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General

<table>
<thead>
<tr>
<th>Program *</th>
<th>Hurricane Harvey State Mitigation Competition – HUD MID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant *</td>
<td>Harris County Community Services Department (CSD)</td>
</tr>
<tr>
<td>County *</td>
<td>Harris</td>
</tr>
<tr>
<td>Application Type *</td>
<td>New</td>
</tr>
</tbody>
</table>
Each application must upload a MIT-Local Certifications form signed by an authorized signatory along with other required application documentation. Each applicant for CDBG-MIT funding must certify by signing that both the Application for Federal Assistance Standard Form 424 (SF-424) and the MIT-Local Certifications form provided on the GLO website and described in the application guide were followed in the preparation of any CDBG-MIT program application, and will continue to be followed in the event of funding.

The Application for Federal Assistance Standard Form 424 (SF-424) and the MIT-Local Certifications

Related Contacts

Contact *

Mrsny, Reid

Authorized Representative

Hidalgo, Lina

Grant Administrator

Hickingbottom, Kent

Standard Form 424

Application Title *

Greens Bayou Drainage Partnership Application
9/30/2020

Applicant Delinquent on Federal Debt
- Yes
- No

Construction Application
- Yes
- No

Construction Pre-Application
- Yes
- No

Program Not Selected by State for Review
- Yes
- No

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Mitigation Application

Addressed Risk - Select the risk identified in the Action Plan that will be addressed. (select all that apply)

- Hurricanes/Tropical Storms/Tropical Depressions
- Severe Coastal Flooding
- Riverine Flooding

"The Federal Register, 84 FR 45838 (August 30, 2019) defines mitigation as:
“Activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship, by lessening the impact of future disasters.”

Applicants must describe in narrative format how their proposed project meets the above definition and clearly identify the methodology used to determine how the described criteria are being met. Include information identifying how the proposed project addresses overall local mitigation needs.

Mitigation presents communities with unique opportunities to examine a wide range of issues including (1) housing quality and availability, (2) road and rail

Hazard: Risk Description - Describe how the risk(s) selected are impacting the proposed project area. Reference where adopted local mitigation efforts are planned or underway where appropriate.

Subdivisions and businesses throughout the Greens Bayou Watershed in Harris County experience flooding conditions during hurricanes, tropical storms, and even intense rainfall events that overwhelm drainage systems and result in riverine, or out-of-bank, flooding of the local bayous, tributaries, and drainage channels. The risk of flooding is a daily threat to the residents that live in areas with aging and inadequate drainage systems. The project sites identified throughout this application are part of an organized county-wide effort to analyze infrastructure shortfalls, build community resilience, and mitigate future hazards through flood risk reduction projects and strict floodplain management practices. The sites described in this application benefit many residents in some of the most vulnerable and at-risk areas of the County.

The massive and long-term financial commitment is recognized locally, and so a portion of project site costs, most of the sites included in this application, were approved for funding in the 2018 Harris County Flood Control District Bond Program. While some funding was earmarked for these sites, and is currently being used to fund the engineering study and design, the bond funding is not adequate to construct the required improvements. As a result, Harris County and Harris County Flood Control District are in dire need of additional funding to help address these urgent concerns. Income and need were factors when selecting projects for inclusion in the Bond program and the improvements were designed to assist low- and moderate-income persons/communities. Earmarked funding can be found in the Harris County FY 2020 Mid-Year Review and Capital Improvements Program (CIP), adopted in September 2019, along with subdivisions and mapped sites. Additionally, measures needed to address subdivision drainage were included in the Harris County Hazard Mitigation Plan.

See the attached narrative for additional information.
Hazard Mitigation Actions - Describe how the proposed project will mitigate against the identified risks. Reference where adopted local mitigation efforts are being enhanced where appropriate.

The Greater Houston area has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 84 deaths and over $125.5 billion in damages. Because of the devastation and the need to identify measures to mitigate the impacts of major storm events, Harris County studied over 100 previously flooded subdivisions and found drainage solutions to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity project improves drainage at neighborhood and regional levels by making improvements to five subdivisions within the Greens Bayou Watershed and provides detention for Aldine Westfield and Hardy area basins. The proposed improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing storage capacity with new detention basins and enlarging channels. The increased capacity across multiple project sites ultimately places less burden on the watershed, or service area. The cumulative benefits of multiple project sites ultimately mitigate property, life, and economic loss in future flooding events.

Harris County and Harris County Flood Control District have adopted the most stringent floodplain regulations in the United States by incorporating robust infrastructure regulations that ensure development follows standards that minimize the likelihood of future flooding. Copies of the Harris County floodplain regulations, infrastructure regulations, and HCFCD Policies, Criteria, and Procedures Manual with proof of adoption by Commissioners Court can be found in the supporting documentation for this application.

Due to space limitations, details for this section can be found in the narrative attached in documents.

Local Adopted Plans - To meet the local plan requirement, applicants follow specific procedures identified in the CDBG-MIT Application Guide

Is the proposed project included in one or more locally adopted plans?

Yes

Provide the title of the adopted plan being referenced.

Harris County Multi-Hazard Mitigation Action Plan

Provide the page number(s) in the adopted plan(s) where the proposed project is identified.

11-1 through 11-38, 21-5

Provide the date (Month, Year) the plan(s) was/ were adopted:

5/19/2020
Added Resiliency Measures

Applicants must explain if prior capital improvement projects, short or long-range planning efforts, community engagement or educational outreach, the implementation of enhanced building codes or code enforcement, or other related work has been completed which enhances hazard mitigation and/or resiliency throughout the applicable community or service area of the applicant(s).

If no previous efforts have been made, this must be stated in the application. If a joint project is being submitted by multiple entities that crosses jurisdictional or service area boundaries, each jurisdiction or entity should provide examples of previous hazard mitigation or resiliency efforts that have been completed within their particular jurisdiction or service area. Source documents, such as signed memorandum, must be attached to the application which prove such efforts have been implemented.

Does the proposed project enhance mitigation efforts that are already completed or underway?

Yes

If Yes, then provide a brief description.

Public meetings were held for two of the five subdivision sites in this application during project development to gain public input and comments. The study reports and meeting information have been attached. Harris County and the Flood Control District have also taken measures through the most stringent floodplain regulations in the United States and by incorporating robust infrastructure regulations to ensure that development is built to standards that will minimize the likelihood of future flooding. Copies of the above documents and their adoption by Commissioners Court can be found in the supporting documentation for this application. Also, Harris County and the Flood Control District have included funding for the study and design of the projects in their capital program. A copy of the Capital Improvements Program (CIP) has also been attached.

Please see the attached narrative for additional information.

Select the type(s) of prior or current local efforts undertaken that, combined with the proposed project, will provide enhanced hazard mitigation:

- Prior capital improvement project(s)
- Current capital improvement project(s)
- Short-range planning efforts
- Long-range planning efforts
- Community engagement
- Educational outreach
- Implementation of enhanced building codes
- Code enforcement
- Other related work which enhances hazard mitigation and/or resiliency through the proposed project.

