



CITY OF
Tulsa
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Repetitive Loss Area #17

Little Joe Creek

E. 54th St. & S. Urbana Ave. Area



August 17, 2017



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Engineering Services



**Planning and Coordination
ENGINEERING SERVICES DEPARTMENT**

August 17, 2017

Dear Resident/Property Owner:

Once considered the most flood-prone city in America, Tulsa has worked hard to reduce or eliminate flooding of its homes and neighborhoods. The City joined the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP) in 1974 and through decades of effort is now recognized as a national leader in flood hazard mitigation. As a result, property owners in Tulsa receive as much as 40% discount on their flood insurance.

A key component of the NFIP has been its focus on Repetitive Loss Properties, which make up only 1 percent of insured properties, but account for over 30 percent of flood insurance claims payments. A Repetitive Loss Property is defined by FEMA as any property that has been paid two or more flood insurance claims of \$1,000 or more in a 10-year time period.

The NFIP recently expanded its flood hazard mitigation program to include the identification of "Repetitive Loss Areas" (RLA)—those properties near an existing Repetitive Loss Property that are subject to the same general flooding conditions. In most instances, 95% of the properties in an RLA will never have experienced flooding—especially if the cause of damage is shallow, overland flow due to local drainage conditions. Once the City has identified an RLA, we are required to contact the owners and residents of the area and, working together, develop a plan to reduce or eliminate flooding in their neighborhood.

Your property has been identified as being in an RLA. We want to re-emphasize that this does not mean your property has flooded or is even likely to flood—only that it is in the same area, and in a similar geographical situation, as an existing Repetitive Loss Property.

You can protect your property from flooding. We would like to invite you to participate in our flood prevention and mitigation efforts for your neighborhood. We need your input. What can we do, working together, to eliminate potential flood losses in your area? We look forward to hearing from you.

To learn more about your risk of flooding visit www.floodsmart.gov or contact the City of Tulsa Customer Care Center at (918) 596-7777.

Sincerely,
CITY OF TULSA, ENGINEERING SERVICES

Bill Robison, P.E., CFM
Senior Special Projects Engineer
Stormwater Project Coordination

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Acknowledgements

The City of Tulsa Repetitive Loss Area Analysis Plans were developed by Engineering Services with local funding from the City of Tulsa in compliance with the Federal Emergency Management Agency's Community Rating System's requirements. Numerous agencies, departments, organizations and individuals participated in these studies, including:

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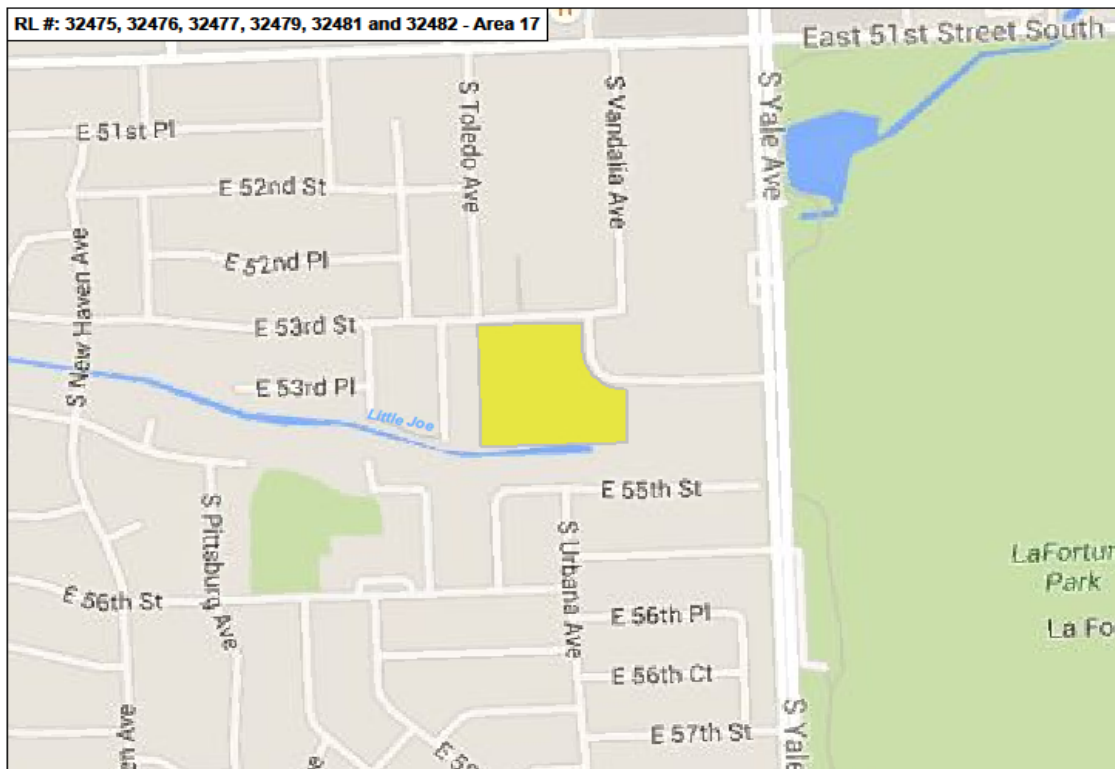
Repetitive Loss Area # 17

