County:

The purpose of this regional wastewater treatment facility and collection system project is to provide increased resiliency and durability for wastewater treatment and discharge on a regional level as compared with the separate municipal systems and significant reliance on individual septic tank and drain field systems. The implementation of this project will be the catalyst for regional economic recovery by providing dependable wastewater transportation and treatment capacity for industrial, manufacturing, commercial, and residential development and expansion.

This project will alleviate the population’s dependency on septic tanks, which are vulnerable during natural disasters, as evidenced in the 2011 flood events. This project will provide the backbone for safe and dependable regional wastewater collection, treatment, and disposal for all communities and population groups.

Evaluation Metric: Environmental Value

Evaluation: The successful implementation of this project will result in centralized wastewater treatment and disposal. One tremendous environmental impact from this project will be the diversion of treated wastewater from the Hatchie to the Mississippi River. This is especially important because the Hatchie is designated as a “scenic river” under the Tennessee Wild and Scenic Rivers Act. Success will be measured by identifying the number of septic systems are in use and monitoring when they are removed from service and the parcel is hooked up to the public sewer system. Success will also be reflected in the wastewater flow rate monitored at the new facility. All additional flow at this plant will represent flow that was not being discharged into the ground or processed at other older treatment plants.

Unmet Recovery Need/Increased Resiliency: After the 2011 flood events, Tipton County was identified by FEMA as an area affected by the severe storms, straight-line winds, tornadoes, and flooding. During the disaster, significant portions of Tipton County, in the Mississippi, Loosahatchie, and Hatchie River basins, were affected. Due to the extent of flooding, a larger area was unable to utilize septic tanks and drain fields for disposal of wastewater due to high ground water elevations. The clayey soils in the region were saturated during and beyond the duration of the disaster, allowing almost no percolation of water. During that time, wastewater was entering drain fields caused by increase pressure from the septic tank system, which led to run off into surface water features. This occurred in many areas well beyond the time of the disaster from April to June, when the regional shallow ground water table was lowered enough to allow for percolation into the subsurface. The implementation of this project will provide a dependable alternative for wastewater treatment and discharge for these communities.

National Objective: This project meets two of Housing and Urban Development's (HUD) National Objectives: benefitting LMI populations and solving an unmet and urgent need. Tipton County and the adjacent area, including Lauderdale, Fayette, and Haywood counties, have significant LMI populations. The added value of dependable wastewater collection will improve the quality of life for all persons in the target area. This project also meets an urgent need for the potential development of available industrial property. The implementation of a regional wastewater treatment facility could be the catalyst for industrial growth both from the Memphis Regional Megasite and other associated development. It is estimated this development will create over 3,600 non-construction jobs and over 5,400 construction-related jobs as analyzed by Younger and Associates.

Vulnerable Populations: This project will have a positive impact on vulnerable populations by eliminating their reliance on individual septic tank and drain field systems for wastewater treatment and disposal. Vulnerable populations are the least able to relocate from their homes during times of flood or other regional impact should their home become uninhabitable. The extra expenses are a burden. The implementation of a regional collection system will eliminate the potential for their home becoming uninhabitable due to the septic tank and drain field not operating properly. The implementation of this project will also allow for significant development and creation of jobs within the region, allowing for many population groups to improve their standard of living due to increased job opportunities. This is a direct driver for strengthening economic resiliency.

Model: The implementation of a regional wastewater treatment plant will greatly benefit the region and can serve as a standard model for other rural areas with high LMI populations. A single plant is desired, as compared to multiple smaller plants, for many reasons. A single plant simplifies environmental compliance confirmation, reduces the number of effluent discharges, and provides the region with a distinct treatment location that can manage the various sources of wastewater independently.

Feasibility: This regional wastewater project is not only feasible, but supported by the existing Memphis Regional Megasite of Haywood County. When implemented, it will meet a current unmet need within the multi-county region. Any risks associated with the operation of this project are no different than the risks currently managed by municipalities within the region. The transport of wastewater through either gravity or pressure pipe conveyances has the inherent risk of pipe rupture and accidental discharge of untreated wastewater into the environment. This risk exists now within the current municipal systems and would exist with this proposed project.

With the proposed project, the risk will be mitigated through the installation of new wastewater transport systems with water-tight joints and high-quality materials. This will further minimize any associated risk, especially as compared to existing older systems.

Consultation: The project team has consulted with the County Executive who has interfaced extensively with other County personnel to understand the magnitude of the issues facing the county and the possible alternatives available.

Map: A map of the activity can be found in [Attachment A2: Regional Sewer System](#)

Scaling / Scoping: The project was scoped to provide the projected wastewater treatment capacity for industrial and regional growth and to provide the backbone of the wastewater collection system in this area. If the project is not completely funded, portions of the project can move forward with partial funding. The wastewater treatment facility can be built in phases, reducing the initial costs. The wastewater collection system could be implemented in phases as developed needs are presented.

Budget: The budget for this project includes:

Program Management	\$3,250,000
Planning	\$1,000,000
Engineering / Design	\$2,000,000
Construction Costs	\$56,800,000
Grant Administration (5% of Funding Request).....	\$3,152,500
Total Activity Cost	\$66,202,500

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 9 months from kickoff

State and Funding Review: 3 months from Design Completion

Construction: 24 months from Approval of Plans and Specifications

Consistency with other Planning Documents: PER, Megasite Plan

Activity 3 – Jackson Energy Authority (JEA) Wastewater System Enhancements:

The JEA is responsible for providing water, sewer, gas, electric and broadband internet services to the City of Jackson. The JEA’s Miller Avenue Wastewater Treatment Plant (MAWTP) currently processes 95% of the residential, commercial and industrial waste for Jackson and surrounding Madison County. During the Presidentially Declared Disaster of 2011 (DR-1979), the MAWTP was flooded due to excessive infiltration and inflow (I/I) of ground water and stormwater into the collection system. As a result, the MAWTP exceeded its average daily flow of 9.3 million gallons per day (MGD) by approximately three and a half times.

The proposed improvements focus on various aspects of the JEA system. The first project consists of improvements at the MAWTP and includes influent structure replacement and peak flow management improvements, allowing the plant to better handle peak flows in the future. The second project is the rehabilitation of the Riverside Interceptor. This Interceptor is the primary conveyance method for collecting wastewater from the system and transporting it by gravity to the MAWTP. Over time, hydrogen sulfide has corroded the concrete pipe material, decreasing the wall thickness and structural integrity. Excessive flows, as a result of I/I, have further deteriorated the integrity of the Interceptor. Rehabilitating this structure will reduce I/I and the chance of a structural failure which would result in local overflows and require emergency repair.

The third improvement is in the South Jackson (Bemis Area) which currently relies on one source of potable water and one transmission line to convey sanitary sewer across the Forked Deer River. Approximately 3,500 houses are located in this area, which is isolated from the remaining portion of the water distribution and wastewater collection systems. The existing water and sewer lines are installed on the side of a highway bridge. During previous flooding events, floodwater has crested over this bridge. The force of rushing flood water and debris against the transmission lines make them highly vulnerable to cracking, breaking free from the bridge and rupturing. In the event of a failure, approximately 15% of JEA's water and sewer customers (~ 9,000 people) would be without potable water or sewer service.

Evaluation Metrics: Environmental Value

Evaluation: Success will be measured by a decrease in the Inflow and Infiltration into the system at the Waste Water Treatment Plant.

Alternatives/Unmet Recovery Need/Increased Resiliency: During previous flood events, the JEA endured tremendous infrastructure debilitation. The MAWTP, which is equipped with a design capacity of 17.4 MGD, was inundated with 32.2 MGD. This is approximately twice the permitted capacity. The tremendous amount of I/I is the root of the problem. JEA is in the process of addressing a system-wide sewer basin study that outlines the locations of major sources of I/I, which includes the Riverside Interceptor. JEA has recently completed the installation of approximately 10,000 linear feet (L.F.) of the Riverside Interceptor but there are another 10,000 L.F. that need to be replaced. This project will eliminate a tremendous amount of the I/I the system is currently experiencing and will also decrease the chance of a structural failure.

The South Jackson area is highly susceptible with every storm event that floods the South Fork of the Forked Deer River. When water reaches Highway 45, the road is not passable. The water and sewer lines, which are attached to the side of the Highway 45 Bridge, are vulnerable and if damaged would leave residents without water or sewer service or both.

National Objective: This activity will clearly address an unmet need that was identified during the 2011 flood events. Maintenance of wastewater collection and treatment systems is required to ensure that effluent discharges are appropriately treated and will not harm the environment.

Vulnerable Populations: JEA's water and sewer improvements will have a positive impact on the vulnerable sections of the Jackson population. Sewer collection services will be improved. This will keep water and sewer rates down, which will provide more disposable income to LMI populations. Furthermore, the vulnerable section of South Jackson will have a redundant potable water supply and sewer service.

Model: The collection and treatment of wastewater is pivotal to maintain clean water for environment and recreation. Maintaining an efficient collection system that does not allow clean groundwater to enter is pivotal to maintain a concentrated influent stream and is the goal of all collection systems.

Feasibility: This project is essential to the treatment of wastewater from approximately 24,500 residential sewer customers and over 2,800 commercial and industrial customers. The redundancy of water and sewer to south Jackson will impact approximately 9,000 residents. JEA is in the process of using SRF funds to address sewer rehabilitation problems system wide. The additional allocation of these funds would further advance these projects towards completion.

Consultation: JEA held a public meeting on September 22, 2015 to discuss the proposed sewer system improvement activities. The purpose of the meeting was to review the proposed projects and notify the residents that no sewer rate increase was anticipated.

Map: A map of this activity can be found on [Attachment A3: JEA Wastewater Enhancements](#)

Scaling / Scoping: This project is broken down into three construction phases: 1) the improvements to the Miller Avenue WWTP, 2) the Riverside Interceptor replacement, and 3) the redundancy for water and sewer services to South Jackson. All three projects could be bid separately.