Other Hazard Mitigation Work
Mitigation Application

A grant to a locality under the CDBG-MIT program may be awarded only if the locality certifies that it is following a detailed citizen participation plan that provides for and encourages citizen participation at all stages of the program. If an applicant has a current citizen participation plan, they must follow their current citizen participation plan for each proposed project.

CDBG-MIT applicants and funded entities are required to carry out citizen participation procedures in accordance with the Citizen Participation Plan as described in this guide. Each applicant certifies, by signing SF-424, that it has and will comply with the requirements of the Citizen Participation Plan as stated.

When did your jurisdiction post the project for public comment?

| From |  
|      |  
|      |  

To

| To |  
|    |  
|    |  

Although public hearings are not a program requirement, jurisdictions for whom public hearings are required by their citizen participation plan or choose to hold them, list the date(s) and attach the hearing documentation.
Upload an affidavit of public posting along with pictures that demonstrate the posting and documentation of public hearings held for citizen participation purposes, if applicable. Choose the applicable document type from the Citizen Participation Document Group.

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Mitigation Application

Each applicant for CDBG-MIT funding is expected to have a Grant Management Plan that assesses administrative, design, permitting, construction, and all other elements required to deliver a successful eligible project. For detailed information and instruction regarding the requirements of a Grant Management Plan, refer to the CDBG-MIT Application Guide.

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Mitigation Application

Maximum number of Projects per Application: 1

Create new Mitigation Project. To modify and/or submit an existing Project, navigate to Projects -> Complete an Existing Draft Project menu option.

Total Requested Amount

$100,000,000.00

<table>
<thead>
<tr>
<th>Proj #</th>
<th>GLO17-11258-P</th>
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</thead>
<tbody>
<tr>
<td>Project Title</td>
<td>Greens Bayou Partnership Drainage Improvements</td>
</tr>
<tr>
<td>County</td>
<td>Harris</td>
</tr>
<tr>
<td>Project Status</td>
<td>Draft</td>
</tr>
</tbody>
</table>
Mitigation Application Project

Acknowledging that mitigation needs may span a variety of services and facilities, for purposes of Mitigation funding only, the definition of project is expanded to include a discrete and well-defined beneficiary population and subsequent geographic location consisting of all eligible activities required to complete and provide specific successful mitigation benefit to the identified population.

For purposes of Mitigation application and implementation, the Project provided represents the overall Mitigation need being met.

There may be more than one Activity included in a Project. For instance, a successful Mitigation Project may require a drainage facilities activity, a street improvements activity, and a water facilities activity.

Program
Hurricane Harvey State Mitigation Competition – HUD MID

Subrecipient Application/Contract
Greens Bayou Drainage Partnership Application

Project Title
Greens Bayou Partnership Drainage Improvements

Project Summary
The Greens Bayou Watershed has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 64 deaths and over $125.5 billion in damages. Because of the devastation and the need to identify measures to mitigate the impacts of major storm events, Harris County studied nearly 100 previously flooded subdivisions and found drainage solutions to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity improves drainage at a regional and neighborhood level by making improvements to flood control facilities and five subdivisions within the Greens Bayou Watershed. The proposed improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing storage capacity with new detention basins and enlargement of channels. The increased capacity across multiple project sites ultimately places less burden on the watershed, or service area. The cumulative benefits of multiple project sites ultimately mitigate property, life, and economic loss in future flooding events.
All of the state’s mitigation activities under this grant will meet a national objective for either (1) benefiting low- to moderate-income persons (LMI), or (2) urgent need mitigation (UNM). At least 50 percent of CDBG-MIT funds will be used to support activities that benefit LMI person, and all programs and projects will have an LMI priority. For CDBG-MIT activities, HUD approval will be required to rely on the national objective criteria for elimination of slum and blighting conditions, because this national objective generally is not appropriate in the context of mitigation activities.

As indicated in the State Mitigation Action Plan: To qualify an application activity under the national objective of principally benefitting low-and moderate-income persons, at least fifty-one percent (51%) of beneficiaries of the activity must be low-and moderate-income persons.

Does the proposed project principally benefit Low- and Moderate-Income Persons or Mitigation Urgent Need?

<table>
<thead>
<tr>
<th>Low-and Moderate-Income Persons</th>
</tr>
</thead>
</table>

**Low- and Moderate-Income Persons**

- [x] LMI Area Benefit
- [ ] LMI Housing Activity
- [ ] LMI Limited Clientele

Provide the proposed beneficiary data:

**Total Beneficiaries**

**LMI Beneficiaries**

**% LMI Beneficiaries**
The basis for determining which residents are to be considered as beneficiaries of a proposed project can be achieved through the most recent LMISD information, or by conducting a survey of the area with approved CDBG-MIT forms.

All applications must include a project map identifying the benefit area. Target area projects must use Low and Moderate-Income Summary Data (LMISD) to document beneficiaries and must provide LMISD maps which clearly show all the census geographic areas (i.e. census tract, block group) within the applicant's jurisdiction. Locations and boundaries of all project target areas must be clearly delineated by identifiable features, such as named streets, railroads, streams, etc.

**Select the beneficiary identification method used to determine this National Objective.**

- Census

**Census**

Census data should be used to the maximum extent feasible for determining the income of persons residing in service areas; therefore, the boundaries of the service area determined by the applicant for the project need to be compared with the boundaries of census divisions (tracts, block groups, etc.). The census divisions that best fall within the service area should be used for documenting the percentage of low- and moderate-income persons residing in that area. HUD-based LMISD spreadsheets are used to document this beneficiary information.

The race, gender, and ethnicity for the total beneficiaries claimed for the proposed project must be tabulated in the space provided.

**Total Beneficiaries, Hispanic (System Calculated)**

- 0

**Total Beneficiaries, Non-Hispanic (System Calculated)**

- 0

**Total Beneficiaries (Hispanic and Non-Hispanic) (System Calculated)**

- 0

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Applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for grant administration, environmental, and engineering services if using CDBG-MIT funds to pay third-party vendors for those services. These rules and regulations also apply to procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html
Have you procured a third-party administrator to administer the proposed project?

Yes

Have you procured a third-party environmental service provider for the proposed project?

Yes

Company Name

Various (by site) - Procured with local funds and not requesting reimbursement.

Have you procured a third-party engineer for the proposed project?

Yes

Company Name

Various (by site) - Procured with local funds and not requesting reimbursement.
What is the current status of the project?

In Progress

Provide a brief narrative regarding how CDBG-MIT funding is to be used. Demonstrate that all HUD CDBG environmental requirements have been met to date. Applicants should be advised that all HUD CDBG environmental requirements must be met before reimbursement can be considered.


The Greens Bayou Watershed has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 84 deaths and over $125.5 billion in damages. Because of the devastation and the need to identify measures to mitigate the impacts of major storm events, Harris County studied nearly 100 previously flooded subdivisions and Harris County Flood Control District identified regional solutions, finding drainage alternatives to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity improves drainage at a regional and neighborhood level by making improvements to flood control facilities and five subdivisions within the White Oak Bayou Watershed. The proposed improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing storage capacity with new detention basins and enlargement of channels. The increased capacity across multiple project sites ultimately places less burden on the watershed, or service area. The cumulative benefits of multiple project sites ultimately mitigate property, life, and economic loss in future flooding events.

