
CITY OF TULSA
FLOODPLAIN MANAGEMENT PLANNING/RLAA
ANNUAL PROGRESS REPORT

2023-2024



CITY OF TULSA
510 Floodplain Management Planning
2023-2024 Annual Progress Report

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CITY OF TULSA
510 Floodplain Management Planning
2023-2024 Annual Progress Report

REPORTING PERIOD: October 1, 2023, to September 30, 2024

BACKGROUND

The City of Tulsa (City) participates in the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA) and in the NFIP's Community Rating System (CRS). The objective of this activity is to credit the production of an overall strategy of programs, projects, and measures to reduce adverse impacts of hazards on the community and help meet additional municipal needs. In compliance with the NFIP, the City prepared a Hazard Mitigation Plan (HMP) which is an overall strategy of programs, projects, and measures aimed at reducing the adverse impact of hazards with the highest impact in the community. As of the 2024 cycle recertification, the City of Tulsa is updating its plan, but for purposes of this report, the active 2019 plan will be used. This HMP is located here: <https://www.cityoftulsa.org/media/18120/2019-all-hazard-mitigation-plan-2.pdf>.

A Repetitive Loss Area Analysis (RLAA) has been adopted by the City. Included in the RLAA is an assessment of areas that include structures identified by FEMA as Repetitive Loss Properties. FEMA defines a repetitive loss property as any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period, since 1978. The RLAA outlines areas that may be exposed to similar flood risk, the likely sources of flooding, and possible mitigation measures to reduce the risk from flood events. Current RLAA documents are located here: <https://www.cityoftulsa.org/government/departments/engineering-services/flood-control/repetitive-loss-area/>.

PURPOSE

This progress report's purpose is to provide an annual update on the implementation of activities outlined in the Floodplain Management Plan (512a) and serve as the action plan identified in the RLAA (512b). Our objective is to ensure a continuing and responsive planning process that will keep the plans and related outreach efforts dynamic and responsive to the needs and capabilities of the City and stakeholders.

This report discusses the following:

- Review of the action plan
- Implementation status of action plan
- Recommendations for changes/enhancement

How the City provided the Report to the media and public in 2024:

- The City of Tulsa provided the report to the media through a press release
- The Report is posted on the City of Tulsa website
- Copies of the report are available at the City's Water and Sewer Department

FLOODPLAIN MANAGEMENT PLAN PROGRESS

In September 2019, the Federal Emergency Management Agency (FEMA) approved the City of Tulsa Multi-Hazard Mitigation Plan, which serves as the Floodplain Management Plan for CRS. Formally created by a resolution of the City Council of Tulsa on August 8, 2018, the planning process began. Designating the Tulsa Stormwater Drainage and Hazard Mitigation Advisory Board (SDHMAB) to serve as the Tulsa

Citizens Advisory Committee to oversee the planning effort, the resolution was approved. As done for the 2014 Hazard Mitigation Plan update, the SDHMAB elected to use the Program for Public Information Committee (PPI) as the Steering Committee for this project. The Hazard Mitigation Plan identifies and prioritizes an action plan consisting of 29 all Hazard Mitigation Activities. One requirement of the CRS program is that an annual report of the status of current HMP actions be presented to the governing body of the City of Tulsa. This report satisfies this requirement and was presented to the Program for Public Information Committee, which meets at least quarterly during the reporting period.

The PPI reviewed the action items identified in the HMP at a meeting held June 6, 2024, and recommended updates based on progress to date. Subsequently, the City's Stormwater Drainage and Hazard Mitigation Advisory Board reviewed the annual progress report at a meeting held on June 18, 2024, and approved it in the subsequent meeting held on July 16, 2024.

Summary Overview of the Action Plan's Progress

As of this reporting period, the overall progress is as follows:

- 23 out of 29 initiatives (80 percent) reported ongoing action toward completion
- 3 out of 29 initiatives (10 percent) reported no action taken
- 3 out of 29 initiatives (10 percent) reported as completed

Review of the Action Plan: Appendix A: 2024 Hazard Mitigation Plan Report reviews the action plan, reporting the status of each initiative. More detailed descriptions of each initiative and the prioritization process are in the HMP.

Recommendations for Changes or Enhancements: The following recommendations will be noted for future updates or revisions to the HMP:

- During the 2019 Hazard Mitigation Planning Process the PPI committee focused on a strategy the city could realistically implement and/or make progress on during the five-year maintenance period. Several actions identified are things the City of Tulsa has incorporated into regular maintenance. These items could be removed or listed as complete in future updates. ***Note: the 2022 PPI committee recommended leaving the maintenance items on the list as "ongoing". No changes were recommended in 2024.***
- As part of the 2019 Hazard Mitigation Plan Update an interactive website was developed and deployed to educate the public and provide information to help the public prepare for the disasters that affect Tulsa. The Tulsa Hazard Mitigation Plan analyzed 12 classes of hazards in a GIS environment. The website was used during the May 2019 flood event and should continue to be updated annually. ***Note: The 2022 PPI committee concurred that annual updates to this website continue to be updated annually. 2024 Update: The ownership of this website is being transferred to the City of Tulsa.***
- The City of Tulsa should continue to use the Hazard Mitigation Plan to meet the FMP requirement for the Community Rating System. Tulsa should continue to include specific priorities of the CRS program in the HMP, such as the Flood Insurance Coverage Improvement Plan, Program for Public Information, and the Repetitive Loss Area Analysis. ***Note: the 2022 PPI committee approved the 5-year update of the Flood Insurance Coverage Improvement Plan, Program for Public Information on August 4, 2022, with approval of the same by the Stormwater Drainage and Multi-Hazard Advisory Board on August 16, 2022. The 2022 PPI committee and the SDHMAB approved the FMP and RLAA Updates on those same dates, respectively. 2024 Update: Suggested changes to specific***

action items were noted during the 2024 review with PPI and SDHMAB and are included in this report.