Budget: The budget for this project includes:

Program Management	\$346,500
Planning	\$0
Engineering / Design.....	\$924,000
Construction Costs	\$11,550,000
Grant Administration (5% of Funding Request).....	\$641,025
Total Activity Cost	\$13,461,525

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 9 months from Approval of Plans and Specifications

Consistency with other Planning Documents: PER

Activity 4 – Dyersburg Sewer System Rehabilitation:

The sewer system in South Town portion of Dyersburg represents a key piece of infrastructure. It is located at the “bottom” of the basin and represents the largest part of the system that was inundated by the 2011 flood events. This area is also in the most economically challenged area of Dyersburg. By performing a complete evaluation of this system and performing the needed rehabilitation, this area could help dramatically improve the resilience of this high impacted area, subject to sanitary sewer overflows (SSOs) and service interruptions. By making the overall system more flood resistant, Dyersburg can help prevent this area, including LMI populations, from being exposed to sanitary sewer in the event of another flood event.

Evaluation Metrics: Environmental Value

Evaluation: The Town of Dyersburg was engaged in outreach through a series of Public meetings held in the area. Also, the town engaged SSR, Inc. to evaluate the feasibility of this project and it was determined the need was great. The City will monitor the flow at the Wastewater Treatment Plant (WWTP) during rain events and compare those events to preconstruction events to determine if the repairs to the system have reduced the amount of I/I entering the collection system.

Alternatives/Unmet Recovery Need/Increased Resiliency: This project will rehabilitate the part of the sewer system that was inundated during the 2011 flood events, as well as repair the existing screens at the influent pump station and WWTP that were damaged by the surcharge.

National Objective: There is an urgent, unmet need to repair the sewer system, which is old and in disrepair. The number of SSOs has increased exponentially in the last five years which are almost exclusively affect LMI residents in the South Town area.

Vulnerable Populations: The majority of population in the South Town area of Dyersburg is highly vulnerable and contains a high LMI population. The vulnerability comes not only from

the economic depression of the area, but also because this area continues to be exposed to continued flood hazards. Repairing their sewer system will help safeguard residents from sanitary sewer overflows due to inundation and line ruptures.

Model: The collection and treatment of wastewater is pivotal to maintain clean water for environment and recreation. Maintaining an efficient collection system that does not allow clean groundwater to enter is pivotal to maintain a concentrated influent stream and is the goal of all collection systems.

Feasibility: There is minimal risk involved with this project. The city has already begun flow monitoring in the system to identify the segments most in need of repair.

Consultation: Since the floods occurred there has been ongoing dialogue with the population of South Town. Improvements have already been made to the pump stations in this area, and our current CDBG grant will be used to begin rehabilitation of the manholes in the area.

Map: A map of this activity can be found [Attachment A4: Dyersburg Sewer Rehabilitation](#)

Scoping / Scaling: At this time we are requesting funds to repair all of the collection system in South Town. However, we could scale down the approach to a portion of the system if all of the funding requested was not available.

Budget: The budget for this project includes:

Program Management	\$105,000
Planning	\$0
Engineering / Design	\$280,000
Construction Costs	\$3,395,000
Grant Administration (5% of Funding Request).....	\$189,000
Total Activity Cost	\$3,969,000

Schedule – The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 9 months from Approval of Plans and Specifications

Consistency with other Planning Documents: Dyersburg Sewer Plan

Activity 5 – Henning Sewer System Restoration:

The sewer collection system in the Town of Henning has had significant infiltration issues for years and has no doubt been exacerbated during recent flood events. This infiltration of stormwater into the wastewater collection system has contributed to frequent overtopping of the municipal wastewater lagoon levee system. Recent flood events have weakened the integrity of the levee structure over time and contributed to new emergency repair attempts.

When the lagoon levee overtops, the inadequately treated effluent flows directly into Alston Creek. The Alston then flows directly into the Hatchie Scenic River. Taking no action to repair the levee of the lagoon system could result in a breach or failure. Proper re-construction of the levee in concert with upgrades and the rehabilitation of the sewer collection system is in order to prevent continued harm to the environment.

This project involves lining of one of Henning’s older lagoons with an HDPE liner, upgrading the outfall system and utilizing Cured-In-Place pipe repairs to rehabilitate the existing sewer lines.

Evaluation Metrics: Environmental Value

Evaluation: The completed project will be evaluated by measuring the reduction in leakage of the levee and also by measuring the reduction in the number of lagoon failures and emergency repairs.

Alternatives/Unmet Recovery Need/Increased Resiliency: Flooding in 2011 was intense and caused a portion of the structure to fail. Temporary repairs were made, but one of the lagoons is in need of immediate attention. The West Tennessee River Basin Authority plans to make temporary repairs to prevent the lagoon from failing before a more permanent rehabilitation can be implemented.

National Objective: This particular project benefits Low and Moderate Income populations by providing a functional and safe wastewater treatment plant and sewer system. The project also meets the urgent need of rehabilitating an aging sewer collection system.

Vulnerable Populations: Vulnerable populations will benefit as a result of a functional sewer system and wastewater treatment plant. Both of these improvements will also result in fewer sanitary sewer overflows which negatively affect local surface water quality.

Model: The collection and treatment of wastewater is pivotal to maintain clean water for environment and recreation. Maintaining an efficient collection system that does not allow clean groundwater to enter is pivotal to maintain a concentrated influent stream and is the goal of all collection systems.

Feasibility: The biggest risk for the project is funding. Henning has very limited financial resources and a declining tax base.

Consultation: The Mayor of Henning, the manager of the Division of Water Resources, the Lauderdale County Mayor, and A2H Engineering Consultants were all contacted. Most of the

population of Henning is considered a vulnerable population. The impact on this vulnerable population is the prime reason this project is being pursued.

Map: A map of this activity can be found [Attachment A5: Henning Sewer Restoration](#)

Scoping / Scaling: The project was scoped based on existing needs. It is unlikely that partial funding would allow the total project to proceed. If the project is partially funded, the WWTP will be rehabilitated and the leaking sewer lines would repaired with any remaining funds as available. This is a small project and partial funding can likely be overcome with contributions from Lauderdale County, the TWRA and the WTRBA.

Budget: The budget for this project includes:

Program Management.....	\$46,000
Planning	\$90,000
Engineering / Design.....	\$124,000
Construction Costs	\$1,549,000
Grant Administration (5% of Funding Request).....	\$90,450
Total Activity Cost	\$1,899,450

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 8 months from Approval of Plans and Specifications

Consistency with other Planning Documents:

Activity 6 – Mississippi River Levee Pumps:

The mainline Mississippi River Levee protects Lake County from flooding during major flood events such as the 2011 Mississippi River flood. However, rainfall that accumulates on the “land side” of the levee creates flooding in Tiptonville and on agricultural properties in Lake County. The rural economy of Lake County is principally based on agriculture. During Mississippi River flood events as many as 21 low to moderate income homes are subjected to flooding. Portable pumps are utilized, but they do not have the capacity to protect the homes and agricultural lands.

The proposed project involves planning, design and construction of a permanent stormwater pump station on the landside of the mainline Mississippi River levee southwest of Tiptonville. Multiple large pumps, three phase electricity and ancillary enclosure facilities would be installed as part of the proposed improvements. The permanent pump station would be sized to reduce the frequency of flooding of Tiptonville homes and agricultural lands. A total pumping capacity in excess of 200 cubic feet per second is anticipated.

Implementation of this project would serve to provide needed risk reduction to the residents living within the flood prone area. The current plan is dependent on the availability and logistics of transporting portable pumps to the interior ponding area and the function of these during the flood event. The permanent pump station would provide a resilient mechanism to evacuate interior runoff and reduce the risk of flooding in adjacent areas. In addition, the portable pumps are operated by diesel fuel, which is subject to spills and contamination of the environment. A permanent pump station would operate on electricity and reduce the potential environmental impacts.

Evaluation Metrics: Resiliency Value

Evaluation: Project success will be evaluated during Mississippi River floods by Lake County, the Lake County Levee Board and the US Army Corps of Engineers (USACE). Success will be measured by evaluating the reduction in flooding of 21 homes and agricultural lands.

Alternatives/Unmet Recovery Need/Increased Resiliency: The mainline levee in Lake County was subjected to historic flood levels in the May 2011 flood. Lake County, the Levee Board and the West Tennessee River Basin Authority utilized several portable pumps and the associated piping to reduce flooding on the land side of the levee. Unfortunately, the capacities of the pumps were unable to fully evacuate flood waters on the land side of the levee. The piping installed over the top of the mainline levee interfered with the “flood fight” efforts of the Levee Board and the US Army Corps of Engineers.

National Objective: This particular project benefits Low and Moderate Income populations and meets an urgent need of reducing the risk of flooding in parts of Tiptonville and Lake County.

Vulnerable Populations: The project will reduce the risk of flooding for vulnerable populations in Tiptonville. Life, health and safety issues are key components of the positive impact realized if the project is selected.

Model: Permanent flood water pumps are critical to certain levee systems. Having permanent pumps installed assures proper operation of the system during critical flood events.

Feasibility: The project is feasible with close coordination between USACE and the Levee Board. With a proper design, there are virtually no risks that would prevent the project from moving forward.

Consultation: County Mayor Denny Johnson, Colonel Jeff Anderson, and USACE staff were consulted on the project. Mayor Johnson is very familiar with the problems vulnerable populations face in low lying areas of Lake County.

Map: A map of this activity can be found [Attachment A6: Mississippi River Levee Pumps](#)

Scaling / Scoping: The project was scoped based on existing needs that were apparent during the 2011 Flood Event and other smaller Mississippi River Flood events. If the project is not completely funded, a smaller-scale pump station could be constructed.

Budget: The budget for this project includes:

Program Management.....	\$200,000
Planning	\$100,000
Engineering / Design.....	\$200,000
Construction Costs	\$2,700,000
Grant Administration (5% of Funding Request).....	\$150,000
Total Activity Cost	\$3,350,000

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 8 months from Approval of Plans and Specifications

Consistency with other Planning Documents:

Activity 7 – Reelfoot State Park Improvements:

This activity is comprised of two separate projects. The first is the replacement of shoreline stabilization along portions of Reelfoot Lake within the Reelfoot Lake State Park. The initial wall that lined various sections of the lake was damaged during the 2011 flood. The replacement of this wall will incorporate an American Disabilities Act (ADA) compliant walkway.

The second project associated with this activity involves making necessary improvements to the local tourist center. Reelfoot Lake is one of the region's primary tourist attractions and improving the tourist center will ensure that visitors continue to come to the park and surrounding areas.

Evaluation Metric: Social Value

Evaluation: This project could be evaluated by monitoring annual park visitation and comparing to annual visitors in years prior to the improvements.