Will the proposed project site have any negative impact(s) or effect(s) on the environment per HUD environmental regulations as described?

More information at https://www.hudexchange.info/programs/environmental-review

No

Is the proposed project site likely to require a historical resources/archaeological assessment?

More information at https://www.hudexchange.info/environmental-review/historic-preservation

No

Is the proposed project site listed on the National Register of Historic Places?

More information at https://www.nps.gov/subjects/nationalregister/index.htm

No

Is the proposed project site in a designated flood hazard area or a designated wetland?

FEMA Firmette located here: https://msc.fema.gov/portal/search

Yes
Is the applicant participating in the National Flood Insurance Program?
More information at https://www.hudexchange.info/programs/environmental-review/flood-insurance

Yes

Is the project in compliance with Executive Order 11990?
More information at https://www.hudexchange.info/environmental-review/wetlands-protection

Yes

Is the project in a designated Regulatory Floodway?
More information at https://www.hudexchange.info/environmental-review/floodplain-management

Unknown

Is the proposed project site located in a known critical habitat for endangered species?
More information at https://www.hudexchange.info/environmental-review/endangered-species

No

Is the proposed project site a known hazardous site?
More information at https://www.hudexchange.info/environmental-review/site-contamination

Unknown

Is the proposed project site located on federal lands or at a federal installation?

No

What level of environmental review is likely needed for the proposed project site?

Categorical Exclusion

Provide any additional detail or information relevant to Environmental Review

Supporting documentation has been provided with additional detail. The type of environmental review required is subject to change.
Mitigation Application Project

Identify activities already achieved to further fair housing, and those activities to be undertaken if an award is made by CDBG-MIT and when that activity will be complete. Upload any backup documentation to support your efforts.

<table>
<thead>
<tr>
<th>Name</th>
<th>Activity 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Planned</td>
<td>Publishing the contact information, at the local, state and federal levels, for reporting a Fair Housing complaint—achieved March 1, 2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Activity 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Planned</td>
<td>Designating a Fair Housing Month – will achieve April 1, 2021 and have achieved April 1, 2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Activity 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Planned</td>
<td>Develop an anti-NIMBYism plan – achieved Nov. 12, 2018</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Name</th>
<th>Activity 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comment Planned</td>
<td>Developed an AFH/Fair Housing Plan and submitted to HUD – achieved Jan 31, 2019</td>
</tr>
</tbody>
</table>

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Mitigation Application Project

The schedule requested here is the Project Level Schedule. Identify the time needed to complete every activity and ensure a full and eligible project. Activity Level schedules must be uploaded separately.

<table>
<thead>
<tr>
<th>Project Phase</th>
<th>Start Date</th>
<th>Length (months)</th>
<th>End Date (calculated)</th>
<th>Phase Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement of Engineer/Architect Services Professional Services</td>
<td>1/16/2020</td>
<td>5</td>
<td>6/16/2020</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Start-Up Documentation</td>
<td>1/16/2020</td>
<td>10</td>
<td>11/16/2020</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Acquisition</td>
<td>10/7/2020</td>
<td>21</td>
<td>7/7/2022</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>3/17/2021</td>
<td>12</td>
<td>3/17/2022</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Bid Advertisement</td>
<td>2/9/2022</td>
<td>10</td>
<td>12/9/2022</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Contract Award</td>
<td>4/1/2022</td>
<td>10</td>
<td>1/31/2023</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Construction NTP</td>
<td>5/27/2022</td>
<td>14</td>
<td>7/27/2023</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Construction</td>
<td>5/27/2022</td>
<td>32</td>
<td>1/26/2025</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Submit As-Builts/COCC/FWCR</td>
<td>8/20/2023</td>
<td>19</td>
<td>3/20/2025</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Contract Closeout</td>
<td>9/20/2023</td>
<td>19</td>
<td>4/20/2025</td>
<td>NotExecuting</td>
</tr>
<tr>
<td>Construction Activity Completion</td>
<td>12/26/2024</td>
<td>1</td>
<td>1/26/2025</td>
<td>NotExecuting</td>
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</table>
The Project Level Budget represents summary data compiled as each Activity and Site are defined. Applicants are expected to present a thorough budget at the site level that includes all elements required for an eligible and successful project. Construction or public facilities budgetary information must be provided by a professional engineer or architect licensed to practice in the state of Texas using the MIT-Budget Justification of Retail Costs (formerly Table 2) form available the GLO website at: https://recovery.texas.gov/files/resources/mitigation/mit-budget-justification-of-retail-costs.xlsx

Original sealed construction and public facilities budgetary information must be uploaded as supporting

**Minimum Total Amount Requested**

$0.00

**Maximum Total Amount Requested**

$1,000,000,000.00

**Maximum # of Activities per Project**

20 Activities

**Total Estimated/Original Project Budget**

$100,000,000.00

**Budget Activities**

<table>
<thead>
<tr>
<th>Program Budget Code</th>
<th>Flood control and drainage Improvements</th>
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</thead>
<tbody>
<tr>
<td><strong>Planned/Requested Amount</strong></td>
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<tr>
<td><strong>Total Other Funds</strong></td>
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<td><strong>Activity Total</strong></td>
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Budget Activity for Mitigation Project

General

Hurricane Harvey State Mitigation Competition – HUD MID

Project

Greens Bayou Partnership Drainage Improvements

Program Budget Code *

Flood control and drainage Improvements

Item Cost (Calculated based on Site Budget)

$100,000,000.00

Project Sites for this Activity. Provide Site and Site Budget Information.

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Total Requested from Site Budget

$100,000,000.00

Total Other Funds

$19,374,247.03

Activity Total

$119,374,247.03

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<table>
<thead>
<tr>
<th>Site Number</th>
<th>S-003163</th>
<th>S-003164</th>
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<tbody>
<tr>
<td><strong>Total Requested Grant Funds</strong></td>
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<td>$3,156,879.04</td>
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<tr>
<td><strong>Total Other Funds</strong></td>
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<td>$463,271.00</td>
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<tr>
<td><strong>Total Grant &amp; Other Funds</strong></td>
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<td>$3,620,150.04</td>
</tr>
<tr>
<td><strong>Site Title</strong></td>
<td>Castlewood Addition Sections 3 and 4 Subdivision Drainage Improvements</td>
<td>Fountainview Sections 1 and 2 Subdivision Drainage Improvements</td>
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<tr>
<td>Site Number</td>
<td>S-003166</td>
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<tr>
<td><strong>Total Requested Grant Funds</strong></td>
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<td><strong>Total Other Funds</strong></td>
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<tr>
<td><strong>Total Grant &amp; Other Funds</strong></td>
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<tr>
<td><strong>Site Title</strong></td>
<td>Humble Road Place and Parkland Estates Subdivisions Drainage Improvements</td>
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<table>
<thead>
<tr>
<th>Site Number</th>
<th>S-003167</th>
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<tbody>
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<td><strong>Total Other Funds</strong></td>
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<td><strong>Total Grant &amp; Other Funds</strong></td>
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<tr>
<td><strong>Site Title</strong></td>
<td>North Forest Subdivision Drainage Improvements</td>
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<tr>
<td>Site Number</td>
<td>S-003328</td>
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<tr>
<td>--------------</td>
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<tr>
<td>Total Requested Grant Funds</td>
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<tr>
<td>Total Other Funds</td>
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<tr>
<td>Total Grant &amp; Other Funds</td>
<td>$59,999,916.46</td>
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Site Title: Greens Bayou Mid-Reach Channel Improvements and Stormwater Detention Basins
Project Sites & Locations