REPETITIVE LOSS AREA ANALYSIS PROGRESS

The City of Tulsa Repetitive Loss Area Analysis (RLAA) was adopted by the City Council in 2023. The 2024 RLAA now includes 67 adopted Repetitive Loss Area Plans covering the 74 unmitigated repetitive loss properties remaining in the city. The RLA plans are posted on the City website at: www.cityoftulsa.org/RLA. The data in this appendix reflects the repetitive loss list data received from the NFIP on April 1, 2024.

Summary Overview of the Action Plan's Progress: The RLAA was created in conjunction with the development of the HMP. The city is systematically updating the RLAA's to evaluate and determine the best alternative for each, do a benefit/cost analysis to determine HMA grant eligibility, prepare conceptual plans as needed and develop capital improvement project requests. Seven repetitive loss properties were added in 2023 but six of these have already been mitigated. In 2024 no new properties have been added to the repetitive loss list.

In 2023, the City submitted 43 properties in 24 RLAs to have their status changed from not mitigated to mitigated based on projects that have provided flooding protection. The City submitted 6 additional properties as conditionally mitigated because they are protected from flooding above the 2% annual chance (AC) storm but are not protected against the 1% annual chance storm. The City has received confirmation that 16 properties are fully mitigated; this includes all RL properties in 7 RLAs.

The PPI reviewed and approved the annual progress report at a meeting held on July 11, 2024. Subsequently, the City's Stormwater Drainage and Hazard Mitigation Advisory Board reviewed and approved the annual progress report at a meeting held on July 16, 2024.

Review of the Action Plan: Appendix B: This 2024 Repetitive Loss Area Analysis Report reviews the action plan, reporting the status of each initiative. More detailed descriptions of each initiative and the prioritization process can be found in the RLAA or FMP.

Recommendations for Changes or Enhancements: The following recommendations were noted for future updates or revisions to the RLAA in 2023 and are updated below:

- Assess the feasibility of creating a more mobile friendly version of the Flood Control Website: **2024 Update: This is in progress as the City of Tulsa Flood Control Website is updated.**
- Consider the use of private social networks like NextDoor to assist in providing alerts to the residents: **2024 Update: Completed and determined not feasible. Replace with consider the use of mass communication networks to provide alerts to residents in flooding events.**
- Consider expanding the RLA's during the reverification update and reducing the number to further protect privacy of property owners and make the activity more manageable. The two RLAs shown in proximity (within blocks) on the same map in the Perryman MDP are a good example of why this should be considered. **2024 Update: Change to "Continue to improve the RLAA process through the consolidation of RLAs and mitigation of RL properties."**

PUBLIC REVIEW NOTICE

The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been posted on the City's Website. Any questions or comments regarding the contents of this report should be directed to:

*City of Tulsa
Water and Sewer Department
Project Planning - Stormwater
(918) 596-9798*

Appendix A: Hazard Mitigation Action Items Update for 2023

Action 1: Develop and fund hazard preparedness, education, information, and awareness programs	
Responsible Agency	TAEMA, City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. The City of Tulsa Program for Public Information met monthly during the reporting period. For more detailed information see the PPI Annual report. No changes are recommended at this time.
2022 Update	No changes recommended at this time.
2023 Status	No changes to report at this time.
2024 Status	Public awareness, education and information campaigns are ongoing via various avenues. See PPI annual report for more information.

Action 2: Develop a city-wide disaster recovery and reconstruction plan.

Responsible Agency	TAEMA, City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. Tulsa maintains an inventory of storm shelters and safe rooms, available to Tulsa Fire Department in a GIS format. The 2020 Tulsa Area Emergency Management update to the EOP refers briefly to incorporating long term resilience into recovery. The City of Tulsa should consider pursuing a recovery plan specific to the City of Tulsa's long-term goals and objectives that integrates long term infrastructure resilience, land use, stormwater management program, low-impact development, and disaster-resistant construction.
2022 Update	While generally completed, Joe Kralicek, Tulsa EM is planning to completely revamp the plan within the next year.
2023 Status	Ongoing. FEMA moved it from Annex in EOP to setting up entire emergency recovery plan. Will write a new EOP to recovery rather than annex. Moving into CPG101, will move into ERF's.
2024 Status	Action Item reworded to: "Update the city-wide disaster recovery and reconstruction plan" in 2024 HMP Update 2024 Status: Ongoing. Initiative being shifted from development of plan to update, which is reflected in the wording of the updated action item for the 2024 HMP.

Action 3: Inventory and maintain an active list of disaster resources available in Tulsa.

Responsible Agency	TAEMA, City of Tulsa Water & Sewer Department, Tulsa Health Dept.
Potential Resources	Local/General, FEMA HMA
2020 Status	Some progress. Tulsa Area Emergency Management Agency recently selected VEOCI to implement a virtual emergency operations center (EOC) through CARES Act funding, which provided the resources the agency needed to acquire the solution. When the solution is fully implemented, the Tulsa Area Emergency Management Agency will be able to easily accommodate the 100 plus team members and stakeholders involved in the agency's virtual EOC.
2022 Update	Joe Kralicek reports that this has been purchased and funded for 8 more years and the resources are in the process of being loaded in and cross referenced with FEMA cost codes or actual codes.
2023 Status	No changes addressed.
2024 Status	Ongoing. TAEMA maintains a list in VEOCI which is updated continuously.

Action 4: Develop an emergency preparedness and mitigation website.

Responsible Agency	TAEMA, City of Tulsa GIS
Potential Resources	Local/General, FEMA HMA
2020 Status	Some progress. Tulsans can utilize the online City of Tulsa Hazard Mitigation Plan viewer to zero in on their property and see what hazards have affected the neighborhood before and what hazards the area may be impacted by in the future.
2022 Update	This website is maintained by a consultant to the City. No changes are recommended this year.
2023 Status	Website is being transferred from consultant to City of Tulsa and being renamed to "Map My House".
2024 Status	Action Item reworded to: "Develop an emergency preparedness and mitigation website; update and transfer the "Map My House" website from subconsultant to reside on the City's GIS platform." 2024 Status: City has configured the website and has been provided with the necessary datasets to maintain it.

Action 5: Evaluate, upgrade and maintain outdoor warning systems.

