

City of Hendersonville
Lower Mud Creek Flood Risk Reduction - Phase 2

ID: G-202302-07024
Program Lead: Kasey Ginsberg

Grant Amount: \$250,000.00

Status **Awarded**

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Organization: City of Hendersonville
Primary Contact: Michael Huffman
Primary Signatory: John Connet

Fiscal Information

Organizations's next fiscal year begins: 7/1/2023
Total current annual operating budget: \$52,469,974.00
Budget figure provided is for fiscal year ending: 6/30/2023
Total current endowment, reserve, or unrestricted fund balance: \$8,289,088.00
Endowment, reserve, unrestricted fund balance is for fiscal year ending: 6/30/2023
Does this grant include a Fiscal Sponsor? No

▼ Full Application

Project Title: Lower Mud Creek Flood Risk Reduction - Phase 2
Program Area: Flood Mitigation and Recovery Program

Project Summary:

The Project is Phase 2 of a corridor-wide project to address frequent flooding and potential health and safety impacts to citizens and property owners along Mud Creek. The Project will plan, design, and permit activities to maximize the potential for flood storage on a Site for which for which acquisition funding has been recently awarded by NCLWF. Approximately 77% of residents in the adjacent census area are classified as low-income. The Project will dovetail with, and benefit from, other recently funded efforts upstream. City staff and an Engineering consulting firm with expertise in green infrastructure flood reduction planning and design will complete the Project and pursue next steps to construct and maintain the Project over time.

Amount Requested: \$250,000.00
Total cost of the project including the amount requested from Golden LEAF
Project Budget: \$256,198.00

County where the project is located. Henderson
Please select one option.

1. To be eligible under this program, a proposed project must fit within the categories below. Select one response that most closely aligns with your project proposal. (All infrastructure must be publicly owned.): Engineering expenses related to planning and development of flood mitigation solutions

2. Project term: How long will it take for the project to be completed? Enter a number of months only, e.g. 12:
24 months

3. Geographic area served by the project. :

The City of Hendersonville, NC. Specifically, the area referred to as the "southside", which encompasses the floodplain and floodway along Mud Creek near the intersection of HWY 225 - Greenville Hwy and HWY 176 - Spartanburg Hwy. XY coordinates for the project property is x:-82.452997 y: 35.312530

4. Provide a summary of the proposed project.

The City recently completed a NC Land and Water Fund Planning Study (Planning Study) in 2022-2023 that prepared conceptual designs and cost estimates for corridor-scale sustainable green infrastructure approaches to increase flood storage, restore natural functions, and reduce high frequency flooding in the Lower Mud Creek Watershed, focusing on Phase 1 implementation activities on two upstream City-owned parcels of approximately 15-acres each, but also identifying a critical acquisition Site for flood storage potential on which Phase 2 activities would take place. That Site, consisting of 25-acres (3 parcels) upstream of the

Saluda Railroad Grade (a proposed rail-trail) and Jackson Park, is the subject of this current grant proposal. Phase 1 funding has been awarded for design and construction on the two upstream sites, and acquisition of the 25-acre proposed project Site. Phase 1 funding also includes \$6,198 for preliminary planning of Phase 2 improvements on the acquisition Site. The proposed Project is to build upon this planning to complete design, engineering and permitting for all Phase 2 activities on the acquired Site.

Historic berms along Mud Creek, running through the western side of the Site, and along site ditches (see Project Map) disconnect high frequency flood flows from the primary flood storage areas on the eastern side of the Site. In addition, the Phase 1 sites are hydrologically connected to the Phase 2 Site via a flood bypass channel named Johnsons Ditch allowing potential for upstream high frequency events to be routed to flood storage areas on the Site via this conveyance. Planning and design is needed to assess, model and develop design plans for the breach of the Mud Creek berms on the Site and routing and handling of increased overflow from Mud Creek, and/or via Johnsons Ditch from upstream site work, through the site in order to integrate and maximize the Site's flood storage potential into the multi-site system of flood reduction. Besides ensuring non-erosive connections through the site, a primary activity will be to design through detailed hydraulic modeling, as well as the retrofit or replacement design of hydraulic relief structures on the Site. It is anticipated that, at a minimum, these structures can be retrofit to provide additional flood storage for high frequency events. Proposed activities will be designed to develop the site's full potential for flood storage while accounting for existing and future site activities as well as permitting requirements. Design activities must route flows and provide flood storage in a manner that accommodates existing and future infrastructure (which includes a future sanitary sewer realignment (in design), and a proposed regional greenway) and to facilitate the continuation of existing public use which the private landowner allows and facilitates through the maintenance of natural surface walking trails on the site. Permitting must be consistent with allowable activities under the Clean Water Act, and also meeting floodplain permitting and other permitting requirements. These conditions will require agency coordination as well as iterative design to provide for multiple objective solutions.