**Program**
Hurricane Harvey State Mitigation Competition – HUD MID

**Site Number**
S-003163

**Site Title** *
Castlewood Addition Sections 3 and 4 Subdivision Drainage Improvements

**Site Description**
The Castlewood subdivision was developed in the 1960s and '70s. The two sections for this project site consist of 80+ acres of residential parcels served by a roadside ditch drainage system. The system of ditches drain into Harris County Flood Control district (HCFCD) channel P138-01-00, a tributary of Greens Bayou. Although current regulations allow ditches, this project site is considered non-conforming due to culvert sizing, inadequate extreme event sheet flow design, lack of detention, and poor lot grading. The subdivision experiences drainage issues during frequent rainfall events but becomes quickly inundated during high intensity or long duration rainfall events. The southern portion of the subdivision drains through a HCFCD channel which subsequently discharges into P138-01-00. The northern portions of the subdivision drain toward ditches along the south side of Lauder road which eventually drain into P138-01-00. The rest of the subdivision drains east, directly into P138-01-00.

Historical flooding information shows that the most damaging flood event was Hurricane Harvey (August 2017), which caused structural flooding in 195 of the 198 homes, up to 36 inches in depth. Other less intense historical flood events, including Hurricane Ike (September 2008), in June of 2006, and Tropical Storm Allison (June 2001) recorded a smaller number of water damaged homes. Most of the damages during these smaller flood events occurred in Section 3 of the Castlewood Addition, located in the western portion of the subdivision. Overall, this project site has suffered from structural flooding in 17 separate storm events, and 34 homes throughout the subdivision have been declared repetitive loss structures by FEMA.
County

Harris

State

TX

Latitude

29.91061

Longitude

-95.34506

Scope of Work

The proposed Castlewood flood and drainage activity will convert all roadside ditches and culverts to a curb and gutter roadway with underground storm sewer. Additional work to relocate utilities and provide sidewalks is included in the project as well. The new storm sewer will convey the 2-year, or 50% AEP, storm while the curb and gutter pavement will provide additional storage and conveyance for events up to a 100-year, or 1% AEP, rainfall event. Two major outfalls will be located on the eastern side of Woodgate and Connorvale. The Woodgate outfall will also have an extreme event swale. Other extreme event flow paths and approximately 40 acre-feet of detention is included in the project scope.

The proposed system will resolve internal drainage issues and is expected to reduce flooding by at least one foot which mitigates future flood risk for the 195 previously flooded structures. The addition of sidewalks increases the safety of pedestrians throughout the subdivision.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:

https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?

No

Construction completion method to be used

Competitive Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?

Yes

Estimated Number of Parcels

2
If yes, has acquisition been completed, in progress, or will need to be acquired?
In Progress

If yes, provide a brief narrative describing the acquisition activities required.
An easement is required for the new outfall.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to...

Districts and Elected Officials

Cong. Rep
- Garcia, Sylvia

State Rep
- Walle, Armando

State Senator
- Alvarado, Carol

Cong. Rep District #
29

State Rep District #
140

State Senator Dist#
6

Site Budget

Specify Site Budget Information

Total Requested Grant Funds
$15,018,292.02

Total Other Funds
$1,057,189.00

Total Grant & Other Funds
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### Site Metrics

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Project Site

Project Sites & Locations

**Program**

Hurricane Harvey State Mitigation Competition – HUD MID

**Site Number**

S-003164

**Site Title** *

Fountainview Sections 1 and 2 Subdivision Drainage Improvements

**Site Description**

Fountinview was constructed in the 1970’s. The 40-acre residential development is comprised of single-family homes with concrete sidewalks and a curb and gutter storm sewer system. There are nine individual storm sewer systems within the neighborhood that outfall to the HCFCD channels P133-00-00 and P134-00-00, which border the project area on the west and east. Each system consists of two leads to a single trunk line located at the cul-de-sac of each street. The existing development is considered non-conforming in accordance with current regulations due to the storm sewer inability to convey the 2-year, or 50% AEP, storm event, non-existent detention facilities, and a lack of consideration for the extreme event ponding or sheet flow patterns.

The drainage issues in the neighborhood are immediately observed during smaller, more frequent, rainfall events primarily due to the flat street grading and low capacity inlets. During a 100-year, or a 1% AEP, storm event flow from P133-00-00 backs up into the two tributary channels, P133-03-00 and P133-04-00 exacerbating the ponding within the neighborhood. During Hurricane Harvey 19 homes experienced flood damages.

It is a crime for any person to knowingly present false, incomplete, or misleading information through the submittal of documents to any Administrator of CDBG-DR funds for the purpose of securing any benefit related to CDBG-DR programs.
County
Harris

State
TX

Latitude
29.93567

Longitude
-95.30885

Scope of Work

The proposed Fountainview flood drainage activity replaces the existing storm sewer systems with new systems capable of conveying the 2-year, or 50% AEP, rainfall event without modifying the current storm sewer alignment or pavement grades. The evaluation and construction of extreme event overflow structures at each cul-de-sac is included in the project scope. In order to create no adverse impact downstream, a 10 acre-foot detention basin is proposed along the northern boundary of the project.

The proposed improvements conform with present-day infrastructure regulations and result in reduced inundation depths and durations for up to a 100-year, or 1% AEP, storm event. The reduction in water surface will mitigate future flood damages for at least 19 previously flooded homes.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318–§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?
No

Construction completion method to be used
Competitive Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?
Yes

Estimated Number of Parcels
1

If yes, has acquisition been completed, in progress, or will need to be acquired?
In Progress
If yes, provide a brief narrative describing the acquisition activities required.

Acquisition is required for a detention basin. The pond area is outside of Harris County owned parcels and would require land acquisition. With the recommended upsized storm sewer, the two connections between the existing parallel storm systems and pond area would help reduce flood depth approximately 0.5' to 1.0' at the Sarti Street Cul-de-sac.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to.

---

**Districts and Elected Officials**

**Cong. Rep**
- Garcia, Sylvia

**State Rep**
- Thompson, Senfronia

**State Senator**
- Whitmire, John

**Cong. Rep District #**
- 29

**State Rep District #**
- 141

**State Senator Dist#**
- 15

---

**Site Budget**

Specify Site Budget Information

**Total Requested Grant Funds**
- $3,156,879.04

**Total Other Funds**
- $463,271.00

**Total Grant & Other Funds**
- $3,620,150.04

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Project Site

Project Sites & Locations

Program

Hurricane Harvey State Mitigation Competition – HUD MID

Site Number

S-003166

Site Title *

Humble Road Place and Parkland Estates Subdivisions Drainage Improvements

Site Description

The Humble Road Place and Parkland Estates subdivisions were developed prior to 1970 and the 200+ acre project site is served by roadside ditch systems that drain either north to HCFCD channel P133-00-00 or south to Greens Bayou. The extreme northern and southern portions of the area lie within the 100-year and 500-year floodplain but the vast majority of residents live in low risk areas. Although current regulations allow ditches, this area is considered non-conforming due to culver sizes, ditch geometry, inadequate sheet flow design, poor lot grading, and the lack of detention.