Responsible Agency	TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. TAEMA installed four new warning sirens in the spring of 2019 through FEMA's Hazard Mitigation Grant Program. The agency is working to secure four additional sirens as funding becomes available.
2022 Update	Joe Kralicek reports that TAEMA has been approved for grant funding to purchase 3 sirens and is in the planning phases of modernization and encryption of the overall system.
2023 Status	Ongoing. The sirens that were ordered are on backorder and are currently down another siren which shattered during the recent storm. Moving toward activating sirens in areas specific to hazard threat instead of larger areas using a cloud-based system.
2024 Status	Action Item reworded to: "Evaluate, upgrade and maintain outdoor warning systems; deploy a cloud-based system to activate sirens in areas specific to hazard threat instead of larger areas." 2024 Status: Ongoing. TAEMA has replaced and repaired sirens damaged because of the June 2023 storms, bringing the City's total to 110 total sirens. There are 18 sirens approaching obsolescence that will need to be replaced soon.

Action 6: Purchase and distribute NOAA weather radios.

Responsible Agency	TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress to report. TAEMA is the responsible agency and relies on FEMA Hazard Mitigation Assistance funds for this project. No funding was available during the 2019-2020 update period.
2022 Update	As of 2022 TAEMA is still waiting for funding per JK.
2023 Status	No funding available.
2024 Status	No change. No funding available.

Action 7: Maintain debris management plan and update as required/needed.

Responsible Agency	TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	Completed. The City of Tulsa maintains a FEMA approved Debris Management Plan as part of the Emergency Operations Plan. This action can be deleted in the next Hazard Mitigation Plan update.
2022 Update	Completed. Same as 2020. This action can be deleted in the 2024 HMP Update.
2023 Status	Completed (no change).
2024 Status	Removed from 2024 HMP Update 2024 Status: Completed and removed.

Action 8: Initiate an individual safe room program.

Responsible Agency	TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress to report.
2022 Update	Awaiting funding.
2023 Status	No funding available.
2024 Status	Action Item reworded to: "Initiate an individual safe room program including a rebate program to reimburse for installation of qualified safe rooms and site surveys." 2024 Status: No change, still awaiting funding availability.

Action 9: Maintain safe room inventory and GIS database.

Responsible Agency	City of Tulsa Customer Care Center, Tulsa Fire Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. Tulsa maintains an inventory of storm shelters and safe rooms, available to Tulsa Fire Department in a GIS format.
2022 Update	Ongoing.
2023 Status	Inventory database is complete and updated as needed.
2024 Status	Ongoing. Database is tracked through Tulsa FD.

Action 10: Provide safe rooms at critical facilities.

Responsible Agency	TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	Some progress. In 2020 the Tulsa Housing Authority received funds through the FEMA Pre-Disaster Mitigation program to construct a safe room. The action could be expanded to include facilities other than those considered to be critical or essential.
2022 Update	Awaiting funding.
2023 Status	Pending. Request has been submitted by THA for funding.
2024 Status	This action item is being revised and integrated into a new action item (Action Item 46) for the 2024 HMP Update.

Action 11: Educate the general public on benefits of disaster resistant construction.

Responsible Agency	TAEMA, Development Services
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. The Disaster Resilience Network (DRN), formerly Tulsa Partners, Inc, secured a grant through the FEMA Hazard Mitigation Grant Program to educate the public on the benefits of disaster resistant construction. The DRN Housing Council is a collaborative venture between DRN and other entities to help people build stronger and more weather-resistant homes. This includes the promotion of programs like the Insurance Institute for Business and Home Safety FORTIFIED Homes as well as the use of low impact development / green infrastructure strategies in dealing with storm water drainage / retention such as rain gardens, bioswales, pervious concrete, etc. Public education is ongoing.
2022 Update	The Tulsa Housing Council is still working on this. Grant implementation is still underway to promote Fortified Housing. Other agencies are involved as well as NHMA. OU has proposed to do research on the fortified program. OU professor Jason Vogel is on the board and studying LID and building codes.
2023 Status	Grant has been completed. Working on IBHS FORTIFIED program and beyond code, disaster-resilient construction. May consider changing wording for this action item. Charles Snyder is the POC for this project.
2024 Status	<p>Action Item reworded to: "Educate the general public and local builders, and other stakeholders on the benefits of disaster resistant construction."</p> <p>2024 Status: Ongoing. Action item is carried out in practice to continually educate builders and developers.</p>

Action 12: Provide Training/Education on disaster resistant techniques to local builders.

Responsible Agency	City of Tulsa Water & Sewer Department, City of Tulsa Public Works, TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. The Disaster Resilience Network (DRN), formerly Tulsa Partners, Inc, secured a grant through the FEMA Hazard Mitigation Grant Program to bring FORTIFIED evaluator training to Tulsa.
2022 Update	This is part of the HMGP grant mentioned above and includes education for other agencies and groups. In the 2024 Update, this will be combined with Action 11.
2023 Status	No change; will be combined with Action 11 in 2024 HMP Update.
2024 Status	Removed and Combined with Action 11 for 2024 HMP Update 2024 Status: No change.

Action 13: Retrofit critical facilities to withstand hazard events.

Responsible Agency	TAEMA, Development Services
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress to report.
2022 Update	Awaiting funding.
2023 Status	Ongoing. Waiting for a “DR” to apply for 406 to start rebuilding facilities damaged by recent storm, but process is going much slower than expected.
2024 Status	Ongoing. 406 Mitigation has been acquired to repair damage to critical facilities. This action item will be combined with Action Item 10 for the 2024 HMP Update.

Action 14: Install generators at critical facilities.

Responsible Agency	City of Tulsa Water & Sewer Department, City of Tulsa Asset Management, TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress to report.
2022 Update	In progress. TAEMA has had the USACE power teams to do site surveys to determine generator needs at City water treatment facilities per JK.
2023 Status	Ongoing. Have identified generator needs at critical facilities. Waiting for funding. Updating based on new information from recent storm.
2024 Status	Ongoing. Waiting for funding.

Action 15: Develop and implement an air conditioner program.