The proposed Project will develop assessment data, detailed hydrologic and hydraulic modeling to refine design and documentation of flood benefits on the Site, design plans and specifications for grading, outlet/hydraulic structure modification and/or replacement, revegetation of disturbed areas of the site, and preliminary recommendations for inspection and maintenance to promote long-term sustainability of the efforts. Stakeholder outreach will be conducted and easements and permits will be applied for and obtained, as described in the detailed description of project implementation.

5. Describe the process by which the proposed project was developed, including what other solutions were evaluated and if any cost / benefit analysis was used. Please include if this proposed project was previously recommended in a stormwater study or other comprehensive storm analysis.

The proposed Project was identified through a water quality planning grant awarded to the City of Hendersonville in 2022 by the NC Land and Water Fund. Previous assessments conducted in 2002 Southside Development Initiative planning effort and 2003 Mud Creek Watershed Restoration Plan.

6. Provide a detailed description of how you will implement the proposed project including any required permits, easements, or permission from other entities (including the railroad, NCDOT, Army Corp of Engineers, etc) that will be required and an anticipated timeline to secure each.

The proposed Goldenleaf funding of the Phase 2 Project on the acquisition Site will consist of the following task breakdown: Assessment, Preliminary Modeling and 30% Design, Stakeholder Coordination 60% Engineering and Design, Temporary Easement or Access Agreement Acquisition, 90% Engineering and Design, Final Engineering and Design (Bid Documents), and Permitting. No construction will be completed under the current funding request, but the City will pursue additional grants and continue to provide in kind and matching funding to fulfill the design using the permits acquired.

After completion of land acquisition for the Phase 2 Site (which will be completed under Phase 1, a separate project with funding awarded), an assessment phase for the Phase 2 Project will be completed to survey and map existing flow patterns, hydraulic controls (bridge and culvert surveys), site vegetation and to collect and review, planning and design documents for other projects to occur in the corridor (sanitary sewer, greenway, other). Any additional boundary or easement data will be collected by a PLS. Additional site evaluation will include jurisdictional determinations for streams and wetlands, agency outreach regarding Section 106 evaluation for historic properties and resources, threatened and endangered species evaluation, and review of other relevant site history. Existing vegetation will be documented for consideration during design. Hand-augered soil borings will evaluate areas that are proposed for flood storage excavation to plan for suitable disposal and/or reuse of excavated materials.

Based on the existing conditions modeling proposed below, a preliminary design will be developed to depict proposed site grading, storage and routing for flood reduction. The design will show how existing and proposed uses are met on the Site, which is mainly planned as open space, but includes linear transportation and utilities. This design will inform and be an iterative part of preliminary modeling and optimization of flood storage and routing for proposed conditions.

The hydraulic model proposed to support the upstream Phase 1 design project will be expanded to include existing and proposed conditions for this Phase 2 Project and will include incorporation of detailed assessment data in order to complete Phase 2 existing conditions hydrologic evaluations and proposed site scenario development for optimization of flood storage and routing for flood reduction. One of the timely benefits of the requested funding is that the Phase 2 acquisition Site can modeled with the upstream Phase 1 projects to maximize the benefit of the Phase 2 acquisition Site for flood routing and storage (attenuation) as part of a corridor wide system of sites. This inter-related hydrology is facilitated by an historically constructed flood relief channel named "Johnsons Ditch" which connects the two Phase 1 (existing City-owned) parcels that have already been funded for design and construction with the Phase 2 acquisition Site. All three sites are predominantly low-lying floodprone areas with significant berms along existing drainage features which prevent routine access of frequent flood events from accessing flood storage on the sites. All street crossings in the corridor, as well as some businesses, are subject to flooding. The proposed Phase 2 Project design will facilitate design of a more efficient system to reduce flooding within the urban corridor as routing and storage optimization between the sites can be planned for maximum benefit.