Alternatives/Unmet Recovery Need/Increased Resiliency: The original bank stabilization structures were constructed by park employees beginning in the 1940s. In the year 2011, a 100 year flood event inundated the current structures by four feet in most areas. During the month long high water event, north winds pushed water inland approximately 100 feet on a daily basis. When this water returned to the lake, it undermined the sea walls and current structures causing them to fail and collapse. This damage has progressively gotten worse over the last four years to the point that the park is losing valuable land use areas along the southern shoreline of Reelfoot Lake. Additionally, the existing failed structures are safety hazards and pose negative impacts to the environment.

The main goal of this project is to stabilize the shoreline to prevent erosion. The secondary goal is to provide a handicapped- accessible walkway along the shore of Reelfoot Lake to make the experience of the greenway and day use areas easy for all to enjoy. This project will connect all of the greenway to form one continuous track around the shoreline, will provide access points for boaters to park and use the restrooms and will provide a structure from which families can fish. Completion of this activity will also encourage a healthy lifestyle by providing

walkways for exercise. When all areas are complete, these walkways will which will consist of approximately 7.5 miles of improved trails.

Improving the tourist center will also encourage park visitations and ensure that visitors are educated and informed about the area.

National Objective: The current disrepair and destruction/eroding of the seawalls is ongoing, and we are losing valuable land base to erosion. There are several public structures and a few houses that received damage from the flood of 2011 that will be protected from future flood damage once this project is complete. The current seawalls have or are collapsing and are safety hazards and eyesores.

Vulnerable Populations: The walkway will encourage a healthy lifestyle for individuals that cannot afford exercise equipment or a gym membership. The closest area for a gym or no cost area to exercise is approximately 30 miles away. All of the areas that will be preserved from this project provide picnic facilities, restrooms, playgrounds, public fishing piers, boardwalks, camping, and hiking are all, with the exception of camping, free to the public. The camping fees are relatively inexpensive to the visitors.

Model: All state and federal parks should strive to maintain a well-kept and accessible destination. They should also offer local facilities to support visitors while at the park.

Feasibility: The feasibility of this project is simple and very manageable. The benefits of this project will greatly increase outdoor opportunities for low to moderate income persons who otherwise do not have the money to spend on a quality outdoors experience. Protecting the shoreline and installing the seawall and walkway will give every individual more opportunities to experience the natural wonders of Reelfoot Lake.

Restoring and replacing the seawalls will restore the beauty of our priceless shoreline. It is imperative that these structures be replaced or restored to prevent erosion and loss of land base that cannot be replaced. The ongoing erosion impacts the wildlife and fish populations in the Reelfoot Lake Natural Area. The project will improve water quality and access for all to enjoy. It will also create a safe and highly accessible greenway for visitors to appreciate.

Consultation: Park staff and visitors have communicated the need for these improvements since the flood. This communication has been made formally and informally to elected officials, state park services, and the Chamber of Commerce.

Map: A map of this activity can be found [Attachment A7: Reelfoot State Park Restoration](#)

Scaling / Scoping: The shoreline stabilization portion of the project was divided into 8 different subject areas. The number of areas to be repairs could be scaled back if all of the requested funding was not available. While this approach would not satisfy the full intent, it would certainly improve the area, water quality and park environment.

Budget: The budget for this project includes:

Program Management.....	\$217,000
Planning	\$0
Engineering / Design.....	\$577,000
Construction Costs	\$7,221,000
Grant Administration (5% of Funding Request).....	\$400,750
Total Activity Cost	\$8,415,750

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 8 months from Approval of Plans and Specifications

Consistency with other Planning Documents: TN State Parks Plan

Activity 8 – Dyersburg Wetlands & Recreation Fields:

The Reagan Levee trail expansion, Dyersburg Soccer Complex, South Precinct relocation and Park, and the Reconstructed Wetland will have a wide-ranging effect on improving the resiliency and quality of life for the people of South Town and to the entire region. The improvement will provide safe pedestrian and bike access from South Town to downtown Dyersburg, the Farmer’s Market and to the Reagan Levee nature trail and multi-use path. Improvements to the Reagan Levee and River Park will promote ecotourism for the City by providing improved canoe and kayak access, improving the levee trail and nature trails, and providing trail heads at each end for parking. Providing outdoor trails promotes the overall health and well-being for all of the citizens in the region. The South Precinct improvement will provide basketball courts and a multipurpose field adjacent to the Precinct. This proximity to the Precinct provides a safe environment where our police and citizens can interact and see each other, in a friendly environment, while ensuring this park is a safe place to play for all of the children, adults, and families. The underground detention, reconstructed wetlands, and stormwater management facility/soccer complex will return large portions of this flood ravaged area to the floodway. The hope would be that the combination of these flood management facilities will mitigate continued risk to these low to moderate income families who continue to reside in South Town.

Evaluation Metric: Social Value

Evaluation: We can compare the measured water level on some structures during future flood events to see if the improvements were successful in reducing the flood elevation. We can monitor the health and wellness of our population to see if it improves. We can measure the attendance at soccer events and compare sales tax revenues from before and after the complex opens. We can monitor the rentals at the canoe/kayak rental facility.

Alternatives/Unmet Recovery Need/Increased Resiliency: All of the stormwater management facilities being proposed are located within the footprint of the 2011 flood. The South Town area was heavily damaged, and no steps have been taken to prevent these same properties from being affected by the next flood.

National Objective: These improvements will alleviate the blight in South Town by removing several run-down motels and a trailer park in very poor condition. It will improve the facilities and amenities available to this low income population by replacing blight with green space and athletic facilities, giving them ready access to youth sports and places to run and play. It will also meet an urgent need to mitigate the impact of flooding by providing millions of cubic feet of storage for flood water below these homes.

Vulnerable Population: The population of South Town is vulnerable, not only because of the economic status, but also because they are not protected by a levee system and are at risk for continued flood damage.

These projects will alleviate some of the structures in the poorest condition in Dyersburg and replace them with parks and greenspace.

Model: This project will provide locals with recreation while also providing various flood mitigation techniques to help prevent future flooding from occurring in the area.

Feasibility: The risk is moderate that the project will not go through. We have to acquire land, and that can be difficult to guarantee. Depending on the funding level offered by the grant, we would have to secure monies for any unfunded portions.

Consultation: The City of Dyersburg has held a public meeting that was very well attended. The meeting informed citizens about the proposed project and the process.

Map: A map of this activity can be found [Attachment A8: Dyersburg Wetlands and Recreation](#)

Scaling / Scoping: This large project can easily be broken into five to six smaller projects and partially funded.

Budget: The budget for this project includes:

Program Management	\$140,000
Planning	\$0
Engineering / Design	\$371,000
Construction Costs	\$4,644,000
Grant Administration (5% of Funding Request).....	\$257,750
Total Activity Cost	\$5,412,750

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 12 months from Approval of Plans and Specifications

Consistency with other Planning Documents: Dyersburg Downtown Master Plan

Activity 9 – Middle Fork Forked Deer Restoration:

Historic landscape changes and more recent development in north Madison County and south Gibson County have resulted in increased flooding of the Middle Fork Forked Deer River (MFFD) and its tributaries in the vicinity of Jackson. Changes in the volume and intensity of stormwater runoff, in conjunction with West Tennessee’s highly erosive soils, has resulted in major channel instability issues. As a consequence, the tributaries of the MFFD generate excessive coarse grained sediments that impair the function of the MFFD, degrade water quality, impact agricultural practices, and deteriorate bottomland hardwood ecosystems.

The State of Tennessee is in the process of acquiring approximately 1,000 acres along the MFFD in north Madison County for the purpose of establishing the Middle Fork Forked Deer Stream and Floodplain Restoration Project. This project will effectively restore natural stream and floodplain dynamics on 2 miles of the MFFD. As a part of the project, approximately 1,000 acres of natural floodplain ecosystems will be restored. Also, approximately 3.5 miles of the tributaries to the MFFD will be restored to natural conditions on the property. Streams will be restored using Natural Channel Design (NCD), innovative and proven techniques for restoring streams. The basis of NCD is to apply the dimensions and features of a naturally functioning, stable, and healthy stream system (reference condition) to a degraded system that has similar watershed features. Instead of stabilizing the stream with rip-rap or other hard armoring, NCD returns the degraded system to a naturally stable plan, cross section, and profile, or, in some cases, NCD can be implemented to put the stream on a shorter course to achieve equilibrium. Habitat features will be installed to provide cover for fish and macro-invertebrates. These in-stream structures mimic natural habitat observed in a reference condition. NCD is a sustainable

and often cost-effective solution to stream instability that improves water quality, halts loss of land caused by erosion, reduces flooding, and improves habitat diversity.

In rural West Tennessee, there are limited recreational opportunities near the major population centers of Jackson and south Gibson County. This project, located strategically in northern Madison County, will be developed to incorporate approximately five miles of biking and hiking trails, boardwalks, waterfowl and wildlife viewing areas, educational kiosks, and easy access fishing piers, canoe access, and restroom facilities. The prime location adjacent to US Highway 45 will result in an unprecedented high visibility restoration project where public engagement is as much a priority as habitat restoration. Vulnerable populations will benefit as a result of easy access to recreational and educational opportunities. Many of the benefits derived will be creation of green space, easy access fishing opportunities, and hiking trails for exercise. It is envisioned that local elementary, middle, and high schools will utilize the facility for educational and recreational opportunities. Additionally, the project will provide research opportunities for local Universities to conduct research to document the on-site and downstream benefits, including improved hydrologic regimes, reduced downstream flooding and land use conflicts, biofiltration of nutrients, and carbon sequestration.

This project will create flood storage capacity that will benefit agricultural properties on a regional basis. Sediment and nutrients generated in the rapidly developing areas of north Madison County and southern Gibson County will be sequestered in the restored floodplain of this project. The USDA's Mississippi River Basin Initiative has identified the MFFD Watershed as a significant contributor of nutrients to the Gulf of Mexico. This project will align with the Initiative's goal of nutrient reduction.

Evaluation Metrics: Environmental Value

Evaluation: The completed project will be evaluated by the level of public use and inspection of the project on an annual basis. The benefits of flood risk reduction will be measured by the use of stream gages in pre- and post-project condition. The benefits of sediment capture will be measured utilizing “as-built” survey data and periodic surveys of floodplain deposition at strategic locations. Wetland and Stream Mitigation Monitoring will be key components of the project to determine success of the restoration components. Monitoring will be conducted on three-year cycles until it is determined that the project is functioning as designed.