Little Joe Creek E. 54th St. & S. Urbana Ave. Area

Overview

Repetitive Loss Area (RLA) #17 is comprised of an apartment complex located at the junction of the North Fork of Little Joe Creek with the Little Joe Creek mainstem, between S. Toledo Pl. on the west and S. Vandalia Ave. on the east, and from E. 53rd St. on the north to Little Joe Creek on the south. The RLA is about 6 miles above where the creek joins the Arkansas River. There are 25 three-story, slab-on-grade buildings in the complex built in 1973. In 1979 and 1984 heavy rains caused overland flow and overbank flooding at the junction of the North Fork with Little Joe Creek. Eight buildings experienced flooding to their ground-level apartments and facilities during these events. The floods generated 25 structural damage claims from 16 properties, 23 of which were paid, totaling \$109,505. The individual claims ranged from a low of \$645 to a high of \$17,749.

The location of RLA #17 is shown on the map below and on the more detailed photo/topography map on page 5. The detailed map identifies properties, County Assessor parcels and floodplains, as well as the existing storm sewer system.



RLA #17 is located at the junction of the North Fork of Little Joe with the Little Joe Creek mainstem, bounded by E. 53rd St. on the north, S. Vandalia Ave. on the east and S. Toledo Ave. on the west.

I. Background

During the post-World War building boom of the 1950s and 1960s, Tulsa expanded rapidly east and south into the basins of Mingo and Joe creeks. Because of the city's climate and the broad floodplains along these creeks this growth brought with it an increased risk of flooding. And indeed, by the mid-1980s floods were occurring almost yearly and flooding had become Tulsa's most destructive natural hazard. One researcher at the time declared Tulsa "the most flood-prone community in the nation."

Tulsa was not unique in its rapid post-war development and attendant risks. Cities across America were experiencing similar problems as they spread out into prosperous subdivisions. In response, the U.S. Congress created the National Flood Insurance Program (NFIP) in 1968 to help property owners protect themselves from flood losses. The NFIP offered flood insurance to homeowners, renters, and business owners if their community participated in the NFIP and agreed to adopt and enforce ordinances that met or exceeded FEMA requirements for reducing the risk of flooding.

Tulsa joined the NFIP in 1974, and through great effort and considerable expense has significantly reduced its exposure to flooding. As a result, Tulsa has been awarded a Class II rating in the NFIP's Community Rating System (CRS), which grants its residents a 40 percent discount on the cost of flood insurance for structures in the Special Flood Hazard Area (SFHA), also known as the 1% or 100-year floodplain. Since the Biggert-Waters Flood Insurance Reform Act of 2012, many properties have seen a substantial increase in their premiums, making this discount even more important.

For its part, the NFIP is continually faced with the job of paying claims while trying to keep the price of flood insurance at an affordable level. Properties that flood repeatedly—known as "Repetitive Loss Properties," have been a particular problem for the program: Although they make up only 1 percent of insured properties, they account for one-third of all claims payments (about \$200 million a year, or \$4.5 billion to date). A Repetitive Loss Property is defined by FEMA as any property that has been paid two or more flood insurance claims of \$1,000 or more in a 10-year time period.

Consequently, one of the requirements of the CRS is that communities identify all Repetitive Loss Properties in their jurisdiction and work with the owners to find ways to reduce or eliminate future flood damage. This initiative has been very successful in reducing flood losses and claims.

FEMA has recently extended its repetitive loss program to include "Repetitive Loss Areas" (RLA). To maintain a Class II rating in the CRS, Tulsa is now required to analyze the area surrounding each of its Repetitive Loss Properties and identify any neighboring properties (including uninsured ones) that may be subject to the same general flooding conditions. This group of nearby properties is then designated as an RLA. The City is required to contact the owners of the properties in all its RLAs, inform them that they are located in an area subject to flooding, and develop a plan for mitigating or eliminating flooding in the area, much as is being done for the individual Repetitive Loss Properties.