Responsible Agency	TAEMA, Community Service Council (CSC)
Potential Resources	Local/General, FEMA HMA
2020 Status	TAEMA is working with the Community Service Council to fund an ongoing program.
2022 Update	Ongoing. This work is in conjunction with the Community Service Council as part of the City's extreme temperature plan, per JK.
2023 Status	Ongoing. The Research Council has undergone recent administrative and staffing changes. Progress on action item will continue once transition is complete.
2024 Status	Action Item reworded to: "Develop and implement an on-going air conditioner program as part of the City's extreme temperature plan." 2024 Status: Community Service Council ceased operations in 2023, which has prevented any further action on this initiative since the 2023 status update. Tulsa's Emergency Manager states that new resource(s) to replace the departure of CSC are in queue to be identified.

Action 16: Construct lightning rods or air terminals for protection of critical facilities.

Responsible Agency	City of Tulsa Department of City Experience
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress to report.
2022 Update	No progress to report.
2023 Status	No changes; no progress to report.
2024 Status	No significant changes or progress to report.

Action 17: Educate the public on the importance of flood insurance.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. This is included in the PPI messaging and included in the information provided by TAEMA to individuals impacted by flooding. Additionally, Tulsa is increasing the number of training sessions for relators from one to two in 2020-2021.
2022 Update	In 2022 the City of Tulsa held a Flood Expo in June to highlight the importance of flood insurance. The Oklahoma Department of Insurance Director Glen Mulready was a speaker at the Expo.
2023 Status	Flood Preparedness Expo held May 2023. Various representatives including the State Flood Insurance Commissioner, Tulsa's Emergency Manager, and NWS and local meteorologists gave presentations on the importance of flood insurance. Flood insurance messages are also included in various notifications and brochures. Realtor training scheduled for July 26, 2023.
2024 Status	Ongoing. Development of Flood Insurance Brochure currently underway in lieu of Flood Expo, which will be held every 3 years (as outlined in 2024 PPI Report). Multiple items are distributed through public outreach initiatives.

Action 18: Update Master Drainage Plans when conditions warrant.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Master Drainage Plans (MDP) updated during the reporting period include Perryman Ditch and Fry Ditch No. 2. The City of Tulsa is currently working to develop a web-based version of the Master Drainage Plans. The online platform allows City officials to monitor the progress of MDP recommendations.
2022 Update	The City of Tulsa budgets for Master Drainage Plan updates annually.
2023 Status	The City of Tulsa budgets for Master Drainage Plan updates annually. Gary McCormick is POC.
2024 Status	Ongoing. City of Tulsa maintains a GIS Viewer, which is used to track and schedule updates as required.

Action 19: Acquire properties in the FEMA Floodplain, Tulsa Regulatory Floodplain and Repetitive Loss/Severe Repetitive Loss properties.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	The City of Tulsa received FEMA funding to acquire properties in Little Joe Creek, one property in Crow Creek, and applied to purchase a property in Haikey Creek.
2022 Update	Ongoing. The City of Tulsa received FEMA funding to acquire properties in Crow Creek and Fry Ditch 2. In 2022 the City completed FEMA funded buy out in Cooley Creek for six properties, one of which was an RL. The City is working on developing a Substantial Damage Plan that will be an appendix to the hazard mitigation plan, to identify a list of prioritized properties and prepare for future disaster assessments. The list of properties was completed in 2021. The Tulsa Stormwater Planning will work with Tulsa's Floodplain Administrator, Michael Ling on this. The list has over 900 properties and includes all of the repetitive loss properties.
2023 Status	Ongoing. Actively working on acquisition projects for two properties in the Jones Creek watershed and one in the Mill Creek watershed. Projects are being funded through the FEMA HMGP program in conjunction with City of Tulsa, as well as currently developing a Substantial Damage Management Plan.
2024 Status	<p>Action Item reworded to: "Acquire properties in the FEMA floodplains, Tulsa regulatory floodplain and repetitive loss/severe repetitive loss properties; develop a Substantial Damage Management Plan" for the 2024 HMP Update</p> <p>2024 Status: Ongoing. The City is in the process of building an historic acquisition database for tracking of all previously and future acquired properties. Identification of RL/SRL properties for possible acquisition are gathered from MDP updates and added to a database for considerations when funding becomes available.</p>

Action 20: Enhance emergency plan for the Arkansas River Corridor.

Responsible Agency	TAEMA, USACE Tulsa District, Tulsa-West Tulsa Levee District 12
Potential Resources	Local/General, FEMA HMA
2020 Status	Some progress. As a result of the 2019 Flood, the USACE Tulsa District developed an Emergency Management Situation Awareness Tool (EMSAT) to understand the impacts of various releases from the Keystone Lake Dam on areas downstream. The USACE also worked with Levee District 12 to update the Tulsa West Tulsa/Levee District 12 Emergency Operations Plan (EOP), based on response operations and lessons learned in the 2019 flood event. The EMSAT and updated EOP were incorporated into the 2020 Flood Exercise.
2022 Update	Ongoing. This has been completed since the 2019 flood but is updated approximately quarterly and is provided to Joe Kralicek/TAEMA.
2023 Status	Completed. Tulsa West Tulsa EOP is updated annually, with assistance from USACE. Will be incorporated as an annex to City of Tulsa EOP. MCN project for hydraulic analysis is pending. This action can be removed from future HMP updates.
2024 Status	Removed from 2024 HMP Update 2024 Status: Completed & Removed

Action 21: Implement recommendations of the City of Tulsa Master Drainage Plans.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. The City of Tulsa received funds to implement one of the actions identified in the Tupelo Creek Master Drainage Plan. The project was funded in 2018 and final plans are under review. Construction is set to begin in 2021. Completion of the project will remove 18 structures from the floodplain. In 2019 the City of Tulsa applied for Advance Assistance funds through FEMA's Pre-Disaster Mitigation program to complete design and benefit cost analysis of a project identified in Bell/Fulton.
2022 Update	In 2022, construction plans are complete, and the project is set to begin in 2022. Environmental review may delay that somewhat. Completion of the project will remove 18 structures from the floodplain. Also, the Stormwater Utility Enterprise Initiative (SUEI) is in progress and will be implemented in 2023, programming funding for stormwater improvement recommendations. The City has also been notified of probable BRIC funding for the ongoing flooding problems at 43rd & Sheridan in Tulsa. This will include implementing Bell/Fulton Master Drainage Plan recommendations.
2023 Status	Tupelo Creek MDP improvements are under construction but have been delayed on an environmental basis. 43rd & Sheridan BRIC grant has been recommended for "further review" and awaiting approval, pending request for additional information.
2024 Status	Tupelo Creek MDP improvements will be complete in December 2025. Fulton Creek (43rd & Sheridan) BRIC application has been approved for Phase 1 activities and work is ongoing.