The subdivision experiences drainage issues during frequent rainfall events because the lack of capacity in the roadside ditch but becomes quickly inundated during high intensity or long duration rainfall events due to riverine flooding from P133-00-00 and P100-00-00. A primary issue for P133-00-00 is a constriction at the nearby railroad bridge. The railroad bridge forces all flow through its single bridge opening and causes a backwater of over 1.4’ in the 100-year storm. The project area is inundated with overflow from Greens Bayou Tributary that then travels south through the subdivisions between the railroad and Old Humble Road until it drains into Greens Bayou approximately one mile south. This overflow into the subdivisions causes flooding and damage to the houses located in these developments.

54 homes within the Parkland Estates subdivision reported flooding during Hurricane Harvey. Only 16 of those 54 are located in the 500-year floodplain. 202 homes within the Humble Road Place subdivision reported flood damage during Hurricane Harvey. About half of the 202 flooded homes are actually in a special flood hazard area.
Scope of Work

The improvements propose to mitigate P133-00-00 overflows into the Parkland Estates and Humble Road Place subdivisions and improve the capacity and conveyance of the internal drainage systems. The overflow from P133-00-00 will be reduced through the construction of a bypass channel under the existing railroad. The bypass channel will reduce the upstream water surface elevations during extreme events by providing additional flow capacity in the P133-00-00 channel. A mitigation basin in proposed downstream to account for any adverse impacts. The reduction in water surface elevations allows the proper function of the internal drainage system. The internal capacity is improved through the addition of storm sewer under the roadside ditch throughout the site. The system will be divided into a north (P133-00-00) and south (P100-00-00) system with adequate detention in each area to offset the increase in flow.

For additional information, please see the narrative listed in documents.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?
Yes

Construction completion method to be used
Competitive Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?
Yes

Estimated Number of Parcels
4
If yes, has acquisition been completed, in progress, or will need to be acquired?
- Still Needed

If yes, provide a brief narrative describing the acquisition activities required.
- Acquisition required for detention.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2

Districts and Elected Officials

Cong. Rep
- Garcia, Sylvia

State Rep
- 

State Senator
- Alvarado, Carol

Cong. Rep District #
- 29

State Rep District #
- 141 142

State Senator Dist#
- 6

Site Budget

Specify Site Budget Information

Total Requested Grant Funds
- $24,095,575.28

Total Other Funds
- $1,394,549.98

Total Grant & Other Funds
- $25,490,125.26

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Site Budget Code | CDBG-MIT Construction

Other Funds

Site Budget Total | $10,727,307.50

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Created On | 9/22/2020 9:16 PM

Budget Line Item | Flood control and drainage Improvements - - GLO17-11258-P

Amount Requested | $10,878,000.00

Site Budget Code | CDBG-MIT Acquisition

Other Funds

Site Budget Total | $10,878,000.00

Name | Humble Road Place and Parkland Estates Subdivisions Drainage Improvements - CDBG-MIT Acquisition

Created On | 9/22/2020 9:23 PM

Budget Line Item | Flood control and drainage Improvements - - GLO17-11258-P

Site Metrics

Name | Linear Feet of Public Improvement

Comment | Ditch Regrading - 31,800 Storm Sewer Improvements - 41,600

Numeric Resp Planned | 73400

Name | Number of public improvements

Comment | Channel Improvements (CY) - 1,110 Detention Improvements (CY) - 120,000 Ditch Regrading (LF) Storm Sewer Improvements (LF)

Numeric Resp Planned | 4
Project Site

Project Sites & Locations

Program
Hurricane Harvey State Mitigation Competition – HUD MID

Site Number
S-003167

Site Title *
North Forest Subdivision Drainage Improvements

Site Description
The North Forest subdivision was built in the 1960’s and 70’s. The 110+ acre development is primarily dense residential lots served by a curb and gutter roadway and a storm sewer system that outfalls into HCFCD channel P145-03-03, a tributary of Greens Bayou. Based on the analysis, the existing system is partially non-conforming. The storm sewers were designed for up to a 10-year, or 10% AEP, storm event, but the project site has no detention and does not account for extreme event flow paths.

The primary drainage issue for North Forest is the extreme storm event. The storm sewer system along Ella Blvd, N Forest Boulevard and other streets within the North Forest subdivision become surcharged. The inadequate extreme event flow paths and relatively flat topography in the area result in excessive ponding within the subdivision with depths exceeding three (3) feet near the eastern and southeastern parts of the subdivision.

During Hurricane Harvey, 30 homes reported some amount of flood damage. The average depth of flooding in the homes was not readily available from existing data, but it is believed that it was generally about 1 to 2 feet with the southeastern part of the subdivision experiencing relatively more flooding with depths exceeding 3 feet. Within the subdivision, the average height of the finished floor is approximately 2 feet above the top of curb elevation of the street.
County
Harris

State
TX

Latitude
30.00340

Longitude
-95.43556

Scope of Work
The proposed North Forest flood drainage activity consists of splitting the existing storm sewer into two systems and constructing a detention basin to receive and store the flows from the subdivision. Extreme event overflow locations are included in the project scope as well. The existing outfall configuration will remain and continue to discharge into the P145-03-03 channel. The 110 acre-foot detention basin receives flow from the eastern part of the subdivision via proposed 60-inch RCP storm along North Forest Boulevard. The basin is spread over 12.32 acres with an average depth of eight (8) feet.

The aforementioned improvements conform with current regulations and mitigate the future damage to at least 30 previously flooded structures.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?
No

Construction completion method to be used
Competitive Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?
Yes

Estimated Number of Parcels
2

If yes, has acquisition been completed, in progress, or will need to be acquired?
In Progress
If yes, provide a brief narrative describing the acquisition activities required.

21 acre acquisition is required for detention.

Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to 2

---

### Districts and Elected Officials

#### Cong. Rep
- Jackson Lee, Sheila

#### State Rep
- Thompson, Senfronia

#### State Senator
- Whitmire, John

#### Cong. Rep District #
- 18

#### State Rep District #
- 141

#### State Senator Dist#
- 15

### Site Budget

#### Specify Site Budget Information

**Total Requested Grant Funds**

$13,075,169.85

**Total Other Funds**

$1,113,404.40

**Total Grant & Other Funds**

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Edit Project Site

Project Sites & Locations

Program
Hurricane Harvey State Mitigation Competition – HUD MID

Site Number
S-003328

Site Title *
Greens Bayou Mid-Reach Channel Improvements and Stormwater Detention Basins

Site Description
The site includes channel (P100-00-00) conveyance improvements from Imperial Valley Drive to JFK Boulevard and includes two storm water detention basins adjacent to the Bayou located just east of Hardy Toll Road.