It is important to note that most of the homes in an RLA—perhaps as many as 80% or 90%—may not have experienced flooding of any kind. What they have in common is being subject to the same general geographical and flood conditions as the nearby repetitive loss property. It should also be stressed that the flooding events in question

may have had little or nothing to do with overflow from a creek, but perhaps may have been the result of storm sewer backup or overland flow from a neighbor's property into a low-lying, slab-on-grade home or garage.

II. Location

Joe Creek is about 6.5 miles in length and drains an area of 13.7 sq. miles in southeast Tulsa. The creek has several tributary branches (Upper Joe Creek, Little Joe and South Joe) that converge near E. 53rd and S. Evanston Ave., at Manion Park, just north of Eisenhower International School, to form lower Joe Creek mainstem. The mainstem and its tributaries have been channelized through much of their lengths.

Little Joe Creek rises near S. 61st St. and 73rd E. Ave. and flows north and then west for 3.4 miles, crossing under Sheridan Rd. just south of The Farm shopping center and then passing through La Fortune Park and under Yale and Harvard Aves. before finally joining the North and South Forks of the creek at Manion Park.

The North Fork of Little Joe Creek has two branches: One rises at E. 46th St. and S. Irvington Ave. and the other at about E. 49th St. and S. Sheridan Ave. The two branches join at about E. 51st

St. and S. Hudson Ave., just upstream from the Thornton Family YMCA, and pass through the LaFortune Golf Course and under S. Yale Ave. and E. 54th St. before entering a box culvert to pass beneath the apartment complex that makes up RLA #17 and join Little Joe Creek at about E. 55th and Vandalia Ave.



Little Joe Creek, looking west (downstream) towards RLA #17 from Yale Ave.

RLA #17 is located on the north side of Little Joe Creek and the west side of the North Fork. It is bounded by S. Toledo Ave. on the west, S. Vandalia Ave. on the east, E. 53rd St. on the north, and Little Joe Creek on the south. The North Fork enters a box culvert on the east side of the apartment complex at E. 54th St. and passes beneath the property's southeast corner.

III. History

Development

The upscale, 3-story, 25 building, multi-unit, slab-on-grade apartment complex that makes up RLA #17 was built in 1973 on 8.4 acres of land. The ground was leveled to about 680-682 ft. elevation and the North Fork was channelized and routed through storm sewers along the east side of the property to connect with Little Joe Creek at S. Vandalia

Ave., about 175 yards east of the original junction, which was closer to S. Toledo Ave. The first-finished-floor elevations of the buildings generally are between 680 and 682 feet, with the 100-year flood elevation generally at 678.5 feet.

Flooding

There was significant flooding on Joe Creek in October 1959, May 10-11, 1970 (Mothers Day flood), June 7-9, 1974, May 31, 1976 (Memorial Day flood), June 21, 1979, June 17, 1980, May 27, 1984 (another Memorial Day flood), August 11, 1992, May 7, 1993, July 1994, May 6, 2000, May 8, 2007, September 21, 2009 and May 20, 2010. According to newspaper reports, flooding was particularly bad on Joe Creek in 1974 and 1976, although not necessarily along this reach. The storms that resulted in the 24 paid damage claims in RLA #17 totaling \$109,505 were in 1979 and 1984.

The apartment complex that comprises RLA #17 has eight buildings that are Repetitive Loss structures. Of these, five are within the 100-yr flood boundary. All 25 buildings in the complex are within the 500-yr flood boundary.

Flooding in RLA #17 has been largely due to overland flow that resulted from very heavy rainfall and undersized storm sewers, which were only designed to carry 10- to 50-year rainfall events. When more severe storms occurred (as in the 300-year event of 1984), the storm sewers were overwhelmed, with the resulting overland flow generally following the course of the original creek bed. In the case of RLA #17, the channelized Little Joe Creek and North Fork the stream overtopped the creek banks, but did not spread beyond the drainage easement. Flooding in the apartment complex was due to overland flow from the northwest and northeast into slab-on-grade units within the complex.