Stakeholder Coordination will be conducted to allow for public input on the sites, and to coordinate with landowners and public and private entities where easement or other coordination is required. NCDOT encroachment agreement, possible railroad coordination with the rail-trail easement holder or railroad, and possible private landowner access agreements may be required. Permitting entities will be engaged to ensure that designed activities can be permitted and include provisions necessary to facilitate permit acquisition. Reestablishing a floodplain connection will subject the Site to large overflows from Mud Creek and this proposed Project will evaluate the location and extents of berm removal along Mud Creek, prescribe the establishment of stable connection points between Mud Creek and floodplain storage areas, and plan and design outlet control structures that help to facilitate flood storage and maintain the long term integrity of the project (currently the Site is drained by a series of historic ditches and two aging and rusting corrugated metal culverts under the downstream railroad embankment). The existing relief culvert openings will be redesigned or replaced to restrict outflow at lower stage flood levels to enhance flood storage. The likely need to replace these will be used to evaluate opportunities to create more capacity for less frequent large floods as well.

Flood benefits, estimated project construction costs, and a full bid package will be prepared. An inspection and maintenance plan will be developed for natural and engineered features that will be implemented post-construction by the City of Hendersonville.

60% and 90% Engineering and Design milestones will be set in order for the City to conduct reviews, and for modeling, permitting, stakeholder coordination and other project requirements to be progressed in a step-wise

fashion. Between 60-90% design phases, any necessary temporary access agreements or easements will be negotiated and finalized at the appropriate time.

The outcome of the proposed Project will be design and bid documents that can be constructed along with, or shortly after, improvements to upstream Phase 1 sites for which construction funding has already been obtained. In addition, all permitting will be completed for this Phase 2 portion of the larger corridor wide initiative, including the following: 404/401 permitting, floodplain development permitting (FEMA), and erosion & sediment control permitting.

7. Describe the benefitting population for this project by filling in the appropriate blanks below. If not applicable, please put 0. Supporting documentation for these outcomes must be provided as a required attachment.

Households located in the immediate project area (for multifamily housing, each unit is a separate household):	18
Businesses located in the immediate project area:	75
Other public or private entities including public buildings, schools, places of worship, fire and/or rescue facilities located in the immediate project area. Provide detail in the next question.	0
Bed capacity of a hospital or health clinic located in the immediate project area:	0

8. Describe any additional project outcomes or population benefitting from this project.

The larger corridor project, of which this Phase 2 Project is a key contributing part, addresses flooding in the Upper Mud Creek sub-watershed (060101050301) along Mud Creek, which flows north around downtown Hendersonville on its way to the French Broad River. There are 75 commercial properties (\$48,643,000 total assessed value) and 18 residential properties (\$13,258,000 total assessed value) with medium to high combined vulnerability and risk for flooding in the project's immediate area of influence. As of 2018, there were 13 repetitive flood loss properties with 61 claims totaling \$1,183,716 (\$823,961 in building payments and \$359,754 in content payments).

Between 2009-2020, 12 out of 27 flood crests have caused minor to moderate flooding in the project area (see attached Mud Creek Flood Risk Summary for supporting tables and maps). With moderate flooding, Mud Creek is overtopping bridge decks and railroad tracks, inundating S. Grove St., and threatening businesses along several major commercial corridors (S. King, S. Main/Greenville Hwy, and Spartanburg Hwy). With minor flooding, Mud Creek reaches the bottom of multiple bridge decks, and causes backwater effects along Wash Creek inundating an access road. Flooding at the intersection of Spartanburg Highway and Greenville Highway as well as along S. Grove St. and upstream on Erkrwood Rd. can also isolate residents on the southside of Hendersonville. Flooding of this area can prevent residents from accessing their homes and also increases travel time from the southside of the city to critical facilities such as Pardee Hospital. Flooding of these streets increases response times for emergency services as well.

The attached Mud Creek Flood Risk Summary shows that the entire project area is flood prone, and highlights the residential and commercial flood vulnerability and risk in the project's area of influence described in 10.1. The project area also includes a Potentially Underserved Block Group (PUBG) identified by the NC DEQ Community Mapping Program (see the PUBG Project Location Map). Approximately 47% of the population is minority with a median household income of \$23,365, and approximately 77% are classified as low-income. At the encompassing census tract level, the CDC's Social Vulnerability Index (SVI) is .94 (out of a maximum of 1), 33.8% of households are below the poverty line, and 34% receive SNAP benefits.

The South Grove Acquisition parcels will preserve existing Bottomland Floodplain forested areas, add flood storage capacity, and provide the missing physical connection between the Brevard Church and the Dog Park sites, opening opportunities for additional flood storage, floodplain connectivity, and public access through these sites to Jackson Park. With the implementation hydraulic control measures, acquisition activities will target upwards of 70 acre-feet of available flood storage upstream of the railroad.