Action 22: Repair the levees based on recommendations from USACE.

Responsible Agency	City of Tulsa, USACE Tulsa District
Potential Resources	Local/General, FEMA HMA
2020 Status	<p>The Chief's Report was signed on 23 April 2020. The Chief's Report identified, evaluated, and disclosed all associated impacts that would result from the construction and operation of the recommended plan to improve life safety during flood events within the levee protected areas. The recommended plan consists of a filtered Berm with Toe Drains on Levee A and Levee B and reconstruction of pump stations. This plan met the study objectives for reducing flood risk to the public. The structural features include: 13 miles of a filtered berm with toe drain, 2,000 feet of cut off wall in Levee A at the Superfund site, A landside inverted filter berm, Two detention ponds at Levee B tieback, Riprap armoring on landside at overtopping in Levee B, Grouting penetrations, Replace penetrations, Reconstruction of pump stations 1 through 5; and, A filtered floodway structure. The Chief's Report has been submitted to Congress for construction authorization which should occur in Fall 2020. (<i>Status from Bryan Taylor, Project Manager, Civil Works Branch, 17 Aug 2020</i>).</p>
2022 Update	<p>Underway. The District was awarded a \$150,000,000 project to repair the levees. The design is underway. Project construction is on an expedited path. Some culvert construction may begin as early as the end of year 2022. (Per Bill Smiley 8/1/22). The USACE is starting to replace pump stations (19 total) as part of a different project. That will get the levees back to where they can protect areas in a similar flood to that of 2019. It will improve total pump capacity to approximately 250,000 gallons per minute.</p>
2023 Status	<p>Levee repair is currently under Preliminary Engineering Design (PED) by USACE. Pump station repair work is currently underway.</p>
2024 Status	<p>Underway. Project has been started and is in preliminary development.</p>

Action 23: Notify the public of their risk living within the floodplain, levee, or dam inundation area.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. This is included in the PPI messaging. Annual Floodplain Notification, Levee Notification, and Repetitive Loss Notification sent to public in 2020. Information on dam inundation was distributed in City Life. Additionally, the Tulsa Hazard Mitigation Plan web viewer remains active and updated on the City of Tulsa website. Citizens can view their geographic risk to the flood, levee, and dam breach hazard on this website.
2022 Update	Same as 2020.
2023 Status	Same as 2020.
2024 Status	Ongoing. Annual messaging campaign is conducted by the City. Approximately 15,000 notifications are sent out each year.

Action 24: Construct additional fire stations in outlying areas.

Responsible Agency	Tulsa Fire Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Some Progress. City officials broke ground in August 2020 for Tulsa Fire Department Station 33. It will sit at the corner of 41st Street and 134th East Avenue.
2022 Update	In 2022 this has been completed as a CIP project.
2023 Status	Completed (no change).
2024 Status	Removed from 2024 HMP Update 2024 Status: No change (Completed)

Action 25: Continue replacing inadequately sized water lines with lines of sufficient size to provide proper fire protection to annexed and existing areas.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. Can remove this from future updates of the Hazard Mitigation Plan.
2022 Update	Ongoing. This is a part of both utility replacement and roadway projects, whenever inadequate waterlines are encountered.
2023 Status	Ongoing. This is a part of both utility replacement and roadway projects, whenever inadequate waterlines are encountered.
2024 Status	<p>Action Item reworded to: “Continue replacing inadequately sized water lines with lines of sufficient size as an element of both utility replacement and roadway projects whenever inadequate waterlines are identified” in the 2024 HMP Update</p> <p>2024 Status: Ongoing. Water & Sewer Dept. maintains a Water Main Rehabilitation Risk Map that identifies high-risk/high-priority water lines in need of replacement, which is updated quarterly.</p>

Action 26: Implement mitigation actions to reduce fire access issues.

Responsible Agency	Tulsa Fire Department, TAEMA
Potential Resources	Local/General, FEMA HMA
2020 Status	No progress reported.
2022 Update	Ongoing. JK reports that the City is working with Levee District 12 and area fire chiefs to create a river access ramp for emergency response.
2023 Status	Ongoing. Met with Andrew Little at Tulsa FD who indicated there was some concern due to the number of fires and needing a ramp into the Arkansas River for swift water rescue teams to access from a gathering place for emergency vehicles at Turkey Mtn. Turkey Mtn access update (by Joe Kralicek) – Forestry was working that area and made some progress before the June storm. Of the 130 parks in Tulsa, 100 have sustained substantial damage as a result of the recent storm, including downed trees.
2024 Status	<p>Action Item reworded to: “Implement mitigation actions to reduce fire access issues including a ramp to the Arkansas River for swift water rescue operations” in 2024 HMP Update.</p> <p>2024 Status: Ongoing. TAEMA is working with the State and Gilcrease Park to do a control for fire access roads in the park area since they are in the WUI.</p>

Action 27: Implement Water Sense Program.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	The City Life utility bill newsletter in July makes an annual mention of WaterSense in a story titled, "Water Conservation." The story mentions WaterSense and Energy Star.
2022 Update	Ongoing. This will be in the August 2022 CityLife newsletter.
2023 Status	Ongoing. Included in the July 2023 issue of CityLife.
2024 Status	Ongoing. Public outreach program coordinated through CityLife newsletter.

Action 28: Continue replacing broken pipes in areas of high soil expansion, with piping more resistant to breakage.