Improvements

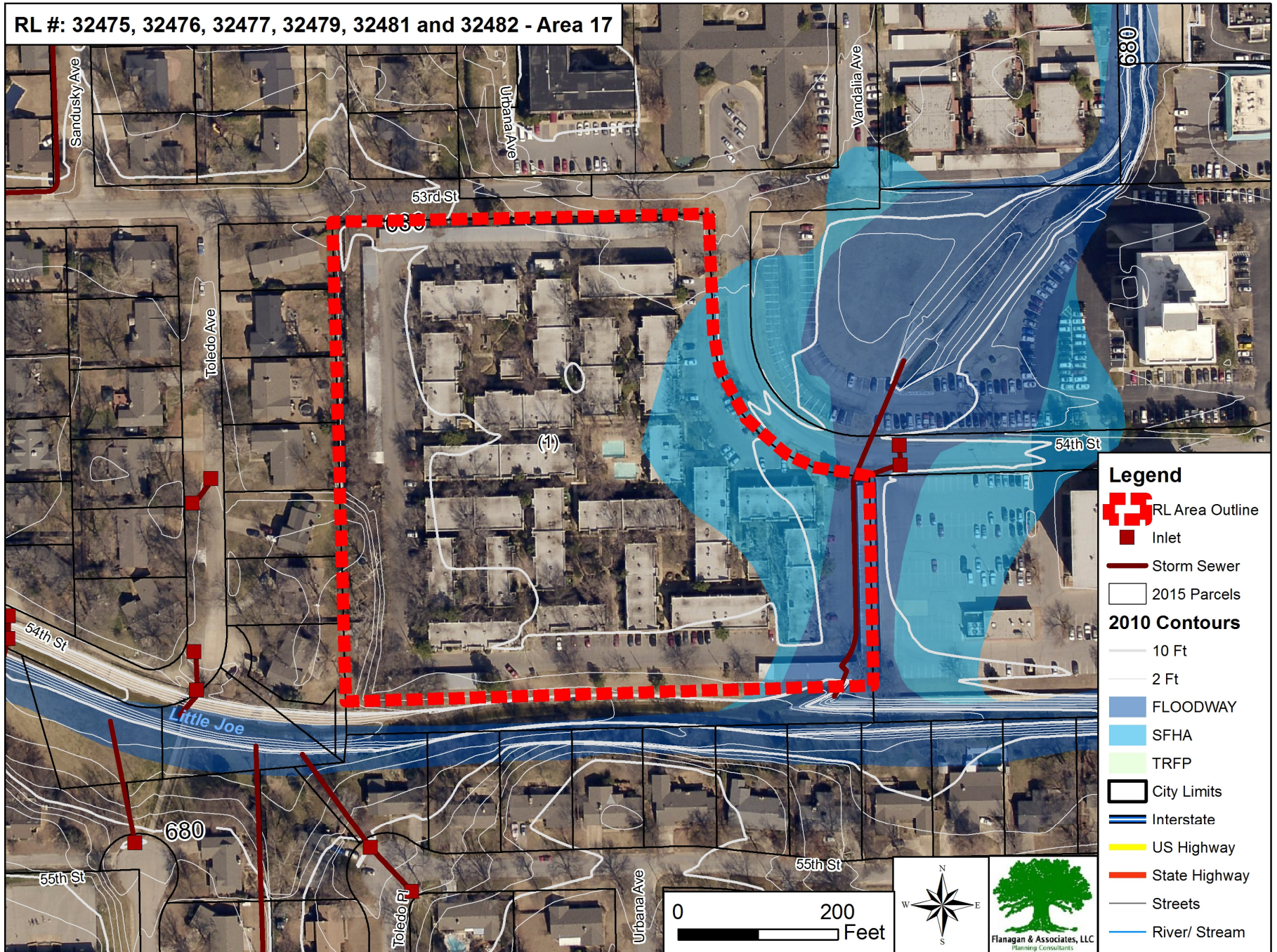
Improvements to the Joe Creek channel by the City and the US Army Corps of Engineers in the 1970s and 1980s channelized a good deal of Joe Creek and its tributaries and installed parallel storm sewers along Little Joe Creek and the North Branch. In the 1990s the City enlarged the storm sewer system in the lower Joe Creek drainage to solve chronic backup problems at numerous locations. On the North Fork, a stormwater detention facility was installed in LaFortune Park and the culverts enlarged beneath Yale Ave. and E. 54th St. These improvements have reduced flooding along the North Fork and Little Joe Creek, but not eliminated it.



The North Fork joins Little Joe Creek immediately south of RLA #17, at about E. 55th St. and S. Vandalia

It is uncertain, as of this writing, to what extent these improvements have resolved the shallow flooding hazard in RLA 17. As stated above, the first-finished-floor elevations of the buildings in the complex are generally at between 681.4 and 682.5 feet in elevation, while the 100-year flood level is at 678.5 feet. This being said, the Tulsa area is subject to

RL #: 32475, 32476, 32477, 32479, 32481 and 32482 - Area 17



Legend

- RL Area Outline
- Inlet
- Storm Sewer
- 2015 Parcels
- 2010 Contours**
- 10 Ft
- 2 Ft
- FLOODWAY
- SFHA
- TRFP
- City Limits
- Interstate
- US Highway
- State Highway
- Streets
- River/ Stream

rainfall events in excess of the 100-year storm, such as the 300-year event of 1984. For this reason, the *Little Joe Creek Master Drainage Plan* recommended a combination of floodproofing and flood insurance as the most effective flood protection options for these structures.