Please see the attached narrative for more information about the site, the scope and benefits.
County
Harris

State
TX

Latitude
29.94091

Longitude
-95.35970

Scope of Work

This mitigation activity consists of improvements to approximately 5.5 miles of Greens Bayou (HCFCD Unit P100-00-00) from Imperial Valley Drive to JFK Boulevard and includes two stormwater detention basins adjacent to the Bayou located just east of Hardy Toll Road.

The channel improvements will be contained within the existing right of way and the existing depth of the channel will not be increased. All existing backslope interceptor structures, corrugated metal pipes, backslope swales, concrete lining, outfall structures, and riprap will be removed and replaced to accommodate Greens Bayou widening. A 15-foot wide all-weather access road of crushed limestone flexible base course 6" thickness will be required on both sides of Greens Bayou to allow for proper maintenance of the improved channel.

Two basin to the north of Greens Bayou (Aldine Westfield Stormwater Detention Basin) and (Hardy Stormwater Detention Basin) will be built resulting in 1,000 ac-ft of capacity.

As previously indicated, applicants must follow the procurement process guidelines set forth in 2 CFR §200.318-§200.326 for procurement of construction services. For better detail regarding procurement methods and requirements, refer to:
https://recovery.texas.gov/local-government/resources/procurement-contracting/index.html

Have you procured construction services for the proposed project?
No

Construction completion method to be used
Competitive Sealed Bid/Contract

Will acquisition of real property or any activity requiring compliance with URA be required?
No
Applicants must follow 2 CFR 200 rules and regulations in the procurement of construction services. For better detail regarding procurement methods and requirements, refer to:

### Districts and Elected Officials

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### Site Budget

**Specify Site Budget Information**

- **Total Requested Grant Funds**
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- **Total Other Funds**
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- **Total Grant & Other Funds**
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It is a crime for any person to knowingly present false, incomplete, or misleading information through the submittal of documents to any Administrator of CDBG-DR funds for the purpose of securing any benefit related to CDBG-DR programs.

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CDBG MIT Application Project and Site Narrative

Hazard Risk Description - Describe how the risk(s) selected are impacting the proposed project area. Reference where adopted local mitigation efforts are planned and underway where appropriate.

Summary

Subdivisions and businesses throughout the Greens Bayou Watershed in Harris County experience localized and regionalized flooding conditions during hurricanes, tropical storms, and even intense rainfall events that overwhelm drainage systems and result in riverine, or out-of-bank, flooding of the local bayous, tributaries, and drainage channels. The risk of flooding is a daily threat to the residents that live in areas with aging and inadequate drainage systems. The project sites identified throughout this application are part of an organized county-wide effort to analyze infrastructure shortfalls, build community resilience, and mitigate future hazards through flood risk reduction projects and strict floodplain management practices. The project sites described in this application benefit many residents in some of the most vulnerable and at-risk areas of the County.

Residents within the aforementioned watershed most recently experienced structural flooding damage during Tropical Storm Imelda in 2019. The most notable, though, was Hurricane Harvey in 2017 where estimates indicate that flooding damages exceeded $125 billion. Harris County’s housing flood insurance claims exceeded $2.9 billion (over 47,000 homes), and FEMA individual assistance claims was estimated at $4.6 billion (177,600 claims). The estimated residential losses within Harris County include 154,170 flooded homes and 36 flood related deaths. Additionally, more than 300,000 vehicles were flooded across Harris County, many of which were at homes, parking garages and dealership lots.¹

While Hurricane Harvey is viewed as the most disastrous flood on record in Harris County, other similar type flooding occurred in the area over the past five years. The Memorial Day Flood (May 25-27, 2015) flooded over 6,000 structures and the Tax Day Flood (April 17-18, 2016) flooded 9,820 structures.²


recently, Tropical Storm Imelda (September 17-19, 2019) brought more than 30 inches of rain to the area, resulting in a death and several hundred high-water rescues.³

A portion of the losses are located within the FEMA designated floodplain, which is anticipated during rainfall events of this magnitude, but a large portion of the flooded population are located outside of those typical flood prone areas.

The prevalence of residential losses outside the regulated floodplain spurred local investment into drainage studies to identify drainage infrastructure problems, propose solutions to mitigate future flooding, and estimate project costs. The studies determined that these subdivisions, while built according to the drainage standards and regulations at the time, are now considered “non-conforming” or “partially non-conforming” according to current infrastructure and local floodplain regulations. The sooner that these subdivisions are reconstructed and conform to current regulations, the more resilient the community becomes and the risk of future property damage, costs for repair, lost wages, and reduced productivity are reduced or eliminated. The unique challenges in constructing conveyance improvements, detention facilities, extreme event overflow structures, or nature-based drainage solutions in fully developed, well-established neighborhoods require advanced engineering expertise, community support, and funding sources. Additionally, to support the local drainage, investments in regional solutions are needed to help create additional capacity, in concert helping the local improvements to be more effective, especially during greater rainfall events. As such, Harris County has partnered with the Harris County Flood Control District with this application, to make an even greater impact and investment to the Green’s Bayou Watershed.

The massive and long-term financial commitment is recognized locally, and so a portion of project site costs, most of the sites included in this application, were approved for funding in the 2018 Harris County Flood Control District Bond Program⁴. While some funding was earmarked for these subdivision drainage sites and is currently being used to fund the engineering study and design, the bond funding is not adequate to construct the required improvements. As a result, Harris County and Harris County Flood Control District are in dire need of additional funding to help address these urgent concerns. Income and need were factors when selecting projects for inclusion in the Bond program and the improvements were designed to assist low- and moderate-income persons/communities. Earmarked funding can be found in the Harris County FY 2020 Mid-Year Review and Capital Improvements Program (CIP), adopted in September 2019, along with subdivisions and mapped sites.⁵


⁴ Harris County Flood Control District Bond Program. Available https://www.hcfcd.org/2018-bond-program

Additionally, measures needed to address subdivision drainage were included in the Harris County Hazard Mitigation Plan, which indicates that strong codes and enforcement of those codes is critical to curb flooding in future major storm events.6

Harris County, partnered with Harris County Flood Control District, as leaders in practices to plan for and mitigate flooding, have participated in the Community Rating System (CRS) since May 1, 2004. The CRS program encourages and rewards communities for floodplain management activities that exceed the minimum National Flood Insurance Program standards. The CRS has been developed to provide incentives in the form of premium discounts for communities to go beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. Because of its proactive steps, Harris County’s current CRS rating is a 7, which results in a 15% reduction in premium discounts for policyholders.7

Project Area
The five project sites described below mitigate residential flooding risk and in turn increase community resilience and overall well-being through the reduction of property damage and risk to injury or loss of life. This project is within a HUD-designated Most Impacted and Distressed (MID) area, qualifies for a CDBG eligible activity, Flood and Drainage Facilities, and meets HUD’s Low to Moderate Income (LMI) national objective.

Below is a summary of each site, the problems they have encountered as a result of major storm events such as hurricanes, tropical storms or tropical depressions, and the impacts caused by their deficiencies.