Alternative/Unmet Recovery Need/Increased Resiliency: All of the properties adjacent to the MFFD associated with this project routinely flood and sustain damage from sediment deposition. The most serious flood events occurred on these properties in the May 2010 and May 2011 flood events. Levee failure, flooding, and sediment deposition all occurred as a result of both of these

National Objective: This particular project benefits Low and Moderate Income Populations by providing free recreational, quality of life, and educational opportunities. The project also meets an urgent need of reducing agricultural flooding in parts of Crockett, Dyer, Gibson and Madison Counties.

Vulnerable Population: Vulnerable populations will benefit as a result of easy access to recreational and educational opportunities. Many of the benefits derived will be creation of green space, easy access fishing opportunities, and hiking trails for exercise. It is envisioned that local elementary, middle, and high schools will utilize the facility for educational and recreational opportunities. Low and Moderate Income persons and families will realize a myriad of benefits, given access to a project of this type.

flood events.

Model: This project will effectively restore a natural stream and floodplain. As a result, approximately 1,000 acres of natural floodplain ecosystems will be restored.

Feasibility: The biggest risk for the project is lack of sufficient funding to fully develop the project. Funding is available for property acquisition and development of parts of the project. The final hurdle will be development of trails, boardwalks, wildlife viewing areas, and easy access fishing piers.

Consultation: The Mayor of Jackson, the Madison County Mayor, the State Representative and the State Senator were heavily involved in the concept development and locating the project in the “heart” of the heavy population centers and close to schools. The impact on vulnerable populations was given serious consideration as a part of these deliberations.

Map: A map of this activity can be found [Attachment A9: Forked Deer Middle Fork Restoration](#)

Scaling / Scoping: The project was scoped based on the existing need for a flood risk reduction project and to create recreational opportunities in the “heart” of West Tennessee’s rural population center. The project will proceed even if not fully funded. The vast majority of the project features will be constructed and benefits will be realized. To maximize the full benefits of the project the funding requested must be received. Otherwise, the number of trails, boardwalks, public access fishing areas, and stream restoration miles will be scaled back to a portion of the property.

Budget: The budget for this project includes:

Program Management	\$500,000
Planning	\$500,000
Engineering / Design	\$500,000
Construction Costs (includes land acquisition)	\$11,500,000

Grant Administration (5% of Funding Request).....\$650,000
Total Activity Cost\$13,650,000

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 6 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 24 months from Approval of Plans and Specifications

Consistency with other Planning Documents: WTRBA Plan

Activity 10 – Jackson Urban Flood Control:

Recent and historic urban development has increased localized flooding and destabilized Anderson Branch, Dyer, and Sandy Creeks. Homes, culverts, businesses, and roads are threatened by floods, channel incision, and stream bank instability. The West Tennessee River Basin Authority (WTRBA), in conjunction with the City of Jackson and Madison County, has developed a plan to install a series of innovative storm water detention structures in kudzu gullies on these three tributaries to the Middle Fork and South Fork Forked Deer Rivers. The projects are designed to mitigate flooding, protect roads/infrastructure, improve quality of life, recharge the Memphis Aquifer, reduce the volume of sediment contributed to the Forked Deer Rivers, and provide biofiltration for urban runoff. Regional benefits will be realized in the counties located west of Madison County along the Forked Deer Rivers. These benefits will be in the form of flood reduction, improved hydrology via reduction in peak flows, and improved stream function via removal of large volumes of coarse grained sediments that West Tennessee’s rivers must transport. The projects will also contribute to the reduction of nutrients that are delivered to the Gulf of Mexico. In fact, the Middle Fork Forked Deer River Watershed has been

included in the USDA's Mississippi River Basin Initiative as a targeted watershed. This program targets nutrient and sediment reduction in an attempt to reduce the Gulf of Mexico Hypoxic Zone. These structures will be coupled with recreational, green space, and connectivity projects to increase benefit to vulnerable populations.

The three Anderson Branch structures will be installed in low income areas of southeast Jackson near Highway 70 and on property adjacent to the Jackson Fairgrounds. The five Dyer Creek structures will primarily be installed in the vicinity of Interstate 40 and Pringles Park, a large sports complex managed by the City of Jackson. The five Sandy Creek structures will be installed in low to moderate income neighborhoods in the vicinity of Muse Park and northeast of Hicksville. The WTRBA has funding to install three of the five Sandy Creek structures and has completed construction of the Sandy Creek #1 Structure. The Sandy Creek #1 project was completed adjacent to Muse Park in a low income community utilizing a Tennessee Healthy Watershed Initiative Grant. Sandy Creek #2 and #3 will be installed in 2015-16. These structures will convert 10 to 30 foot deep kudzu gullies into stormwater detention and infiltration basins, mimicking the function of very large "rain gardens." The structures incorporate stormwater detention, kudzu eradication, ground water infiltration into the Memphis Aquifer, creation of wetlands, establishment of bottomland hardwood timber, water quality improvements, wildlife viewing opportunities, community gardens, trails, and greenways that connect the projects to downtown areas and business districts.

There are a total of 13 structures. The WTRBA has funding to construct three of these structures. The anticipated cost of each structure and the ancillary features will cost ~\$300,000 per project, bringing the total project cost to ~\$3,000,000.

Evaluation Metrics: Resiliency Value

Evaluation: The completed project will be evaluated by the level of public use and inspection of the project on an annual basis. The benefits of flood risk reduction will be measured by the use of stream gages in pre- and post-project conditions. The benefits of sediment capture will be measured utilizing “as-built” survey data and periodic surveys of sediment deposition at strategic locations. Wetland and Stream Mitigation Monitoring will be key components of the project to determine success of the restoration components. Monitoring will be conducted on three-year cycles until it is determined that the project is functioning as designed. Recharge of the Memphis Aquifer will be measured through a project with the University of Memphis Groundwater Institute. Instrumentation will be installed at one or more sites pre-construction. This instrumentation will continue to be monitored until aquifer recharge can be accurately measured at completed project sites.

Alternatives/Unmet Recovery Need/Increased Resiliency: Flooding in 2011 was intense, causing many homes to flood and road closures. The very nature of these projects will reduce that risk of flooding, allowing access to vital services.

National Objective: This particular project benefits Low and Moderate Income Populations by providing recreational opportunities, pedestrian access, and quality of life improvements. The project also meets the urgent need of reducing flooding and protecting infrastructure in the City of Jackson and Madison County. The projects, once constructed, should also improve native vegetation health by helping to eliminate blight.

Vulnerable populations will benefit as a result of easy access to recreational opportunities, connectivity, and quality of life improvements. Many of the benefits derived will be creation of green space, trails for exercise, and access to business districts. Low to Moderate

Income persons and families will realize a myriad of benefits, given access to greenways, trails, and community gardens.

Vulnerable Populations: Vulnerable populations will benefit as a result of easy access to recreational and educational opportunities, as well as greenways and trails that connect citizens to business districts. These populations will also benefit from reduced flooding and protection of roads and vital infrastructure.

Model: This project is designed to mitigate flooding, protect roads/infrastructure, improve quality of life, recharge the Memphis Aquifer, reduce the volume of sediment contributed to the Forked Deer Rivers, and provide biofiltration for urban runoff.

Feasibility: The biggest risk for the project is lack of sufficient funding to fully implement the project. The project concept has been vetted on the Muse Park Structure. Another risk is the inability to acquire easements for project construction. However, the WTRBA already has obtained easements for four additional structures. This risk is relatively low, since the properties (i.e., kudzu gullies) in the present state are essentially not currently useful and the City of Jackson owns several of the properties.

Consultation: The Mayor of Jackson, the Madison County Mayor, and the City Engineer were heavily involved in the concept development and locating the projects. The impact on vulnerable populations was given serious consideration as a part of these deliberations.

Map: A map of this activity can be found [Attachment A10: Jackson Urban Flood Control](#)

Scaling / Scoping: The project was scoped based on the existing need for a flood risk reduction project and to create greenways and trails in the City of Jackson. The project will proceed even if not fully funded. The WTRBA, in conjunction with the City of Jackson, will prioritize the construction of these projects based on the greatest need and benefit.

Budget: The budget for this project includes:

Program Management	\$250,000
Planning	\$100,000
Engineering / Design	\$250,000
Construction Costs	\$2,400,000
Grant Administration (5% of Funding Request).....	\$150,000
Total Activity Cost	\$3,150,000

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 12 months from Approval of Plans and Specifications

Consistency with other Planning Documents: Downtown Jackson Development Plan

Activity 11 – Cold Creek Chute Restoration:

Cold Creek Chute is an abandoned Mississippi River Oxbow Lake that is a key component of the rural economy in western Lauderdale County. This lake is used for recreation, including fishing and hunting. A rock spillway near the southwest corner of the lake controls summer water levels. The spillway, which has been in place for over 30 years, was installed and is maintained by the Tennessee Wildlife Resources Agency. During the 2011 Mississippi River Flood Event the spillway failed at its northern abutment. Minor repairs were made; however, subsequent flood events resulted in a permanent breach in the north end of the spillway. Failure of this structure has resulted in water levels that are approximately two feet below the previous normal pool elevation. This prevents the local population from accessing the lake for sustenance

fishing and recreational opportunities. The combination of both factors impacts vulnerable populations and the local economy.

The proposed improvement involves repair of the spillway to raise the water surface elevation in Cold Creek Chute such that it is equal to the water surface elevation prior to the 2011 flood. This will be accomplished by repairing and keying the north end of the structure into the north abutment and placing large riprap over the remaining spillway material. Depending on the construction method, semi-impermeable material would likely be used in the “core” of the structure to allow the water to pond upstream of the new spillway and effectively raise the pool elevation. The new riprap will be larger than the existing riprap and will be sized to more effectively resist erosion during large flood events on the Mississippi River. The larger riprap will be placed over the existing and raised portions of the embankment to effectively armor the spillway from erosion and maintain the permanent pool elevation in the future. The surficial riprap will also be grouted to provide additional reinforcement. With the raised pool elevation, local populations will again be able to utilize Cold Creek Chute for sustenance fishing and other recreational uses.

Evaluation Metrics: Social Value

Evaluation: The completed project will be evaluated by the increase in the levels of public use by the TWRA. The project will be inspected on an annual basis by WTRBA staff.