The Interim Master Drainage Plan for the West Branch of Joe Creek recommended two detention sites on the North Fork of Little Joe Creek (a wet pond at LaFortune Park and a dry site southwest of the Thornton Family YMCA) and the enlargement of the box culverts beneath Yale Ave. The detention pond at LaFortune Park was implemented and the larger box culverts installed. Since these improvements would not protect the RLA during flood events in excess of the 100-year storm, the Final Plan recommended floodproofing and flood insurance as the primary option for reducing flooding in the apartment complex.

IV. Research and Analysis

The analysis of Repetitive Loss Area #17 was conducted by the Project Team through interviews with City officials, research into Engineering Services and Stormwater Drainage files, including the *Little Joe Creek Master Drainage Plan* and the *Joe Creek East and West Branches Interim Report*, review of the City's extensive flood history documentation, assessment of insurance claims, field trips to the RLA, interviews with home owners and questionnaires mailed to owner and residents soliciting information about prior and existing flooding issues, if any.

Agencies and Organizations

The City of Tulsa's Storm Drainage & Hazard Mitigation Advisory Board (SDHMAB), which also serves as the City's Hazard Mitigation and CRS Committee, and the CRS Public Participation Involvement & Information Committee (PPI) met monthly during the two-year Repetitive Loss Area Planning process. Each committee was updated on the status of the planning process, discussed issues, and provided guidance. Research and analysis were done in accordance with guidelines from the Federal Emergency Management Agency (FEMA), the National Flood Insurance Program (NFIP) and the Community Rating System (CRS).

Local, State & Federal Agencies and non-profit organizations are represented on the PPI Committee. The RLA plans were discussed at the PPI Committee meetings, and other agencies such as TAEMA were contacted by phone or email. The RLA plans were presented to City Council for adoption; the agenda was made public and furnished to the media. The council meeting is a public meeting and the local media was present at the meeting. In addition the council meetings are aired on our local government network TV channel TGOV.

Participating agencies and organizations involved were: City of Tulsa (CoT) Storm Drainage & Hazard Mitigation Advisory Board, CRS PPI Committee, CoT Communications Department, CoT Development Services, Working in Neighborhoods, CoT Engineering Services, CoT Finance Department, CoT Legal Department, CoT Streets & Stormwater, CoT Water & Sewer Department, Child Care Resource Center, Indian Nations Council of Governments, Tulsa Area Emergency Management Agency

(TAEMA), Disaster Resilience Network, Metropolitan Environmental Trust, Oklahoma Insurance Department, Tulsa Association of Realtors, U.S. Army Corps of Engineers.

Plans, Studies and Documents

The following City of Tulsa and FEMA documents were used in the analysis:

- *Flood Insurance Rate Map*, City of Tulsa, October 16, 2012
- *Regulatory Floodplain Map Atlas*, Tulsa Engineering Services, October, 2016
- *2014 City of Tulsa Hazard Mitigation Plan Update*, Flanagan & Assoc., 2014
- *City of Tulsa Stormwater Management Plan*
- *Stormwater Design Criteria Manual: Critical Neighborhood Flood Control Projects*
- *Stormwater Capital Improvements List*, City of Tulsa, Engineering Services
- *Joe Creek Flood Survey and Study*, Owen, Mansur & Steele, 1955
- *Joe Creek East and West Branches Master Drainage Plan, Interim Report*, W.R. Holway & Assoc., March 1988
- *Little Joe Creek Basin Drainage Study (North Fork and Main Stem) Final Report*, The Benham Group, 1992.
- *Guidebook to Conducting Repetitive Loss Area Analyses*, UNO and FEMA

Capital Improvements Plans

No City of Tulsa Capital Improvements are currently planned that could have a positive impact on the flooding problems in Repetitive Loss Area # 16. There are storm sewer improvement and regional detention facilities on the existing CIPs for Little Joe Creek along with Master Drainage Plan recommendations that are not yet on the CIPs. None are presently funded.

Flood Insurance Data

Six properties in the RLA currently carry flood insurance.

Claims Data.

Twenty-five flood damage claims have been made by 16 different structures in RLA #17 for a total of \$109,505—an average of about \$4,500 per claim. There were 13 claims in 1979 and 12 in 1984. Two claims were not paid—one in 1979 and another in 1984. Eighteen of the claims were for the nine Repetitive Loss structures in the RLA. Because the Privacy Act of 1974 (5 USC 522a) restricts the release of flood insurance policy and claims data to the public, neither the Repetitive Loss Properties nor specific claim data are detailed in this Plan.