Responsible Agency	City of Tulsa Water & Sewer Department
Potential Resources	Local/General, FEMA HMA
2020 Status	Ongoing. Included as regular City of Tulsa Maintenance. Can remove from future updates of the Hazard Mitigation Plan.
2022 Update	Ongoing. Since this is a continuing problem, the committee recommended leaving on the list as ongoing.
2023 Status	Ongoing.
2024 Status	Ongoing. Water Main Rehabilitation Risk Map is used to identify high-risk water lines in need of replacement. Much of this has been rolled into risk criteria used for water main replacement.

Action 29: Develop Resilience Hubs in Comanche Park and River West neighborhoods while ensuring proper hazard response information is disseminated to the public.

Responsible Agency	Resilient Tulsa
Potential Resources	Local/General, FEMA HMA
2020 Status	This action is from the City of Tulsa Resilient Tulsa Strategy. The 2019 Annual Report did not indicate any progress on this specific action item.
2022 Update	No additional updates were provided on this action in the reporting period of 2021-2022.
2023 Status	No changes. Resilient Tulsa Strategy is headed by Krystal Reyes as POC.
2024 Status	<p>Action Item reworded to: “Develop Resilience Hubs in each City Council District” in the 2024 HMP Update to ensure proper hazard response information is disseminated to the public in all areas of the City</p> <p>2024 Status: No changes.</p>

Appendix B 2023 Repetitive Loss Area Analysis Update

Previously Mitigated RLAs

In 2023, the City of Tulsa submitted 37 existing RL properties and 6 new RL properties to be mitigated based on acquisition and structural projects that protected the properties from flooding. The City of Tulsa also submitted 6 RL properties for conditional mitigation because they have been protected from the 4% (25-year) AC storm but not the 1% (100-year) AC storm by a project. The City of Tulsa received the updated repetitive loss list in April 2024, which reflected the following changes. Of the submitted properties we have received confirmation that 16 properties, fully mitigating the RL properties in 7 RLAs. Two of the mitigated properties were severe repetitive loss properties. These RLAs are updated in the table at the end of this appendix to “Mitigated in 2023”. Other submitted properties are still being processed by FEMA to determine their status; they are listed as “Requested” in the table at the end of this appendix.

- RLA 2- Bell Creek
- RLA 7- Crow Creek
- RLA 10- Little Joe Creek
- RLA 11- Mingo Creek Mainstem LM
- RLA 12- Fred Creek
- RLA 18- Joe Creek, East Branch
- RLA 24- Fred Creek

Current Mitigated RLAs

The City is requesting that RLs in the following RLAs have their status changed to Mitigated or Conditionally Mitigated. The latter status is for properties that are protected for greater than a 4% AC Storm but less than a 1% AC Storm. Explanations for the status change are included in the individual status update for each RL.

Mitigation of RLAs from Acquisition:

None for 2024.

Mitigation of RLAs from Structural Projects:

- RLA 3 –Current BFE is lower than the FFE for the RL property.
- RLA 4 –Drainage improvements that diverted overland flow away from the RL property during development of adjacent lot.
- RLA 5 - Jones Creek USACE stormwater detention facilities. The 1st (upstream) cell and storm sewer improvements occurred prior to 1995. The 2nd cell (downstream) of the detention pond was completed between 1995 and 2002.
- RLA 8 – West Tributary Fred Creek – Vienna Woods Drainage Improvements recommended as part of the Fred Creek Master Drainage Plan (1989) completed in 2001.
- RLA 9 – Glen Eagles Stormwater Detention Facility was completed upstream of 61st St.
- RLA 19 – This RLA experienced flooding in 1979 and 1984, both extraordinary storms. Detention ponds upstream were constructed between 1978 and 1980 to protect the RLA from flooding events up to the 1% AC storm.
- RLA 21 - This RLA was flooded in 1980 and in 1981. No claims have been made since that time. It is assumed that the grading has been corrected.
- RLA 22 – The RLA flooded in 1979 and 1984 and is well above the 1% AC Storm water surface elevation.

- RLA 23 - The two repetitive loss properties in the RLA have not flooded since the 53rd St. Drainage Improvements were constructed after 2010.
- RLA 27 – This RLA flooded several times between 1979 and 1997. The 71st Widening project in 2002 and 2003 constructed a stormwater detention facility immediately upstream that mitigated this flooding.
- RLA 30 – This RL property is not in a designated floodplain and has not submitted an NFIP flood claim since 1986. It assumed that the homeowners have made improvements to the drainage on the property that have minimized or eliminated the flooding.
- RLA 31 – This RL property is not in a designated floodplain and has not submitted an NFIP flood claim since 1984. It assumed that the homeowners have made improvements to the drainage on the property that have minimized or eliminated the flooding.
- RLA 32 – This RL property is not in a designated floodplain and has not submitted an NFIP flood claim since 1984. It assumed that the homeowners have made improvements to the drainage on the property that have minimized or eliminated the flooding.
- RLA 36 – The RL in this RLA does not appear in the 2022 or 2023 data.
- RLA 41 – This RLA experienced flooding in 1979 and 1984, both extraordinary floods. FFE's above the 1% AC Storm water surface elevation.
- RLA 42 – The owner of this RL property redeveloped to eliminate flooding.
- RLA 50 – The RL property in this RLA is protected by a levee along Mingo Creek. It appears to be mitigated for the 1% AC storm.
- RLA 51 – This RL property has been mitigated as a result of the ODOT I44 Widening Drainage Improvements in 2009-2010 and Perryman Ditch Drainage Improvements. These projects included increased storm sewer capacity and improved local drainage.
- RLA 58 – The upstream area is being developed for a school. The RLA will also benefit from a stormwater detention facility that is part of the stormwater runoff controls for the development and the City of Tulsa requirements for runoff control in general.
- RLA 63 – This RLA is flooded by during extraordinary floods in 1979 and 1984.