Alternatives/Unmet Recovery Need/Increased Resiliency: Flooding in 2011 was intense and caused this structure to fail. Temporary repairs were made, but the spillway failed again. A more permanent solution is required.

National Objective: This particular project benefits Low and Moderate Income Populations by providing recreational opportunities and sustenance fishing. The project also meets the urgent

need of restoring “normal pool” levels in this abandoned chute of the Mississippi River. Without the restored pool levels the chute cannot be accessed for fishing and hunting.

Vulnerable Population: Vulnerable populations will benefit as a result of restoration of access to this popular fishing site, the restoration of recreational opportunities, and quality of life improvements. Low and Moderate Income persons and families will realize the benefit of sustenance fishing.

Model: Maintaining critical infrastructure is imperative to maintain appropriate flood stages during flood events.

Feasibility: The biggest risk for the project is access for construction and delivery of materials. There are two options: (1) transport rip rap to the site during the “dry” season with dump trucks and mobilize heavy equipment to the site to build the structure and (2) place the rip rap via barge when the Mississippi River is at an appropriate flood stage and mobilize heavy equipment during the “dry” season to grade the rip rap to appropriate dimension.

Consultation: The Lauderdale County Mayor, local users of the Cold Creek Chute, the State Representative and the State Senator have been very engaged on this project. The impact on vulnerable populations in this rural area was given serious consideration as a part of these deliberations.

Map: A map of this activity can be found [Attachment A11: Cold Creek Chute Restoration](#)

Scaling / Scoping: The project was scoped based on existing needs. This is a small project and partial funding can likely be overcome with contributions from Lauderdale County, the TWRA and the WTRBA.

Budget: The budget for this project includes:

Program Management\$20,000

Planning	\$20,000
Engineering / Design	\$15,000
Construction Costs	\$145,000
Grant Administration (5% of Funding Request).....	\$10,000
Total Activity Cost	\$210,000

Schedule – The preliminary schedule for this activity is as follows:

Design and Permitting: 2 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 3 months from Approval of Plans and Specifications

Consistency with other Planning Documents: WTRBA Plan

Activity 12 – Mississippi River Corridor Overlook:

Lauderdale County contains thousands of acres of bottomland forests, numerous lakes and streams, miles of frontage on the Mississippi River that includes large islands, and outstanding views of the alluvial valley and river. The annual inundation of thousands of acres in open land areas and forests is a significant feature of this region and creates a unique environment that is seldom experienced by outdoor enthusiasts. A large portion of the land is owned by federal or state agencies and NGOs with plans to purchase more. The primary objective of these agencies is to acquire a large holding for wildlife conservation and to increase the habitat for their survival. Though a noble pursuit, this land acquisition pattern has an adverse effect on the economy of Lauderdale County by removing land from production and tax revenues.

However, the valley possesses many qualities that would appeal to a growing population segment as a unique recreational destination. If a critical mass of outdoor assets and experiences were made available to the public, it could generate enough activity to stimulate significant economic development initiatives within Lauderdale County and thus augment the local communities. Another added benefit is securing the long-term protection of the bottomlands by establishing an economic value to its natural state.

Evaluation Metrics: Social Value

Evaluation: For the local citizens and government officials in Lauderdale County, the MRCT will need to continually track the economic benefits as the various outdoor assets to be constructed in the bottomlands begin to come on line. For example, the MRCT spent almost three years raising funds, designing and producing a new Civil War exhibition for the Fort Pillow State Historic Park Visitors Center, 17 miles west of Henning. The exhibition was premiered at a reception last fall and since its installation, the Park has witnessed an approximately 20% increase in the number of visitors coming into the Center. They have also created a new canoe/kayak program at the park, as well as the completed significant upgrades in their camping and RV areas. When initial assets are created or enhanced, we have found they have a ripple effect throughout the region as other amenities and vendors are established – particularly in our rural counties along the Mississippi River.

Alternatives/Unmet Recovery Need/Increased Resiliency: The bottomlands in Lauderdale County are located approximately 16 miles west of the bluff and are flooded every spring by the annual high water season. The area is particularly unique as the County has no established levee by the Corp and relies solely on the bluff parameter which is experiencing significant erosion on a yearly basis.

The bottomlands retain their distinct natural beauty because the Mississippi River flows in a natural path and meanders like it did prior to the construction of the levee flood management system established by the US Army Corps of Engineers in 1928.

However, farming in the bottomlands can be very profitable because of the extremely rich soil which is consistently replenished in river nutrients from the annual flooding. Unfortunately, the rising waters are very unpredictable in their yearly time table and the flood of 2011 created a crisis in loss of crops for the land owners and farmers. There were also smaller residential neighborhoods in Ripley and many of those houses were flooded for the first time in over a generation as the water breeched several parts of the natural bluff.

National Objective: The Mississippi Floodplain of Lauderdale County, Tennessee is unique among the land areas along the Lower Mississippi River. This area encompasses over 100,000 acres of floodplain and because no levee system exists, it is routinely subject to complete inundation during seasons of high water. The area is defined as all the land that lies between the mouth of the Obion and Hatchie Rivers and below the Chickasaw Bluffs. It comprises numerous wetlands and “natural lakes” formed by the altering course of the river and by the series of earthquakes that impacted the area in 1811-12.

Since the 19th century, this alluvial bottomland has provided locals with only marginal farming opportunities due to unpredictable flooding. Most local residents did and still use the land for logging, hunting and fishing. However, in the past 50 years there have been attempts to farm huge plantation-style tracts which resulted in thousands of acres being logged and cleared. Though the land is extremely fertile, the ceaseless flooding still makes farming difficult and most attempts to cultivate this area have failed. Over the years, logging within the area has cleared most, if not all, of the old growth.

Lauderdale County provides a unique contribution to the reclamation of the forests and wetlands of the Lower Mississippi River. It possesses one of the few remaining unimpeded tracts of floodplain between the river and the natural bluff.

The MRCT has spent the last four years creating a Conceptual Master Plan that clearly shows the economic potential of developing Lauderdale County into a unique outdoor recreational oasis and destination. (Attached.)

Vulnerable Populations: We strongly believe that if a Master Plan was developed and implemented, the citizens would greatly benefit from the tourism dollars that would flow into their county. Lauderdale is a chronically underserved and economically-challenged rural county in West Tennessee, but has great opportunities because of its environment, location on the Mississippi River and proximity to the large Memphis market of outdoor enthusiasts.

Model: This part of the state, while beautiful, does not offer many opportunities for visitors to observe the natural landscape. This overlook will ensure that visitors to the area, and locals, have an area that they can visit to enjoy the scenery.

Feasibility: Marketing and work force development for outdoor recreation suppliers and outfitters will play critical roles in the success of the Lauderdale County Plan. As documented by the Corps in their recently released *Lower Mississippi River Resource Assessment* of the Lower Mississippi River, we have several unique challenges in our region that will require Federal support.

The specific recreation and recreation access challenges in the Lower Mississippi River are:

- There is a shortage of motorboat access in some areas.
- Existing access points are not conducive to canoeing and kayaking.
- There are not enough biking trails and very few in natural or rural settings.

- Riverfront access is only available around urban areas.
- There are few interpretive centers/signage, and they are scattered.
- This is no “one-stop” organization to provide information for all of the recreational facilities available in the LMRR and to market it as a recreational destination.

However, we know there is a vibrant and immense market for outdoor recreation from numerous studies that have been released in the past several years:

More than 140 million Americans participate in outdoor recreational activities. The outdoor recreation industry supports 6.1 million American jobs and generates \$646 billion in spending each year. In the Lower Mississippi River Region, outdoor recreation and tourism combine to generate nearly \$17 billion annually and over 240,000 jobs.

The MRCT firmly believes that with the establishment of a visitor’s overlook/waystation building on Highway 19, which is located at one of the most scenic bluff overviews in the bottomlands of Lauderdale County, we’ll begin to create the synergy and public support needed for assets to be constructed and enhanced in order to reach this huge outdoor recreation industry.

We also need a very concise Master Plan for the County to construct additional trails, other overlook/rest stops and bike lanes in the bottomlands of Lauderdale County. (Conceptual Master Plan attached.)

Consultation: The following Meetings were held for Phase I:

Lauderdale County Environmental and Economic Plan 2011/12 (CMP)

- 1) November 14, 2011 – Lauderdale Plan “planning meeting” at Bartlett Chamber
- 2) November 18, 2011 – Lauderdale Plan 1st Public Meeting in Ripley
- 3) January 19, 2012 – Lauderdale Plan “planning meeting” at Bartlett Chamber
- 4) January 26, 2012 – Lauderdale Plan 2nd Public Meeting in Ripley

- 5) February 9, 2012 – Lauderdale Plan – Assets identification on map at DMC
- 6) February 23, 2012 – Lauderdale Plan – “planning meeting” at Bartlett Chamber
- 7) April 19, 2012 – Lauderdale Plan 3rd Public Meeting in Ripley
- 8) May 23, 2012 – Lauderdale Plan – Meeting with Jon Crisp (President, North America Eco-Tourism Association) to discuss Eco-Tourism and requested him to speak at final public meeting
- 9) June 4, 2012 – Lauderdale Plan – Meeting in Ripley to provide input for West Tennessee’s Tourism Positioning Statement
- 10) July 25, 2012 - Lauderdale Plan 4th & Final Public Meeting in Ripley

The groups’ universally shared the belief that a well-planned economic development strategy will require the continued maintenance and enhancement of the Bottomland’s natural integrity, thus being a win-win for all stakeholders. Phase Two, therefore, called for a blueprint that describes in detail the various economic opportunities that the Bottomland presents as a result of improving the land’s natural and original state.

The various focus groups were well attended by local citizens, and the consensus among the participants was to pursue the development of the Bottomland into an eco-friendly environment protecting and strengthening its flora and fauna while catering to the human observer.

Map: A map of this activity can be found [Attachment A12: Miss. River Corridor Overlook](#)

Scaling / Scoping: The MRCT has invested **\$125,000** into the production of the *Lauderdale County Environment and Economic Plan*. Our major funding partner was **The McKnight Foundation** – Minneapolis, MN

The MRCT hired a professional economic analysis firm, Younger Associates, to create an Economic Report for Lauderdale County. (Attached).