Field Surveys and Site Visits

Site visits were conducted during the study, primarily to confirm foundation type and view local on-site overland flow drainage patterns.

Review Drainage Patterns.

The Project Team examined aerial topography maps, master drainage plans, storm sewer plans, City Customer Care Center complaints and comments, and conducted field checks to determine area drainage patterns and identify flood problem areas. The results of the

research and analysis are described in the following paragraphs and summarized in the table below.

Structures

The Project Team has made numerous visits to RLA #17 to determine the situation and condition of the structures. On-site, visual analysis was verified by queries of Tulsa County Assessor data.

Structure Type.

The structures in RLA #17 are 23 apartment buildings and two auxiliary structures.

Foundation Type.

The types of foundations were determined by field investigation and query of Tulsa County Assessor records. The foundations of all buildings are slab-on-grade.

Condition of Structures.

The condition of the structures in the RLA was determined by field investigation and a search of the County Assessor’s records. All three structures are in Average condition. These findings are summarized in the following table.

Properties in the RLA

Address	Year Built	Structure Type	Foundation Type	Condition
Property 1	1973	Multi-Family Apartments	Slab-on-Grade	Average

Notification

Annual Floodplain Notification. Each year, in March, the City notifies all homeowners and residents living in a 100-year floodplain that their properties are subject to flooding and informs them of what steps they can take to protect their residences, businesses and families, including the purchase of flood insurance.

Annual Repetitive Loss Area Notification. Residents and property owners in Repetitive Loss Area #17 are notified annually that their properties are located in a Repetitive Loss Area, and are potentially subject to flood damage from overland flow and storm sewer backup flooding.

Property Owners/Residents Notification. Property owners and residents/occupants were advised of the Repetitive Loss Area study and analysis by letter, were sent a questionnaire soliciting information and input, and asked to contact the City for more information or a copy of the completed RLA Plan.

Public Participation and Involvement. City Staff/Consultants interviewed homeowners to brief them on the Repetitive Loss Area Analysis Study/Plan, receive their input, and discuss possible mitigation measures.

Property Owner Response to Notifications. There have been no responses from the property owner or residents of RLA #17 to the City in recent years concerning flooding. The owner has submitted a LOMR to FEMA to have his property removed from the floodplain. A decision has not yet been made.

Conclusions

Flooding in RLA #17 has generally been caused by rainfall that exceeds the capacity of the existing storm sewer system, which is designed to carry lower frequency storms—generally less than the 50-year event. When larger storms occur, the sewers overflow and excess runoff finds its way overland, generally following the original creek bed and collecting in valleys and low spots.

It is understood by property owners and residents that flooding from overland flow would likely continue to occur whenever rainfall and runoff exceeded the capacity of the local storm sewers.

V. Mitigation Measures

Overview

The Master Drainage Plan for Joe Creek identifies the most cost-effective structural solutions (channel improvements, enlarged inlets and storm sewers, stormwater detention ponds) for the area. The Non-Structural Plan identifies buildings where a structural solution is not cost-effective, and acquisition is the recommended solution. There are presently no Capital Improvement Projects for channel improvements or detention ponds in this area. The *Joe Creek Master Drainage Plan* is in the process of being updated, and additional structural and non-structural solutions may be identified.

Individual property protection actions are usually undertaken by property owners on a lot-by-lot, building-by-building basis, and include private floodproofing, moving mechanical equipment above flood levels, installing French drains and minor site grading to move local drainage to the street, sewer backup protection, and flood insurance. Dry floodproofing is sometimes recommended for commercial structures.

Individual Flood Protection Measures: What You Can Do

Individual property protection actions are usually undertaken by property owners on a lot-by-lot, building-by-building basis, and include private floodproofing, moving mechanical equipment above flood levels, installing French drains and minor site grading to move local drainage to the street, sanitary sewer backup protection, and flood insurance.

The City of Tulsa is willing to have a stormwater engineer do a site visit to assist you in analyzing your specific drainage problems and discuss potential solutions. Contact the Customer Care Center at (918) 596-7777, or go online to www.cityoftulsa.org/connect/contact-the-city.

Know and Understand Your Flood Risk. As stated above, being located in a Repetitive Loss Area does *not* mean a property will flood. Nevertheless, it is important that residents and property



This platform and wall protect the home and air conditioning equipment from shallow flooding.

owners in flood hazard areas know and understand their flood risk and take what steps they can to protect their homes, families and possessions. City staff is available to explain the local flood risk, interpret floodplain maps, and determine if an area or property has drainage problems or a history of prior flooding. Staff can also discuss the ways a specific property can be protected from flooding. An Elevation Certificate can help define a property's flood risk under various rainfall scenarios (e.g., in a 10-year, 50-year, 100-year, or 300-year storm). You can receive a free flood zone determination by contacting the City with the correct legal description and street address, or the Tax Assessor/Parcel Number of the property.