Conditionally Mitigated RLAs

- RLA 17 – Most properties are protected against the 1% AC Storm and the sixth RL has a FFE equal to the 2% (50-year) AC Storm water surface elevation as a result of the construction of the Little Joe Creek Channel.
- RLA 34- The RLA has not flooded since 1984. Current floodplain modelling shows the FFE to be at the 2% water surface elevation.

RL Properties Not Included in RLAs

Five properties are included in the City of Tulsa Repetitive Loss List but are outside the City of Tulsa's jurisdiction. These repetitive loss properties will be submitted to FEMA to be removed from the City of Tulsa's list as part of the 2024 update.

Currently Unmitigated RLAs

Master Drainage Plan RLAA Recommendations

Following is the Update of the RLAA's in the City of Tulsa. The changes to the RL's and RLA's that are recommended are based on the data we have researched that is included in the individual appendices to this report.

Joe Creek MDP

RLA 1 and *RLA 20* are named with the following recommendations:

1	Extend and/or improve storm sewer system to better collect stormwater runoff. (Most RLAs can be fixed with extension or improvement of the existing storm sewer system.)
2	Create overland flow path to drain pond water to the stream channel. (Only use this Solution if ponded water could be relieved with a swale to the channel.)
3	Create berms or swales to direct runoff away from residential properties. (Used to divert flowing water away from structures. Only used on City property or ROW)
4	Relocate residents & Acquire flood prone properties on a voluntary basis. (Only used for residential properties.)

RLA 26 – This RLA is named and located at the confluence of MDP Area 1 – Lower East Branch Joe Creek and MDP Area 1 – Lower West Branch Joe Creek, with large overflows. In approximately 2010, ODOT completed the I44-widening, including the new box culverts under Harvard (City of Tulsa) and under I44 (ODOT). These have contributed to lowered floodplain elevations and reduced risk, but this RLA is still subject to flooding from the 10% AC storm. The recommendations for this RLA include acquisition and relocation of residents and properties, and associated storm sewer and stormwater detention improvements.

RLA 59 –Currently there is a street rehabilitation project being designed for the streets adjacent to RL. The designers have been notified that this RLA could be mitigated by the project. This will be revisited following completion of the project. **The recommendations from the Joe Creek Master Drainage Plan that pertain to this RLA are listed below.**

1	Extend and/or improve storm sewer system to better collect stormwater runoff. (Most RLAs can be fixed with extension or improvement of the existing storm sewer system.)
4	Relocate residents & Acquire flood prone properties on a voluntary basis. (Only used for residential properties.)
8	Construct upstream detention to reduce the amount of stormwater runoff into the RLA.

RLA 33 –RLA 33 is named and located in MDP Area 4 - Mockingbird Lake portion of East Branch Joe Creek and a tributary. The large flows in the area and small storm sewer capacities required a recommendation of purchase of the residential structures as the only reasonable alternative.

RLA 16 – RLA 16 is named and located in Little Joe Creek Area 3 – Toledo Avenue/Place. The flooding occurs due to overflows from the creek. The recommended solution to this area is to provide upstream floodplain storage.

RLA 39 – RLA 39 is named and located in Area 8 – Little Joe Creek west of S. Sheridan Rd. Again, flooding is caused by overflow or Little Joe Creek. The recommendation is to acquire two properties and construct floodplain storage in the area on the west side of S. Sheridan Rd

RLA 55 – RLA 55 is named and located in Area 9 – Little Joe Creek east of S. Sheridan Road. The recommended solution for this area is to construct an open detention system within Explorer Park and Memorial Middle School open spaces to provide enough storage to reduce this flooding risk.

RLA 63 – RLA 63 is named and located in Area 6 of the Joe Creek MDP. The recommended solution is a storm sewer system enhancement sized for the 1% AC event that would drain the sump on E. 58th St. to Little Joe Creek, discharging along the existing alignment on S. Hudson Ave.

Bell Fulton MDP

RLA 61 – This RLA has flood claims in 2012 and 2011. This was investigated by an engineering firm and was included as **Appendix F** in the *Bell Fulton Creeks Master Drainage Plan, November 2017*. The problem is that the storm sewer is under capacity. Onsite drainage improvements were recommended but have not been implemented. This is not mitigated. **The status of this RLA is unchanged.**

Perryman Ditch MDP

RLA 48 –The RLA experienced flooding in 2000, 1997 and 1994. While the recommendation in the MDP for a large storm sewer diversion would mitigate the RL, the only reasonable solution to the single house flooding is to purchase and demolish it. The larger project will mitigate other flooding in the area.

RLA 51 – There is a recommendation for both RLA 48 and RLA 51 in the MDP that will provide flooding relief for a large number of houses. However, the improvements that have already been made show that the RLs with RLA 51 have been mitigated because the 1% AC water surface elevations are below the FFE's. While the RLs and the RLA are effectively mitigated, there are still flooding concerns in the north part of the RLA that cannot be quantified at this time.

Northwest Areas MDP

RLA 66 – RLA 66 is located in Problem Area 2, Upper Parkview Creek. The MDP recommended plan to alleviate flooding in RLA 66 is to increase the mainline storm sewer capacity throughout the reach, beginning at the intersection of West Haskell Street and North Xenophon Avenue and continuing all the way down stream to West Edison Street.

Outside of MDP Solutions

These RLAs are not specifically called out in existing Master Drainage Plans as RLAs although they may be part of a problem area. There also may not be a structural project indicated in the Master Drainage Plan where these areas are referenced therefore, they should be considered for future plans. Evaluated solutions are below.

RLA 15 - Improve Conveyance in Creek and construct upstream detention to reduce the amount of stormwater runoff.

RLA 28 - Improve storm sewer system and acquire flood-prone areas voluntarily.

RLA 29 - Improve storm sewer system and construct upstream detention to reduce the amount of stormwater runoff.

RLA 35 - Acquire flood-prone areas voluntarily, improve conveyance in the creek, improve downstream hydraulic structures, and construct upstream detention to reduce the amount of stormwater runoff.

RLA 37 - Acquire flood-prone areas voluntarily.

RLA 43 - Improve storm sewer system and acquire flood-prone areas voluntarily.