Budget – The budget for this project includes:

Program Management	\$45,000
Planning	\$50,000
Engineering / Design	\$175,000
Construction Costs	\$874,500
Grant Administration (5% of Funding Request).....	\$57,225
Total Activity Cost	\$1,201,725

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 3 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 6 months from Approval of Plans and Specifications

Consistency with other Planning Documents: McKnight Foundation Plan

Activity 13 – Reelfoot Rural Ministries Program

Reelfoot Rural Ministries, Inc. (RRM) (www.reelfootruralministries.org) is a vital stitch in the fabric of the communities within the Rural by Nature target area including Lake, Obion and Dyer Counties of Tennessee. RRM’s area of influence is a rural area surrounding Reelfoot Lake with a population engulfed in extreme poverty. Lake County, for instance, has the lowest per capita income of any county in Tennessee and is the 49th poorest in the nation. The combined lasting effects of farm mechanization, lack of manufacturing employment, and a seasonal lake culture have left economic hardships that are lasting and difficult to change.

RRM focuses on assisting the most vulnerable populations everyday via programs such as daycare, thrift stores, meals (delivery and location based), and house renovation/new construction. Additionally, RRM and its staff provide invaluable assistance to area community’s

pre and post disaster thru disaster preparedness and recovery activities. The staff has served as disaster response leaders after the 2006 tornado and 2010 and 2011 disasters. RRM efforts are currently supported via donations from many churches, citizens, private companies, government program grants, and countless volunteers.

RRM is strategically developing a program that will profoundly increase their ability to support communities throughout the year, but especially in times of disaster. RRM is increasing its capacity to house volunteers to serve the victims of disaster, store and process disaster relief supplies, and provide emergency shelter during and short term housing and feeding to Lake County residents affected by disasters. Three immediate projects to implement include:

1. Warehouse: 5,275 sf metal building. Built to current local earthquake codes with backup power provided via standby generator
2. Volunteer Dormitory:
 - 8,000 sf building able to house 70 volunteers and 2 interns
 - 900 sf expansion to existing dormitory to house 20 additional volunteers
 - Backup power generators for both dormitory buildings
3. Multipurpose Building: 5,625 sf building which will include:
 - Tornado shelter for community and housing for victims
 - Industrial kitchen and showers/restrooms for community wide disaster recovery
 - Activity center for RRM Day Care (on adjacent lot) during inclement weather conditions.

The resiliency of the communities supported by RRM will improve enormously because of these efforts. The multipurpose building will provide shelter for up to 20% of the area population and will have the capacity to feed the entire community. The increased dormitory

space will triple the housing capacity for volunteers. The warehouse will be able to provide staging of vital supplies needed during/after a disaster.

Evaluation Metric: Social Value

Evaluation: The full outcome of this activity will be realized when each of the three listed initiatives are completed although each have their own value. The highest impact initiatives are the warehouse and increasing the volunteer housing space. The projects were evaluated with local government officials and contractors familiar with the type of construction

Alternatives/Unmet Recovery Need/Increased Resiliency: During the 2011 flood, citizens of Lake County and the surrounding region were cut off from jobs, life safety, food, and other transportation. Except for the heroic efforts of the Corps of Engineers and first responders, significantly more people would have been cut off from life sustaining assets. Additionally, RRM has an ongoing program to assist the low to moderate income populations throughout the area and have been active in the region for 53 years. These programs include a daycare center licensed to nurture up to 50 children. A home repair outreach that assists upwards of 30 families each year. A Food Bank run by RRM provides groceries to more than 3500 households each year. A senior center that provides a noon meal each weekday (9,100 meals annually) and home delivered meals to those that cannot get to the center for various reasons (5,460 meals annually). Had these facilities been in place relief efforts would have commenced more timely, more efficiently, and with a broader reach through increased volunteer efforts, available supplies, and emergency shelter.

National Objective: RRM's activity will provide the region's low and moderate-income populations with significant social and resilience benefit. The warehouse and additional volunteer housing provides the community with the material resources stored close and the

ability to house, stage and deploy volunteers during disasters. The ability to house volunteers also furthers RRM's ability to support their house rehabilitation and new construction efforts year round. There are countless structures in Lake County that are unfit for habitation, yet many are still inhabited. It is RRM's mission to assist the most vulnerable and at risk residents keep up with home repairs, bring them in compliance with state and federal building codes including flood elevation and wind and seismic and in general safe, sanitary, accessible, and affordable housing. The multipurpose building will provide a safe haven during significant storms as a storm/tornado shelter. The shelter will be able to hold 20% of the current residents. The multiple purpose building will include an industrial kitchen able to feed the entire community in times of disaster.

Vulnerable Population: A community profile demographics report which clearly delineates our population statistics and the large number of households and individuals that live on low to moderate income is available in Appendix A. Lake County is consistently among the nation's lowest income counties.

Model: The RRM activity is a replicable model that can be and is being implemented in rural communities across the country. The following aspects are needed:

- **Sponsor:** Church or philanthropic organization/person with a mission and passion to meet the needs of rural, low to moderate income populations.
- **Partners:** Local Government officials, corporate sponsors, and volunteers
- **Understanding:** local staff need to understand the needs of the community, i.e. census data, type of disaster risks, and how to best meet the identify the needs.

If a community can identify a sponsor organization/lead and partners with a mission and passion and organization like RRM can be spawned to impact the lives of communities like the Reelfoot Lake area.

Feasibility: The initiatives proposed have been vetted by a collaboration of individuals from the RRM, contractors, and public officials. Additionally, engineers from Stantec reviewed the information provided to develop an opinion of the projects feasibility. The buildings and appurtenances planned are commonly built structures that will meet current standards (ASCE, ACI, etc.) and local building codes. These structures will be built above predicted flood levels and meet current earthquake codes. The initial construction costs will be funded through direct leverage from RRM and by grant funds allocated through CDBG_NDR. Future maintenance and operating costs will be funded through the RRM budget and donations/volunteer efforts supporting RRM.

Consultation: RRM consulted with local officials, church leaders, and several trade contractors while planning this activity. RRM reached out to the City of Dyersburg regarding the requirements and cost to build emergency shelters as they have recently built two. RRM also consulted with general building, electrical, heating/air, and plumbing contractors to determine the feasibility and develop planning level construction costs. Additionally, Tiptonville and Lake County officials provided insight to the needs of the community. Finally, RRM consulted with the United Methodist Committee On Relief (UMCOR) to discuss the opportunity to become a partner depot for assembling and storing emergency response supplies in the new warehouse.

Map: A map of this activity can be found [Attachment 13: Reelfoot Rural Ministries](#)

Scaling / Scoping: This project has been scoped to provide the most impact to residents within RRM area of influence. If partially funded, the most impact will be realized by construction of

the warehouse and expansion of the existing volunteer dorm leaving the new dormitory and multipurpose building for future funding.

Budget: The budget provided below is total construction costs (engineering, permitting and construction) and has not been reduced by leverage dollars available.

Program Management	\$115,000
Planning	\$25,000
Engineering / Design	\$250,000
Warehouse.....	\$260,824
Dormitory Expansion.....	\$94,845
New Dormitory	\$687,626
Multipurpose Building	\$1,327,830
Construction Cost.....	\$2,371,125
Grant Administration (5% of Funding Request).....	\$118,556
Total Activity Cost	\$2,879,681

Schedule: The preliminary schedule for this activity is as follows:

Design and Permitting: 4 months from kickoff

State and Funding Review: 2 months from Design Completion

Construction: 8 months from Approval of Plans and Specifications

Consistency with other Planning Documents: United Methodist Committee on Relief Plan

Activity 14 – Multi Hazard Mapping & Education

The goal of this project is to develop, analyze, store and freely distribute data that can be used to plan for and create resilient strategies for some of the most vulnerable (i.e. LMI)

populations in the Rural by Nature study area. This is a critical need in Tennessee because much of the western portions and numerous other parts of the state are rural and lack access to data that can help community officials understand the potential vulnerabilities they face. This data gap is limiting how communities understand and plan for disasters. To overcome this void, data will be compiled through a series of specific resilience focused studies, including:

- 1) **Flood Impact Assessment:** This will provide detailed impact assessment data of future flood scenarios that might occur in the Rural by Nature target areas. This data will help communities facilitate policy changes and build smarter in vulnerable or LMI areas.
- 2) **Agricultural Flood Loss Modeling:** This will provide economic and societal losses estimates resulting for future flood events. Site-specific hazard analysis will help quantify impacts on sediment transport for agricultural resources, which will be used for the development of mitigation measures in agricultural areas.
- 3) **Earthquake Hazards Assessment:** This will provide enhanced seismic and liquefaction hazard data for westernmost Tennessee. Revised information will be used to develop more realistic estimates of seismic hazards and assist with resiliency planning for earthquakes. Additionally, this study seeks to understand the potential for an earthquake early warning system, which could have resiliency impacts far beyond Rural by Nature study area.
- 4) **Mississippi River Supply Chain Risk Evaluation:** This will provide data on the impacts of riverine development and how planning decisions can impact the resiliency of waterborne commerce in the face of extreme weather scenarios.
- 5) **Structural Earthquake Risk Assessment for Schools:** This will provide seismic risk assessment data on three schools in the study area, conducting structural vulnerability and

non-structural assessments to develop risk reduction measures. The goal is to develop a risk assessment templates that can be replicated for other schools in Tennessee, particularly those built prior to modern building codes, and help communities understand how to better protect their children.

- 6) **School Curriculum Development:** This will provide recommendations for high school curriculums, specifically targeted for schools in the study area, to raise awareness of the risks associated with extreme weather and seismic events. The goal is to educate the next generation of leaders so that they can improve their community's ability to recover from future natural disasters.

Through a partnership with the Tennessee Department of Environment and Conservation (TDEC), this project will culminate in the development of a Web-based system that local governments, businesses, and individuals can utilize to find study information, retrieve geospatial data, and evaluate the vulnerability of their infrastructure to extreme weather events and natural hazards. The system will allow users to create an inventory of physical assets in a GIS environment and rank the vulnerability of each item based on user-defined characteristics, assess potential impacts caused by specific types of extreme weather events, and identify areas with the greatest vulnerability to natural hazards. This system will leverage a methodology already developed by TDEC that has been used for conducting extreme weather event vulnerability assessments for facilities in Tennessee State Parks.