Make a Disaster Preparedness Plan. It is always a good idea for residents and property owners in flood hazard zones to prepare a disaster preparedness and response plan that addresses all the steps and details that will demand attention once a flood watch or warning is issued. A Building Permit is required to install a safe room in a flood-prone area.

Create Berms, Swales or Redirected Drainage. Flood waters can be diverted away from your residence using berms, brick planter boxes and swales, but these may not be done in ways that cause damage to other properties. Owners and residents can request a meeting with a City Engineer to discuss the best ways to solve existing drainage problems, and whether a Building Permit will be required.

Install Local, Property-Specific Paving, Plantings and Catchment Basins. City Engineering staff can explain the natural functions of floodplains and how they act to slow and purify urban runoff and reduce flooding. Staff can also suggest low-impact development projects which imitate natural floodplain functions by slowing runoff and filtering out impurities. These include such things as rain gardens, catchment basins and pervious paving materials.

Acquisition. The City of Tulsa has a repetitive loss acquisition program to purchase repeatedly flooded properties. This voluntary program offers owners who are in this situation have a way out. The City applies to FEMA for funds using the Hazard Mitigation Grant Program. Once the grant is awarded, the property is appraised as if it were not a flooded property and the offer for the property is based on this appraisal. In addition to getting the best possible price, the owner receives moving expenses, a \$1,000 stipend for purchasing a home outside the floodplain, and a 30-day rent free period after closing in which to move. All closing costs and other fees are paid by the City. Once the owner has moved out, the home is demolished and restored as open space to protect the natural and beneficial function of the floodplain. If you would like more information about this program contact the Customer Care Center at (918) 596-7777.

Acquisition is usually not feasible or cost effective for areas of shallow flooding, as in RLA #17. If a property is located in a FEMA Floodway or Special Flood Hazard Area, acquisition and relocation may be feasible and cost-effective..

Elevate Your Structure. Elevating the structure is only suitable for areas of shallow flooding, and is usually not feasible or cost-effective for masonry homes built on concrete slabs. It can sometimes be cost-effective for wood frame buildings on crawlspaces. None of the structures in RLA #17 is a candidate for elevation.

Dry Floodproof Your Structure. This can include actions that seal a structure and prevent floodwaters from entering. This method is best in areas where flood depths are no more than two to three feet. Buildings can be made watertight by sealing the walls with waterproof coatings, impermeable membranes, or additional layers of masonry or concrete. Doors, windows, and other openings below the base flood elevation must also be equipped with permanent or removable shields, and backflow valves must be installed in sewer lines and drains. Dry floodproofing needs to be designed by an engineer to insure the structure can resist the force of the water. Dry floodproofing needs to be designed by an engineer to ensure the structure can resist the force of the water.

Wet Floodproof Your Building. Wet floodproofing allows water to enter a structure, while removing, protecting or elevating items that can be damaged, such as air conditioning equipment. This is often used on structures with crawl spaces and shallow flood depths. The City does not allow basements in flood-prone areas, or the wet floodproofing of basements

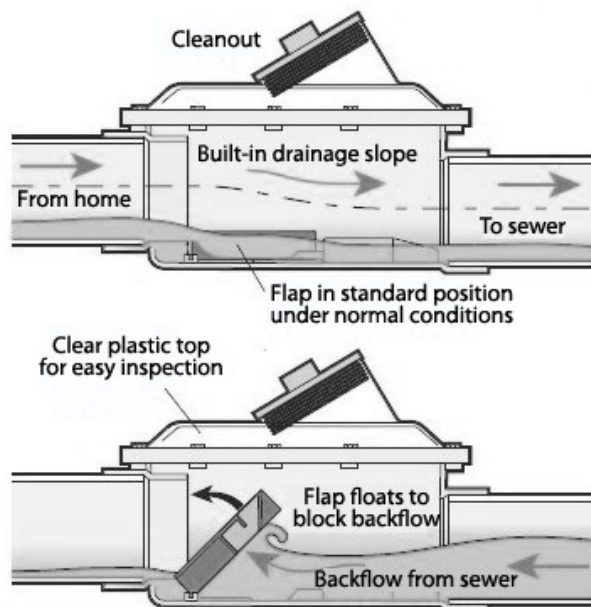
Wet Floodproof Your Garage. The garage, with its slab-on-grade construction, is one of the most vulnerable areas of your home to overland flow flooding. Remove, relocate, protect or elevate items that can be damaged from flooding.