The long-term vision for the corridor is to obtain the flexibility to maximize the hydrologic connectivity and flood storage benefits achieved within the Brevard Church site and downstream acquisition parcels, as well as the Dog Park site and downstream in Jackson Park. These sites are hydrologically connected north of South Grove Street and the railroad by existing crossing structures. Within the Dog Park and the Jackson Park site there is approximately 160 acre-feet of flood storage potential in existing low-lying areas that can be utilized by manipulating water control at multiple points throughout the corridor, starting at the upstream Wilson site and using Johnsons Ditch as a conveyance channel that connects to existing and enhanced offline flood storage areas.

9. Describe how project outcomes will be sustained once the project is complete. For planning projects, this must include a plan for implementation of recommendations if funds through Golden LEAF are unavailable.

The City has a cohesive vision across the engineering, stormwater, parks and sewer departments for the implementation of green infrastructure to support City services and the environment for the benefit of residents and visitors. To date, the City has obtained \$3.2m to implement Phase 1 of this project. In recent years, the City obtained NC DWI funding to implement green infrastructure on 13 sites using a no-interest loan for funding construction and is monitoring and maintaining these sites. The City anticipates that NCDWI, NCLWF, EPA 319, NCDEQ Division of Water Resources and/or other grants will be viable options for implementation the design developed under the current funding request. The design will have secondary benefits to stormwater management, floodplain functions, infrastructure protection and recreational opportunities that are supported by these various grant programs.

10. Identify the local government staff and contractors who will be involved in the project.

Local Government Staff include: Stormwater Division, Public Works Staff, Engineering Department, and Legal Department

Contractors include: Wildlands Engineering

11. How frequently does flooding in this identified area occur? Select one response. Documentation must be provided as a required attachment.	Occurs somewhat frequently, during hurricanes and other large unnamed storms
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12. Provide additional detail regarding the frequency that flooding occurs. Please be as specific as possible.

The attached Flooding Events Supporting Documentation provides additional details regarding the frequency of flooding in the project area.

13. What is the effect of the flooding? Select as many that apply. For purposes of this question, public safety or health services include fire, emergency medical, police, hospitals, urgent care clinics, or similar services.

Increased operating costs for governmental services, Loss of access to public or private property (other than public safety or health services), Damage to public or private property (other than public safety or health services), Increased operating costs for governmental services, Loss of access to public or private property (other than public safety or health services), Damage to public or private property (other than public safety or health services)

14. Provide additional detail regarding the effect of flooding. Please be as specific as possible.

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15. The recent state budget includes various programs to mitigate flooding in North Carolina. Please describe any efforts or intent to pursue funding from any of those programs for this proposed project.

Phase 1 of the project has been awarded \$1.2 million from the NC Land and Water Fund Flood Risk Reduction Program. Part of the funding awarded is for the purchase of the acquisition site for which the Phase 2 professional services proposed as the subject of this grant application will occur. The awarded funding is also being used for related flood reduction planning and design on other sites within the corridor.

After funding is in place for Phase 2 engineering, design and permitting for the acquisition site, the City will subsequently pursue opportunities for state and/or federal grant funding to implement the construction of Phase 2 using the construction documents and permits prepared.

▼ Project Outcomes

Please select the project outcomes below for them to appear.

Priority Flood Mitigation and Recovery Outcomes:

Households located in the immediate project area (for multifamily housing each unit is a separate household),
Businesses located in the immediate project area

Households located in the immediate project area (for multifamily housing, each unit is a separate household).	
Target 1:	18
Baseline 1:	18
Target date 1:	6/30/2025
Data source 1:	Mud Creek Flood Risk Summary V2

Businesses located in the immediate project area	
Target 2:	75
Baseline 2:	75
Target date 2:	6/30/2025
Data source 2:	Mud Creek Flood Risk Summary V2

Other Outcomes:

The City and numerous non-profit entities are engaged in the development of recreational and open space access opportunities in the proposed project corridor including the development of the Above the Mud Greenway Connector, which will connect the Ecusta Trail to the west and the Oklawaha Greenway through Jackson Park to the east. These opportunities will be enhanced through improvements to water quality and through reduced flood frequency, and the use of City-owned land for passive recreation and educational opportunities (signage, outreach events) consistent with restoration goals.

▼ Project Activities

Please select project activities below for them to appear.