Evaluation Metrics: Resiliency and Social Value

Evaluation: To assist in the evaluation of this project, the Project Manager (PM) will conduct an in-person kick-off meeting where a timeline for each of the six studies will be established. Also, each study will develop a list of deliverables. Each study will have an assigned Project Lead,

who will provide quarterly reports to the PM outlining progress towards the deliverables, as well as earned value management (EVM) metric of cost and schedule indices. Because the focus of this multidisciplinary project is data and information, the team will develop defined data standards that all information will adhere to. This will facilitate the use of an accessible Web Portal to organize and disseminate the information. It will also provide an additional tool the State of Tennessee can use in project monitoring. As data becomes available, information can be stored in the Portal for updates and reports. The PM will report directly to the DECD, or appointed consultant, to report the results of this evaluation system.

Alternatives/Unmet Recovery Need/Increased Resiliency: The State of Tennessee has extensive experience with major flooding disasters, including the events of 2011 that resulted in multiple presidentially declared disasters. This flooding event most impacted areas in the middle and western parts of the state, specifically along the Mississippi River corridor. Additionally, earthquake hazards have been well documented in western Tennessee by the US Geological Survey's (USGS) National Seismic Hazard Mapping Project. Earthquake shaking and liquefaction threaten many vital structures and lifelines in Tennessee, including levees, port facilities, transportation networks (roads, railroads, airports, bridges, etc.), electrical transmission lines, pipelines, and communication towers. When an earthquake does strike this area, the losses will be amplified exponentially if a shock occurs during an extreme weather event. For example, a magnitude 6 earthquake in West Tennessee near the Mississippi River could significantly impair key structures and networks needed for flood control, emergency response, and public safety.

National Objective: From a national perspective, and directly in line with the goals of the NDRC program, this project is focused on rural areas that have high rates of poverty and social

vulnerability. Lake County, Tennessee is one of the poorest in the nation. Each of the proposed studies in this project will benefit all persons in Tennessee by increasing access to data that can help build resilience strategies and promote a better understanding of risk reduction efforts.

Additionally, all of the data will help local officials and policy makers comprehend the economic impacts of future disasters, develop educational tools for the teaching of risk vulnerabilities, and allow emergency managers to more rapidly deploy resources following a disaster. This program also directly incorporates capacity building as a primary objective through community-based meetings in identified LMI communities. These meetings will allow for the dissemination of all project results.

Vulnerable Populations: This project, and all six studies, are designed to provide building blocks of data and information that will be used by residents, businesses and local governments to target actions in their communities to reduce the impacts from future natural disasters. Given that most of the Rural by Nature project area is occupied by LMI communities, the anticipated deliverables of each study will allow these vulnerable populations to become more resilient and effective in disaster response and mitigation activities.

Model: This project will develop, analyze, store and freely distribute data that can be used to plan for and create resilient strategies for some of the most vulnerable (i.e. LMI) populations in the area. This approach should be replicated nationwide to ensure that everyone is well informed of potential hazards or disaster areas. This approach will help to ensure safety during times of flood or other disasters.

Feasibility: This project represents a broad partnership between educators, scientists and engineers with mutually compatible talents for multiple hazard risk evaluations, impact assessments, economic loss modeling, and other related skills. Each team member has an

extensive history of successful project design and implementation, making this a high feasible endeavor. The six studies were specifically selected because of the impact to the local, regional and State’s understanding of potential reduction of future losses from disasters, thus increasing the overall resilience of the Rural by Nature area. Additionally, experienced administrators and staff at the University of Memphis and Vanderbilt University are available to support each study. Technology resources are readily available from these resources such that each study can be successfully performed without having to overcome data or software challenges.

Consultation: Teams from the University of Memphis and Vanderbilt University have spent the last eight months developing and refining each of the six studies through collaboration with local officials, discussions with other team members, and meetings with various politicians, engineers, emergency managers, faith-based community leaders, and local citizens. These discussions provided unique insights and impacts that past disasters have had on this area. Vulnerable populations (i.e. LMI area) were also engaged through formal and impromptu discussions at a variety of locations, ranging from bait stores and churches to county courthouses. Assistance in this collaboration came from groups including, but not limited to, Reelfoot Rural Ministries, Northwest Tennessee Development District, TEMA, DECD, and the Tennessee Housing Development Agency.

Map: A map of this activity can be found on [Attachment 14: Multi-Hazard Mapping](#)

Scaling / Scoping:

Budget – The budget for this project includes:

Program Management and Capacity Building	\$150,000
Planning	\$634,000
Engineering and Education	\$2,250,000

Total Construction Cost	\$0
Grant Administration (5% of Funding Request).....	\$151,700
Total Activity Cost	\$3,185,700

Schedule: The preliminary schedule for this activity is as follows:

Flood Impact Assessment: 36 months from kickoff

Agricultural Flood Loss Modeling: 24 months from kickoff

Earthquake Hazards Assessment: 54 months from kickoff

Mississippi River Supply Chain Risk Evaluation: 12 months from kickoff

Structural Earthquake Risk Assessment for Schools: 12 months from kickoff

School Curriculum Development: 24 months from kickoff

Web System Development: 36 months from kickoff

The following provides additional information requested concerning the rural by Nature project.

- **BCA.**

The overall BCA for the Rural by Nature project is 2.38. A detailed breakdown can be found in Attachment F. The BCA was developed by reviewing relevant conceptual engineering and architectural information provided by the individual activity sponsor by Stantec. The goal was to confirm that each of the activities are feasible, cost effective, and will provide benefit to entire West Tennessee Region and specific target areas in accordance with HUD guidelines. This includes typical quantitative measures and qualitative factors traditionally not included in a BCA calculation. At this time the costs and benefits are continuing to be identified and refined.

- **Scaling and Scoping.**

The Rural by Nature project can be scaled up or down based on a thorough review of the project and removing entire activities or of the 14 identified activities and removing or completing individual elements of the activity in a later phase of work and funding.

- **Program Schedule.**

Each of the 14 activities has a schedule provided in this document above. At this time it is estimated that 13 of the 14 activities can be completed in the 24 months of the effective date of the Grant Agreement. Activity 14 has a schedule that will take 60 months to complete.

- **Budget in BDGR format.**

This specific budget format is still being developed

- **Consistency with other Planning Documents.** TN State Parks Vulnerability Assessment

Exhibit F – Factor 4 – Leverage

State of Tennessee

ExhibitG_Phase2_Factor4_Leverage.pdf

Throughout the development of the application, the Tennessee Department of Economic and Community Development (TNECD) has actively sought partnerships with organizations and jurisdictions who not only wish to implement resiliency in the future but who have been working toward more resilient communities since the disasters four years ago. Leveraging these efforts and building upon these foundations is important to establishing a lasting impact. Since the disasters occurred in 2011, funding for recovery and resiliency has been invested that cannot count toward this application; however, projects have taken place that allow the partnership to build upon and provide a good foundation for the proposed projects and leverage of this application. For example, in cases of wastewater system repair, most communities performed some rehabilitation work immediately, but these efforts fall outside of the timeline for leverage as outlined in the Notice of Funding Availability (NOFA).

Even with these challenges the State of Tennessee is working to secure additional leverage and recognizes the need for greater collaboration within the state departments and with the non-profit and philanthropic communities across the state. This opportunity is allowing TNECD to re-examine and alter the way disasters funds are awarded and expended in the future with the hope of creating less dependence on Federal funds for disaster recovery and resilience.

Total Leverage by Activities - \$66,300,000

Activity 1: Port of Cates Landing Rail - \$500,000

The leverage for this activity involves funding to acquire the land for the rail spur. The State invested these funds in 2013 and work continues. However, the Port of Cates Landing was completed in 2012 at a cost of \$53 million dollars with the intent to enhance the quality of life and establish economic resilience in Lake and the surrounding counties. The improvements proposed in the application will make the port more useful to businesses while also providing opportunities to use it during a disaster. This area will be hardest hit by an earthquake, and the

rail spur will allow for transport of people and supplies to and from the region as well as it being used during floods and on a daily basis by industry and agriculture. The investments made several years ago by the local, state and federal government have made this project possible.

Activity 2: Regional Wastewater System: Tipton County - \$22,775,000

This activity has nearly \$23 million in direct leverage, with a \$21 million commitment from TNECD and almost \$2 million from the local government. Like the port project mentioned above, this has been a long-term effort with over \$100 million invested over the past ten years into the Memphis Megasite near the location of this sewer system. The Megasite will provide jobs for individuals throughout the project area, and this sewer system will serve the Megasite as well as the communities in Tipton County who are either not currently on a sewer system or whose system was damaged in the flooding.

Activity 3: JEA Wastewater System Enhancements – \$23,200,000

Jackson Energy Authority has been working to repair and enhance their wastewater system since the disasters in 2011. They have taken out loans from the Tennessee Department of Environment and Conservation (TDEC), and more loans will be issued in the next two years to address inflow and infiltration, damage to their main interceptor and other damage to the system. The grant funds will continue this work and allow for more resiliency efforts to be put into place.

Activity 4: Dyersburg Sewer System Rehabilitation - \$1,300,000

The city is committed to spending \$1 million in a combination of CDBG and local funding as direct leverage to improve and rehabilitate the sewer system. An additional \$300,000 in supporting leverage has been included for this activity. Recurring disasters have resulted in serious damage to the system and CDBG – Disaster Recovery, CDBG, and local funds have been invested in the sewer system in the last few years and will be through the next few years.

Activity 5: Henning Sewer System Restoration – \$100,000

The West TN River Basin Authority (WTRBA) will be dedicating \$100,000 of work, equipment, and other services to aid in the completion of this activity for the town of Henning. Damage has impacted this sewer system in multiple disasters over the last five years. This funding gives the Town an opportunity to resiliently repair their system so that they weather future disasters.

Activity 6: Mississippi River Levee Pumps – \$300,000

Additionally, the WTRBA has committed \$300,000 of work, equipment, and other services toward this activity. The levee board may also be providing \$200,000 of direct leverage to the installation of these pumps, but this commitment has not yet been secured. Because pumps must be brought in every time there is a flood, damage occurs that can be prevented with permanent pumps and the other pumps can be freed up for work in other communities.