Greens Bayou Mid-Reach Channel Improvements and Stormwater Detention Basins

Prior studies of the area have identified that the existing channel capacity is insufficient to meet the high flow demand in intense rainfall events. The area surrounding the middle portion (or Mid Reach) of Greens Bayou has experienced multiple severe flood events during the past several years, including Tropical Storm Allison (2001), unnamed flood events in 2002 & 2003, Memorial Day Flood (2015), Tax Day Flood (2016), Hurricane Harvey (2017) and Tropical Storm Imelda (2019).

Previous studies have identified 5 potential stormwater detention basins to support the channel improvements. To date, 2 of these basins have been fully constructed or are under construction and nearly complete. A third basin, the Aldine Westfield basin, has been partially constructed. This project includes the second and final phase of that basin along with the fourth basin (Hardy Basin). The fifth basin (Lauder Basin) is outside of the scope of this project, but will be required to construct future phases of the overall channel improvements program.

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6 Harris County Hazard Mitigation Plan Sections 11 and 12. Available at https://www.readyharris.org/Portals/60/documents/Mitigation-Planning/Upcoming%20Events/HarrisCounty-Vol1_Area_Wide_Elements.pdf. Accessed August 31, 2020

Castlewood Addition Sections 3 and 4

The Castlewood subdivision was developed in the 1960s and ‘70s. The two sections for this project site consist of 80+ acres of residential parcels served by a roadside ditch drainage system. The system of ditches drain into Harris County Flood Control district (HCFCD) channel P138-01-00, a tributary of Greens Bayou. Although current regulations allow ditches, this project site is considered non-conforming due to culvert sizing, inadequate extreme event sheet flow design, lack of detention, and poor lot grading. The subdivision experiences drainage issues during frequent rainfall events but becomes quickly inundated during high intensity or long duration rainfall events. The southern portion of the subdivision drains through a HCFCD channel which subsequently discharges into P138-01-00. The northern portions of the subdivision drain toward ditches along the south side of Lauder road which eventually drain into P138-01-00. The rest of the subdivision drains east, directly into P138-01-00.

Historical flooding information shows that the most damaging flood event was Hurricane Harvey (August 2017), which caused structural flooding in 195 of the 198 homes, up to 36 inches in depth. Other less intense historical flood events, including Hurricane Ike (September 2008), in June of 2006, and Tropical Storm Allison (June 2001) recorded a smaller number of water damaged homes. Most of the damages during these smaller flood events occurred in Section 3 of the Castlewood Addition, located in the western portion of the subdivision. Overall, this project site has suffered from structural flooding in 17 separate storm events. and 34 homes throughout the subdivision have been declared repetitive loss structures by FEMA.

Fountainview Sections 1 and 2

Fountinvieview was constructed in the 1970’s. The 40-acre residential development is comprised of single-family homes with concrete sidewalks and a curb and gutter storm sewer system. There are nine individual storm sewer systems within the neighborhood that outfall to the HCFCD channels P133-00-00 and P134-00-00, which border the project area on the west and east. Each system consists of two leads to a single trunk line located at the cul-de-sac of each street. The existing development is considered non-conforming in accordance with current regulations due to the storm sewer inability to convey the 2-year, or 50% AEP, storm event, non-existent detention facilities, and a lack of consideration for the extreme event ponding or sheet flow patterns.

The drainage issues in the neighborhood are immediately observed during smaller, more frequent, rainfall events primarily due to the flat street grading and low capacity inlets. During a 100-year, or a 1% AEP, storm event flow from P133-00-00 backs up into the two tributary channels, P133-03-00 and P133-04-00 exacerbating the ponding within the neighborhood. During Hurricane Harvey 19 homes experienced flood damages.

Humble Road Place and Parkland Estates

The Humble Road Place and Parkland Estates subdivisions were developed prior to 1970 and the 200+ acre project site is served by roadside ditch systems that drain either north to HCFCD channel P133-00-00 or south to Greens Bayou. The extreme northern and southern portions of the area lie within the 100-year and 500-year floodplain but the vast majority of residents live in low risk areas. Although current
regulations allow ditches, this area is considered non-conforming due to culver sizes, ditch geometry, inadequate sheet flow design, poor lot grading, and the lack of detention.

The subdivision experiences drainage issues during frequent rainfall events because the lack of capacity in the roadside ditch but becomes quickly inundated during high intensity or long duration rainfall events due to riverine flooding from P133-00-00 and P100-00-00. A primary issue for P133-00-00 is a constriction at the nearby railroad bridge. The railroad bridge forces all flow through its single bridge opening and causes a backwater of over 1.4’ in the 100-year storm. The project area is inundated with overflow from Greens Bayou Tributary that then travels south through the subdivisions between the railroad and Old Humble Road until it drains into Greens Bayou approximately one mile south. This overflow into the subdivisions causes flooding and damage to the houses located in these developments.

54 homes within the Parkland Estates subdivision reported flooding during Hurricane Harvey. Only 16 of those 54 are located in the 500-year floodplain. 202 homes within the Humble Road Place subdivision reported flood damage during Hurricane Harvey. About half of the 202 flooded homes are actually in a special flood hazard area.

North Forest

The North Forest subdivision was built in the 1960’s and 70’s. The 110+ acre development is primarily dense residential lots served by a curb and gutter roadway and a storm sewer system that outfalls into HCFCID channel P145-03-03, a tributary of Greens Bayou. Based on the analysis, the existing system is partially non-conforming. The storm sewers were designed for up to a 10-year, or 10% AEP, storm event, but the project site has no detention and does not account for extreme event flow paths.

The primary drainage issue for North Forest is the extreme storm event. The storm sewer system along Ella Blvd, N Forest Boulevard and other streets within the North Forest subdivision become surcharged. The inadequate extreme event flow paths and relatively flat topography in the area result in excessive ponding within the subdivision with depths exceeding three (3) feet near the eastern and southeastern parts of the subdivision.

During Hurricane Harvey, 30 homes reported some amount of flood damage. The average depth of flooding in the homes was not readily available from existing data, but it is believed that it was generally about 1 to 2 feet with the southeastern part of the subdivision experiencing relatively more flooding with depths exceeding 3 feet. Within the subdivision, the average height of the finished floor is approximately 2 feet above the top of curb elevation of the street.

2. Describe how the proposed project will mitigate against the identified lists. Reference where adopted local mitigation efforts are being enhanced where appropriate:

Summary

The Greater Houston area has experienced multiple major flooding events in recent years including the Memorial Day Flood (2015), the Tax Day Flood (2016) and Hurricane Harvey (2017). These events have amounted to 84 deaths and over $125.5 billion in damages. Because of the devastation and the need to
identify measures to mitigate the impacts of major storm events, Harris County and Harris County Flood Control District have studied and found drainage solutions to mitigate risk to life and safety during future storm events.

This Flood and Drainage Activity project will improve drainage at a regional and neighborhood level by making improvements to numerous subdivisions within the Greens Bayou Watershed area. Some of these improvements include adding or upgrading storm sewer systems, adding curb and gutter systems, and increasing capacity with new detention basins and channel enlargement. By increasing the water storage capacity it places less burden on the watershed that is servicing the area. In future flooding events, this improved capacity will be designed to reduce deaths and property damage caused by flooding.