Flood Mitigation Project Activities : Engineering and Design, Permitting

Activity 1: Engineering and Design	
Activity 1 Target Date:	4/30/2025

Activity 3: Permitting	
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Activity 3 Target Date:6/30/2025

Other key activities:
As part of Engineering and Design activities, the following tasks and anticipated completion dates have been delineated:
Contract Engineering Services - 08/01/23
Assessment - 03/29/24
Preliminary Modeling and 30% Design - 06/28/24
Stakeholder Outreach - 08/30/24
60% Engineering and Design -11/15/24
Temporary Easement or Access Agreement Acquisition 1/31/25
90% Engineering and Design and Final Modeling - 2/28/25
Final Engineering and Design (Bid Documents prepared) - 4/30/25
Permitting - 5/15/25

▼ Project Time Frame

Period of time to complete project outcomes, which may extend beyond the grant term.
Project Begin Date:7/31/2023
Project End Date:12/31/2026
Enter the number of months only.
Project Term:41

▼ Grant Term Information

Period of time over which Golden LEAF funds would be used.
Created By (Date):Michael Huffman (2/20/2023)
Start Date:7/31/2023
End Date:7/31/2025
Duration In Months:24

▼ Documents

[GLF instructions] All attachments are required for submission of an application. The required Certification and Signature Form and Comprehensive Project Budget may be found **here**, on the Mitigation Program Documents page. If one or more of the items listed below are not available, please upload a document that explains why the attachment is not available. Applications may be updated or added to later as needed. Please be sure to use file names to describe the document uploaded. If you have multiple documents for an attachment, please merge prior to uploading. ****Please convert picture files to PDF format to upload or paste into a Microsoft Word document and upload the document.****

Members of Governing Body

Evidence of governmental status

Most recent fiscal year-end financial statements

Organization's budget for the current year

Organization's budget for the period covered by the grant request

Most recent management letter/report on internal controls

REQUEST DOCUMENTS		
	7024_City_of_Hendersonville_Grantee_Acknowledgement_and_Agreement_Aug_2023.pdf Foundation File to Grantee Added by Terri Adou-Dy at 8:28 PM on August 7, 2023	
	Henderson_County_Flood_Events.csv Documentation of flooding frequency Added by Michael Huffman at 12:54 PM on July 13, 2023	
	202302-07024_FloodMitigation_RecoveryProgram_05.10.2023.pdf Other Added by Debbie Pennington at 10:32 AM on May 11, 2023	
	7024-Application Checklist.docx Other Added by Debbie Pennington at 10:09 AM on May 11, 2023	
	Hendersonville Flood Risk Reduction Phase 2 - Project Area Map 5.10.23.pdf	

 Map of project location Added by Michael Huffman at 3:55 PM on May 10, 2023	
 Comprehensive-Project-Budget-and-Project-Management-Plan-Form-2023 Lwr Mud Ck Ph 2 5.5.2023.xls	
Project budget Added by Michael Huffman at 1:38 PM on May 9, 2023	
 20230508 GoldenLeaf Certification Form.pdf	
Certification and Signature Form Added by Michael Huffman at 4:11 PM on May 8, 2023	
 Design Cost Estimate - Rev 5.5.23.docx	
Opinion of Probable Cost or other similar document  Current version added by Michael Huffman at 5:02 PM on May 5, 2023	
 MudCreekFloodRiskSummary v2 - shows flood impacts 2yr.pdf	
Supporting documentation for outcomes data Added by Michael Huffman at 3:15 PM on May 3, 2023	
 Flooding Events Supporting Documentation.pdf	
Photos of flooding Added by Michael Huffman at 1:49 PM on April 27, 2023	
 Flooding Events Supporting Documentation.pdf	
Documentation of flooding frequency Added by Michael Huffman at 1:47 PM on April 27, 2023	
ORGANIZATION DOCUMENTS	
 050423 GL Members of Governing Body.pdf	  
Members of Governing Body Added by Michael Huffman at 10:35 AM on May 4, 2023	
 city_of_hendersonville_acfr_6.30.22.pdf	  
Most recent fiscal year-end financial statements Added by Michael Huffman at 10:29 AM on May 4, 2023	
 COH - Internal Control Memo - 2023.doc	  
Most recent management letter/report on internal controls Added by Michael Huffman at 10:28 AM on May 4, 2023	
 City of Hendersonville.docx	  
Evidence of governmental status Added by Michael Huffman at 10:28 AM on May 4, 2023	
 Golden Leaf Attachment Item 6 Response.docx	  
Organization's budget for the period covered by the grant request Added by Michael Huffman at 3:23 PM on May 3, 2023	
 fy2022-2023_adopted_budget.pdf	  
Organization's budget for the current year Added by Michael Huffman at 1:48 PM on April 27, 2023	