Activity 7: Reelfoot State Park Improvements – \$6,325,000

The Tennessee State Parks Division of TDEC will be providing \$225,000 in supporting leverage for the implementation of this activity. The Mississippi River Corridor is also committing \$2 million toward the expansion and improvement of the Reelfoot Lake Tourist and Visitor’s Center at the Park; this leverage comes from grants, foundations and additional funding from the State Parks Division. Additionally, \$4.1 million is currently being invested in new cabins at the Park. After the disasters in 2010 and 2011 and the subsequent decline in tourism revenues at the Park and across the County, efforts were made to increase tourism. The new Visitor’s Center was designed to educate visitors about the community, its history, the creation of the Lake from earthquakes in 1811 and 1812 and the risk of earthquakes now. New cabins were planned, and the additional grant funds will make the new tourist center more energy efficient and resilient,

protect the center and the new cabins from flooding, and provide additional recreation opportunities to the park visitors.

Activity 8: Dyersburg Wetlands & Recreation Fields – \$2,300,000

This activity benefits from funding from the City of Dyersburg to be used to convert city-owned land into a conservation easement for the creation of wetlands and the development and construction of the soccer fields and a recreation trail. Drainage improvements have recently been completed in the area that were the start of this project that converts land that has repeatedly flooded to an area for recreation and tourism and that connects low-income people to city services.

Activity 9: Middle Fork Forked Deer River Restoration – \$7,500,000

The WTRBA has secured \$7.5 million in direct leverage from state departments and public, private, and non-profit partners to restore and return this portion of the Forked Deer and the land around it to its natural state.

Activity 10: Jackson Urban Flood Control – \$900,000

The WTRBA is dedicating \$900,000 of direct leverage to implement a series of projects to better control the flow of smaller streams within the urban core of the City of Jackson.

Activity 11: Cold Creek Chute Restoration – \$0

While this activity currently has no leverage attached, the low cost of \$150,000 to restore a structure that provides flood control in addition to outdoor recreational activities, such as fishing, make this activity important to resilience of the local community.

Activity 12: Mississippi River Corridor Overlook – \$0

Leveraging sources are still being pursued for this activity, which will combine eco-tourism and education of the natural state of the region.

Activity 13: Reelfoot Rural Ministries Program – \$1,000,000

This activity, specifically designed to serve the LMI population in Lake and Dyer counties benefits from a combination of direct and supporting leverage. Reelfoot Rural Ministries will provide \$170,000 in direct leverage, and \$830,000 will come in the form of donations the organization regularly receives.

Activity 14: Multi-hazard Mapping & Education – \$100,000

Through the partnership of the University of Memphis, Vanderbilt University, the Central U.S. Earthquake Consortium (CUSEC), and TDEC, \$100,000 in direct leverage will go toward the mapping of multiple hazards combined with risk assessment and education in the target areas. The goal is the eventual expansion of the program statewide.

Exhibit G – Factor 5: Regional Coordination and Long-term Commitment

State of Tennessee

ExhibitG_Phase2_Factor5_CoordinationandCommitment.pdf

Lessons Learned

During Phase 1, Tennessee Department of Economic and Community Development (TNECD) and partners developed the Rural by Nature team as the initial step toward institutionalizing resiliency for the State of Tennessee. This is the first time that a group representing so many local, state, federal and non-profit leaders has come together to look at resiliency and disaster response and preparedness. The team became the framework for the State of Tennessee Resiliency Council. Partner letters are included in Appendix A that commit to participation in the council, and the first meeting was held in October 2015. This Council will be supplemented with regional councils in the three grand divisions of Tennessee. TNECD will coordinate the councils, and membership will include local government officials and regional staff from the partner organizations. A letter is included from TNECD that commits to setting up and holding the initial meeting of the regional councils in each region. The purpose of the State council and the regional councils will be to discuss efforts underway by the partners, develop and prioritize projects, and work together to fund projects. These councils will ensure that work is not duplicated and that there are strategies and potential projects in place when funding is available. The metric associated with this goal is the creation of the council by TNECD and having three meetings in the first year of its creation. This council is expected to continue meeting for at least three years, likely longer.

Tennessee Department of Transportation (TDOT) is nearing the final stages of the development of its 25-year Long Range Transportation Plan (LRPT), a comprehensive plan and approach to the direction of the State's transportation vision and goals. Everything from demographic and industry trends to mobility, accessibility and safety are being addressed. As part of the plan development, TDOT worked as part of a FHWA pilot program to assess the

vulnerability of Tennessee’s transportation system to climate change and extreme weather events; Vanderbilt University partnered with TDOT to complete the study. TDOT will be using the findings of this program to address resiliency in extreme weather events and natural disasters into its LRTP and future projects. The metric associated with this plan is adoption of the plan that considers the “Safety, Security and Transportation Resilience Policy Paper.” This will occur before the end of the state fiscal year on June 30, 2016. This plan will be used for transportation and resiliency planning for the next 25 years.

Over the past few decades, the West TN River Basin Authority (WTRBA) has been returning rivers in West Tennessee to natural states that existed before land development. This process includes reintroducing native species and natural habitats along with wetlands and room for the rivers and streams to meander as needed. This process affects the built environment by removing people and structures away from potential flooding and protects the natural environment by removing potential pollutants and debris. WTRBA is a critical part of the Rural by Nature team and is working with the team on projects in the target areas. Additionally, the WTRBA has projects outside of the target areas that will be started in the next year that will affect the region. These projects are listed below; they show that the organization is committed to restoring the streams and rivers throughout the region. The metric associated with this project is the start of these activities. The lifespan of these projects is expected to be at least 10 years.

- Baxter Bottoms Phase III Stream Restoration and Flood Risk Reduction Project – Tipton County. Project Cost~\$500,000
- Stokes Creek Phase II Stream Restoration and Flood Risk Reduction Project – Dyer County. Project Cost~\$400,000

- North Fork Forked Deer Floodplain Restoration and Flood Risk Reduction Project – Gibson County (Trenton). Project Cost ~\$600,000
- Bailey Fork Creek Phase II Stream Restoration and Flood Risk Reduction Project – Henry Co. (Paris). Project Cost ~\$250,000
- Cypress Creek Channel Stabilization and Infrastructure Protection Project – Fayette Co. (Oakland). Project Cost ~\$600,000
- Pond Creek Floodplain Restoration and Flood Risk Reduction Project – Dyer Co. Project Cost ~\$500,000
- Eliza Creek Stream Restoration and Flood Risk Reduction Project – Dyer Co. Project Cost ~\$300,000
- Sandy Creek Stormwater Detention Projects – Madison Co. (in target area). Will address 2 structures referenced in the Jackson Urban Flood Control Project. Project Cost ~\$500,000
- Turkey Creek Stormwater Detention Structure – Gibson Co. (Medina). Project Cost ~\$100,000
- Moize Creek Channel Stabilization and Infrastructure Protection Project – Madison Co. (Jackson). Project Cost ~\$400,000
- Middle Fork Forked Deer Floodplain Restoration and Flood Risk Reduction Project – Henderson Co. Project Cost ~\$500,000.
- Little Beaver Creek Stream Restoration and Flood Risk Reduction Project – Carroll Co. Project Cost ~\$250,000.
- Routine Stream Maintenance on Obion, Forked Deer, Hatchie and Loosahatchie Rivers – Multiple counties. Project Cost ~\$500,000

- Routine Maintenance on 119 Flood Control Structures – Multiple counties. Project Cost ~\$200,000

TDEC, the agency responsible for operating the Tennessee State Parks system, is currently studying the vulnerability of its state parks to extreme weather events in an effort to increase long-term physical infrastructure resiliency. They have committed to factor historic and future potential extreme weather event data and facility damage potential/impact scores into their facilities planning process. They will begin a tree assessment in the next year in partnership with Tennessee Technological University. Because tree falls in the parks is one of their most vulnerable areas, they will use data from the study to prioritize the parks that need the tree assessment the most, train the staff on how to complete the assessment, and then complete the assessment. The metric for this project is the development of the process to eventually be deployed to each park. Benefits are expected to last 10 years or more.

TNECD is also moving toward disaster resilience by re-evaluating the manner in which CDBG disaster funds are used. The department is committed to moving away from its traditional practice of making multiple awards to applicants in the same county which may or may not be complimentary and working toward a more regional, collaborative effort. TNECD feels that a more regional and comprehensive approach will allow for better and more innovative and inclusive outcomes and will provide for a more efficient use of increasingly limited funds; however implementation is dependent on the allocation of additional disaster funding. The regular round CDBG program will also be assessed to try and include resiliency measurements where possible. This will be completed during the next Annual Action Plan process in the Spring of 2016.

Legislative Action

The Rural by Nature team is considering legislative action, but due to the schedule of the Tennessee General Assembly, action has not been taken at this time.

Standards Raised

The Tennessee State Fire Marshal's Office in the Department of Commerce and Insurance is continually working with communities to help them adopt residential building codes. Communities must actively opt out of the codes or they apply in their community. Commercial building codes apply in all parts of the state. The state will adopt the 2009 energy code before the end of the fiscal year on June 30, 2016. These increased standards are critical to protecting homes in floods and earthquakes, making them safer, and making them more energy efficient. The state will also require the 2012 codes for commercial buildings; it is not certain that this will occur in the next 12 months, but it is planned. These codes have updated seismic hazard information and will better protect new buildings during earthquakes and other events.

The State currently requires freeboard of three feet above the minimum NFIP standards in floodplains. Because of the risk of flooding and the concentration of property in the floodplain in the target area and throughout the state, this requirement benefits residents and businesses in every county. This high standard will continue to be enforced for the foreseeable future.

The State NFIP Coordinator is working with communities in the target area to encourage participation in the Community Rating System (CRS), a voluntary program that provides communities the opportunity to reduce flood insurance premiums for its citizens if the community implements and certifies activities that contribute to reduced flood loss. While the state cannot commit to a specific increase in the number of communities that participate because the program is voluntary, it is an important part of the NFIP Coordinator's day-to-day work.

Over the past few years state departments have been developing different resiliency efforts, but this grant opportunity has afforded Tennessee with the chance to bring these efforts together and in a cohesive fashion that can provide comprehensive long-term resiliency to its citizens. With the inclusion for the first time of our federal partners, more involvement by our local partners, and through outreach to non-profits and foundations, Tennessee has shown commitment to resiliency that is innovative and based on data. The target areas in this project are representative of other areas of the state and the successful projects completed this this program will be expanded throughout West Tennessee and the rest of the state. Additionally, the focus on preparedness for riverine flooding will allow the state to simultaneously prepare for other disasters including earthquakes, tornadoes and severe storms, as well as the impacts of the climate change, all of which involve flooding and other, similar impacts.