RLA 45 - Improve storm sewer system, create overland flow path to better allow drainage of ponding water, and acquire flood-prone areas voluntarily.

RLA 46 - Improve storm sewer system, create overland flow path to better allow drainage of ponding water, create berms or swales to direct water runoff away from structures, and acquire flood-prone areas voluntarily.

RLA 49 - Improve storm sewer system, acquire flood-prone areas voluntarily, improve conveyance in the creek, improve downstream hydraulic structures, and construct upstream detention to reduce the amount of stormwater runoff.

RLA 52 - Improve storm sewer system and improve downstream hydraulic structures.

RLA 56 - Improve storm sewer system, create overland flow path to better allow drainage of ponding water, acquire flood-prone areas voluntarily, improve conveyance in the creek, improve downstream hydraulic structures, and construct upstream detention to reduce the amount of stormwater runoff.

RLA 57 - Improve storm sewer system and acquire flood-prone areas voluntarily.

RLA 62 - Improve storm sewer system and acquire flood-prone areas voluntarily.

RLA 64 - Improve storm sewer system, create overland flow path to better allow drainage of ponding water, create berms or swales to direct runoff away from structures.

RLA 65 - Acquire flood-prone areas voluntarily.

RLA 67 - Acquire flood-prone areas voluntarily.

Summary Updates

RLA #	Location	Status	Drainage Basin
1	57th & Birmingham	Not mitigated	Joe Creek, Mainstem
2	41st & 87th E Ave	Mitigated 2023	Bell Creek
3	38th & Archer	Requested	Park View Creek
4	6th & 197th E Ave	Requested	Rolling Hills Creek
5	13th & Memorial	Requested	Jones Creek
6	74th & Richmond	Mitigated	Fred Creek
7	28th & Detroit	Mitigated 2023	Crow Creek
8	67th & Knoxville	Requested	Fred Creek
9	54th & 101st E Ave	Requested	Mingo Creek Mainstem MU
10	49th & Pittsburg	Mitigated 2023	Little Joe Creek
11	7th and Mingo	Mitigated 2023	Mingo Creek Mainstem LM
12	71st & Jamestown	Mitigated 2023	Fred Creek
13	55th & Hudson	Not mitigated	Little Joe Creek
14	13th & Norwood	Mitigated	Upper Mill Creek
15	27th & Madison	Not mitigated	Dirty Butter
16	53rd & Toledo	Not mitigated	Little Joe Creek
17	54th & Urbana	Requested	Little Joe Creek, North Fork
18	33rd & Darlington	Mitigated 2023	Joe Creek, East Branch
19	66th & Sheridan	Requested	Little Haikey Creek
20	59th & Birmingham	Not mitigated	Joe Creek, Mainstem
21	36th & Sheridan	Requested	Audubon Creek
22	58th & 72nd E Ave	Requested	Little Joe Creek
23	56th & Birmingham	Requested	Joe Creek, Mainstem
24	71st & Harvard	Mitigated 2023	Fred Creek
25	59th & New Haven	Mitigated	South Fork Joe Creek

RLA #	Location	Status	Drainage Basin
26	49th & Harvard	Not mitigated	Joe Creek, East Branch, West Branch, Mainstem
27	71st & Birmingham	Requested	Fred Creek
28	5th & Trenton	Not mitigated	Elm Creek
29	7th & Wheeling	Not mitigated	Elm Creek
30	75th & Jamestown	Requested	Fred Creek
31	46th & 85th E Ave	Requested	Bell Creek
32	46th & Memorial	Requested	Bell Creek
33	37th & Sandusky	Not mitigated	Joe Creek, East Branch
34	26th & Yale	Requested	Joe Creek, East Branch
35	101st & 77th E Ave	Not mitigated	Fry Ditch No 2
36	21st & Sheridan	Requested	Jones Creek
37	51st & Columbia	Not mitigated	Flat Rock Creek
38	32nd & Memorial	Mitigated	Audubon Creek
39	53rd & Sheridan	Not mitigated	Little Joe Creek
40	Mitigated	Mitigated	Mingo Creek Mainstem LM
41	54th & Joplin	Requested	Little Joe Creek
42	49th & Darlington	Requested	Little Joe Creek, North Fork
43	Pine & Maplewood	Not mitigated	Coal Creek
44	7th & Sheridan	Not mitigated	Upper Mill Creek
45	31st & Florence	Not mitigated	Joe Creek, West Branch
46	46th Street North & Kenosha	Not mitigated	Valley View Creek
47	6th & 132nd E Ave	Mitigated	Cooley Creek
48	45th & Victor	Not mitigated	Perryman Ditch
49	81st & Elwood	Not mitigated	Hagar Creek, Arkansas River Local Drainage
50	Ute & 105th E Ave	Requested	Mingo Creek Mainstem LM
51	50th & Wheeling	Requested	Perryman Ditch
52	11th & 119th E Ave	Not mitigated	Tupelo Creek
53	15th & Joplin	Mitigated	Upper Mill Creek

RLA #	Location	Status	Drainage Basin
54	5th & 90th E. Ave	Mitigated	Mingo Creek Mainstem LM
55	53rd & 67th E Ave	Not mitigated	Little Joe Creek
56	30th & Trenton	Not mitigated	Crow Creek
57	74th & 77th E Ave	Not mitigated	Little Haikey Creek
58	98th & 69th E Ave	Requested	Fry Ditch No 2
59	49th & Columbia	Not mitigated	Joe Creek, Mainstem
60	12th and Lynn Lane	Mitigated	Center Creek
61	44th & 88th E Ave	Not mitigated	Bell Creek
62	77th & Quebec	Not mitigated	Vensel Creek
63	56th & Hudson	Requested	Little Joe Creek
64	W. 61st St. & S. 25th West Ave. Area	Not mitigated	Mooser Creek
65	West 53rd St. & South Union Ave. Area	Not mitigated	Mooser Creek
66	N. Yukon Ave. & W. Haskell Pl. Area	Not mitigated	Parkview Trib. LB1
67	N. Mingo Rd. & E. Pine St. Area	Not mitigated	Mingo Creek Mainstem LM