**Adopted Local Mitigation Measures**

Harris County has adopted the most stringent floodplain regulations in the United States by incorporating robust infrastructure regulations that ensure development follows standards that minimize the likelihood of future flooding. Copies of the Harris County floodplain regulations, infrastructure regulations, and HCFCDD Policies, Criteria, and Procedures Manual with proof of adoption by Commissioners Court can be found in the supporting documentation for this application.

**Subdivision Flood Mitigation**

Harris County proposes to utilize the above standards, which can be applied to address the problems identified with developed neighborhoods, resulting in a significant reduction in potential future flooding. These design improvements will be up to current design standards and code, thus increasing resilience and reducing or eliminating the long-term risk of loss of life, injury, damage to and loss of property, and suffering and hardship. The proposed mitigation improvements will better help the project sites included in this application withstand and recover more quickly from emergencies and disasters.

Proposed mitigation solutions for each, which are intended to significantly reduce the risk of flooding, is detailed for each site in the list below.

**Greens Bayou Mid-Reach Channel Improvements and Stormwater Detention Basins**

This mitigation activity consists of improvements to approximately 5.5 miles of Greens Bayou (HCFCD Unit P100-00-00) from Imperial Valley Drive to JFK Boulevard and includes two stormwater detention basins adjacent to the Bayou located just east of Hardy Toll Road.

The channel improvements will be contained within the existing right of way and the existing depth of the channel will not be increased. All existing backslope interceptor structures, corrugated metal pipes, backslope swales, concrete lining, outfall structures, and riprap will be removed and replaced to accommodate Greens Bayou widening. A 15-foot wide all-weather access road of crushed limestone

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flexible base course 6” thickness will be required on both sides of Greens Bayou to allow for proper maintenance of the improved channel.

The basin to the north of Greens Bayou (Aldine Westfield Stormwater Detention Basin) is located on 56.2 acres and the basin to the south (Hardy Stormwater Detention Basin) will utilize approximately 60 acres. The ROW for the Aldine-Westfield Basin is already owned by HCFCD. The ROW for the Hardy Basin is currently being acquired through a different funding source. The ultimate combined storage capacity that will be provided is approximately 1,000 ac-ft. The two stormwater detention basins are planned to be dry bottom basins.

It is anticipated that the planned improvements will provide a 10-year Level of Service at bank full conditions. The Preliminary Engineering Report for this project is currently being developed. The benefits will be further refined as the PER progresses.

It should be noted that the Aldine Westfield Stormwater Detention Basin is also submitted as a standalone project application under the 2015 State Mitigation Competition. It is included in the Hurricane Harvey State Mitigation Competition application to meet the "functional independence" criteria established by GLO. The channel improvements that are part of the Greens Bayou Mid Reach Project, are functionally dependent upon construction of the Aldine-Westfield Basin. If this basin is funded under the 2015 State Mitigation Competition, then the scope of the Greens Bayou Mid Reach Project can be modified to redirect funds to extend the channel improvements or to allow for additional excavation and storage at the Hardy Basin.

The proposed Greens Bayou Mid Reach Channel Improvements and Stormwater Detention Basins is a functionally independent portion of a multi-phased program to accomplish significant flood risk reduction in the Greens Bayou watershed. HCFCD has performed multiple investigations and studies in this area to identify potential projects and to develop a long-range planning solution for the watershed, including a 2007 study by Montgomery & Associates Consulting Engineers (Feasibility Study Verification and Alternatives Analysis Report - Greens Bayou Mid Reach Flood Study). Currently, CivilTech is preparing a Preliminary Engineering Report to finalize a scope of work for this project with fully updated hydraulic models and refined project benefits. The PER will identify a Phase I (this project) and additional phasing to complete an ultimate buildout of the improvements. Phase I is functionally independent of the remaining phases, but construction of Phase I will help HCFCD to leverage other funding sources to construct the future phases and provide increased flood risk reduction to the area.

**Castlewood Addition**

The proposed Castlewood flood and drainage activity will convert all roadside ditches and culverts to a curb and gutter roadway with underground storm sewer. Additional work to relocate utilities and provide sidewalks is included in the project as well. The new storm sewer will convey the 2-year, or 50% AEP, storm while the curb and gutter pavement will provide additional storage and conveyance for events up to a 100-year, or 1% AEP, rainfall event. Two major outfalls will be located on the eastern side of Woodgate and Connorvale. The Woodgate outfall will also have an extreme event swale. Other extreme event flow paths and approximately 40 acre-feet of detention is included in the project scope.
The proposed system will resolve internal drainage issues and is expected to reduce flooding by at least one foot which mitigates future flood risk for the 195 previously flooded structures. The addition of sidewalks increases the safety of pedestrians throughout the subdivision.

**Fountainview Sections 1 and 2**

The proposed Fountainview flood drainage activity replaces the existing storm sewer systems with new systems capable of conveying the 2-year, or 50% AEP, rainfall event without modifying the current storm sewer alignment or pavement grades. The evaluation and construction of extreme event overflow structures at each cul-de-sac is included in the project scope. In order to create no adverse impact downstream, a 10 acre-foot detention basin is proposed along the northern boundary of the project.

The proposed improvements conform with present-day infrastructure regulations and result in reduced inundation depths and durations for up to a 100-year, or 1% AEP, storm event. The reduction in water surface will mitigate future flood damages for at least 19 previously flooded homes.

**Humble Road Place and Parkland Estates**

The Humble Road Place and Parkland Estates flood drainage activity proposes to mitigate P133-00-00 overflows into the Parkland Estates and Humble Road Place subdivisions and improve the capacity and conveyance of the internal drainage systems.

The overflow from P133-00-00 will be reduced through the construction of a bypass channel under the existing railroad. The bypass channel will reduce the upstream water surface elevations during extreme events by providing additional flow capacity in the P133-00-00 channel. A mitigation basin in proposed downstream to account for any adverse impacts. The reduction in water surface elevations allows the proper function of the internal drainage system.

The internal capacity is improved through the addition of storm sewer under the roadside ditch throughout the project site. The system will be divided into a north (P133-00-00) and south (P100-00-00) system with adequate detention in each area to offset the increase in flow. The reconstruction of roadside ditches and installation of proper sized culverts will conform with current regulations.

The two aforementioned project phases are intended to reduce or eliminate overflow from P133-00-00 into the Parkland Estates and Humble Road Place subdivisions. This will lower water surface elevations in the interior of these subdivisions during the 2-, 10- and 100-year storm events, and mitigate future damage to over 250 previously flooded structures.

**North Forest**

The proposed North Forest flood drainage activity consists of splitting the existing storm sewer into two systems and constructing a detention basin to receive and store the flows from the subdivision. Extreme event overflow locations are included in the project scope as well. The existing outfall configuration will remain and continue to discharge into the P145-03-03 channel. The 110 acre-foot detention basin receives flow from the eastern part of the subdivision via proposed 60-inch RCP storm along Nort Forest Boulevard. The basin is spread over 12.32 acres with an average depth of eight (8) feet.
The aforementioned improvements conform with current regulations and mitigate the future damage to at least 30 previously flooded structures.