Elevate Damage-Prone Components. Critical items, such as furnace or air conditioning units, should be elevated to avoid flood damage. This should be done for components that are in the wet-floodproofed area of the building as well as for units that are outside of the structure but subject to shallow flooding.

Maintain Nearby Streams, Ditches, and Storm Drains. Local flooding can often be caused by brush and other debris blocking drainage ways and culverts. Although this is not a major problem for Joe Creek itself, debris can block bar ditches and storm sewer inlets and must be kept free of debris. Residents and property owners should do their part in keeping inlets and drainage ways clear of brush and debris. Do not attempt to clear debris during a flood event.

Correct Sanitary Sewer Backup Problems. Sanitary sewer backup can be a problem in low-lying, flood-prone areas like RLA #17. The installation of backflow prevention valves on your sanitary sewer lines is highly recommended.

Purchase and Maintain Flood Insurance. Flood Insurance is available and recommended for the structure and contents for all properties in Tulsa. and is especially recommended for properties in flood-prone areas. Flood insurance for your structure and contents is recommended. A large percentage of all flood insurance claims are for



Sewer backflow prevention valves are essential components for homes in low-lying, flood-prone areas.

properties that are outside the FEMA floodplain. Because of the City of Tulsa's sustained efforts to reduce flooding, you are entitled to a discount on your flood insurance. A property does not have to be in a floodplain to qualify for flood insurance.

Repetitive Loss Area Mitigation Measures: What the City Can Do

The City of Tulsa is actively committed to the following floodplain management activities:

- Preventative activities to keep flood problems from getting worse.
- Natural resource protection activities to preserve or restore natural areas or the natural functions of floodplain and watershed areas.
- Emergency services measures taken during an emergency to minimize its impact.
- Structural projects to keep flood waters away from properties.
- Public information activities to advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains.

As funding becomes available for this Repetitive Loss Area, the City will undertake a more detailed mini-master drainage plan to identify alternative solutions to the flooding problems and recommend a public works project. The actual construction of any public works project may require the acquisition of properties and/or drainage easements. The City will continue to fulfill its maintenance responsibility for channels, drainageways, and storm sewer inlets and pipes. At this time, the City has identified the following actions which may be appropriate for RLA #17.

- Extend and/or improve the storm sewer system to better collect storm water runoff.
- Acquire flood prone properties on a voluntary basis.
- Create overland flow path to allow better drainage of ponded water to the Creek.
- Create berms or swales to direct runoff away from residential properties.
- Construct upstream detention to reduce the amount of storm water runoff into the RLA.

VI. Funding

Due to the nature of the flooding problems and the localized, minor damages involved in RLA #17, the funding of needed individual improvements will have to be borne by the homeowner. The City will investigate the availability of funding for the public works actions listed above. Funding for ongoing City maintenance responsibilities is provided by the Stormwater Utility Fee. Funding for a public works project in this RLA is dependent of several factors, including the prioritized ranking of the project with other Capital Improvement projects, inclusion in future street maintenance projects, inclusion of the project in a Bond Issue, etc. The City will increase the storm sewer capacity with any future street projects in the area. Another potential funding source is FEMA's Hazard Mitigation Grant Program (HMGP), which can be implemented after a Presidential Major Disaster Declaration in the State.

VII. Conclusions and Recommendations

The apartment complex that comprises RLA #17 has eight buildings that are Repetitive Loss structures. Of these eight buildings, five are within the 100-yr flood boundary. All 25 buildings in the apartment complex are within the 500-yr flood boundary.

Flooding in RLA #17 has been largely due to overland flow that resulted from very heavy rainfall and undersized storm sewers, which were only designed to carry 10- to 50-year rainfall events. When more severe storms occur (as in the 300-year event of 1984), the storm sewers are overwhelmed, with the resulting overland flow generally following the course of the original creek bed. In the case of RLA #17, the stream has occasionally overtopped the banks of the channelized Little Joe Creek and North Fork, but has not spread beyond the drainage easement. Flooding in the apartment complex has been due to overland flow from the northwest and northeast into slab-on-grade units within the complex. Since the storm sewers in the area are only capable of handling a 50-year flood event, future flooding is certain, particularly from storms that are 100-year events or greater intensity—such as in May 1984.

Residents and property owners are encouraged to maintain flood insurance. Contents insurance is also available to renters and tenants. The City of Tulsa is a Community Rating System (CRS) Class II Community, and all residents and property owners qualify for up to a 40% discount on their flood insurance premiums. Property owners are also encouraged to undertake individual mitigation measures to reduce their risk of overland flooding. The City of Tulsa is ready to assist in this effort with professional advice.