



# Floodplain Management Plan

2015-2020

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## INTRODUCTION

The City of Grand Prairie is located in Texas and situated partially within both Dallas and Tarrant Counties. The City's boundary also extends into Ellis County. Grand Prairie is centrally located in the Dallas-Fort Worth-Arlington Metropolitan Statistical Area and has a population of 182,610. The City has a total area of 81 square miles, of which 72 square miles is land and 9 square miles, or 11%, is water. The West Fork of the Trinity River and two major tributaries, Johnson Creek, and Mountain Creek, flow through Grand Prairie.

The City's northern border lies 5 to 10 minutes south of the Dallas/Fort Worth International Airport. The eastern boundary is 12 miles west of Downtown Dallas and the western boundary 15 miles east of Fort Worth. Passing east and west through Grand Prairie and linking the City with major markets are Interstate 30, a strong entertainment and business corridor, and Interstate 20, which is developing as a significant retail and corporate location.

Because of its central location and proximity to air and highway transportation infrastructure, Grand Prairie is also a well-established distribution center. Quick access to the Dallas-Fort Worth International Airport, large local markets of Dallas and Fort Worth, and rail and interstate highways continue to attract new construction of warehouse, distribution, and manufacturing buildings.

Recent industrial, hotel and multifamily developments have taken up large tracts of land in and around the City, yet additional open land remains in proximity to Grand Prairie, and southward. The southernmost section of the City around Joe Pool Lake is attracting high-end residential housing.

## STEP 1. ORGANIZE AND PREPARE THE PLAN

The Floodplain Management Committee, or *Committee*, is composed of representatives from an equitable and diverse cross section of the community, including a mortgage lending company, insurance agency, interested citizens, and City staff. Committee members are listed in Table 1, below.

**TABLE 1. FLOODPLAIN MANAGEMENT COMMITTEE**

NAME	REPRESENTING
Mr. Cory Walden	Public
Mr. Michael Gerken	Real Estate/Public
Mrs. Pat Young	Public
Mr. Tim Bordelon	Local Insurance Agency
Mr. Bill Moser	Local Lending Institution
Mr. John Lopez	Public
Ms. Cami McKillop	Public Information Office
Ms. Stephanie Griffin	Floodplain Management
Mr. Jim Hinderaker	Planning Department
Mr. Rob Ard	Building Department
Ms. Cindy Mendez	Environmental Services
Mr. Chase Wheeler	Emergency Services
Ms. Janine Ellington	Consultant

## **STEP 2. INVOLVE THE PUBLIC**

The Committee met on March 23, 2015, April 13, 2015, and September 24, 2015. At the March 23<sup>rd</sup> meeting, City staff provided Committee members an overview of the goals and objectives of the Floodplain Management Plan and explained how the Plan will address flood projects in the current Hazard Mitigation Action Plan (HMAP). Requirements of the 10-step planning process for developing a Floodplain Management Plan, a timeline for completing the Plan, and strategies to meet the goals of the Plan were discussed. The Committee was tasked with reviewing the flood section of the HMAP and Repetitive Loss Report summary.

## **STEP 3. COORDINATE AND INCORPORATE OTHER PLANS**

At the April 13<sup>th</sup> meeting, City staff provided information regarding existing flood control and drainage projects included in the City's Hazard Mitigation Action Plan, flood-prone areas or areas having slow drainage. Review of the Hazard Mitigation Plan also included community needs, historical flooding and flood studies, assessment of protecting natural floodplain areas, and technical data. Based on these findings, the Committee recommended the flood or drainage projects addressed in the Hazard Mitigation Action Plan to be included in this Plan. The Committee will continue to discuss and prioritize drainage and flood control projects and consider possible structural, maintenance, outreach, and regulatory projects as solutions to improve flooding.

## **STEP 4. ASSESS THE HAZARD**

According to the City of Grand Prairie's Comprehensive Plan 2010, construction of single family and multifamily housing comprise Grand Prairie's largest use of developed land. A large portion of City land is still undeveloped or is active agriculture; consequently, mitigating hazard risk in conjunction with future development is a priority for City officials.

The City of Grand Prairie's Hazard Mitigation Planning Team (HMPT) identified 11 natural hazards that pose a direct, measurable threat to the City of Grand Prairie's planning area, including flood hazard. In evaluating vulnerability of the population in the City of Grand Prairie to flood risk, the HMPT determined that the entire population of the City is vulnerable and at risk from flooding. People living in and around identified floodplain areas are more vulnerable to a flooding event than those who live/work outside of floodplain areas. However, the areas outside the floodplain can still be impacted by flooding depending on the severity of the flooding event.

Grand Prairie has a long history of flooding along Johnson Creek. In the 1980s, a major U.S. Army Corps of Engineers project was undertaken to straighten the channel, which has reduced the damage from flooding. Most of the flooding incidents in the City have occurred in the northwest quadrant of the City between The Trinity River and Johnson Creek. Several flooding events have also occurred along Cottonwood Creek near the Dallas County line. Incidents have also occurred along the south fork of Cottonwood Creek, north fork of Fish Creek, and Kirby Creek. Flooding is relatively minor throughout the City during typical thunderstorms or rainfall events. However, there are several areas of the City subject to periodic inundation which may adversely affect the public health, safety and general welfare of residents living in these areas, and as a general condition of flooding City-wide.

Roughly 36% of the total City area lies in floodplain areas, more than any other City in the region. Large floodplain areas include Joe Pool Lake, Mountain Creek Lake, and the West Fork Trinity River floodplain. It is important to note that, while Joe Pool Lake Dam is within the city limits of Grand Prairie, the structure is owned and operated by the Corps of Engineers, and is not a city-owned facility. There are also numerous low-lying flood-prone areas, drainage issues, and other flood concerns that were addressed by the Floodplain Management Committee. Some of these problematic areas were addressed and included in the current Hazard Mitigation Action Plan.

The hazard for flooding in the City of Grand Prairie remains generally low, due in large part to previous mitigation measures. Table 2 provides a summary of flash flood events as recorded by the City of Grand Prairie.

**TABLE 2. SIGNIFICANT FLASH FLOOD EVENTS IN GRAND PRAIRIE, TX**

	LOCATION	DATE	DEATH	INJURIES	PROPERTY DAMAGE
1	Grand Prairie	05/05/95	0	0	0
2	Grand Prairie	10/21/96	0	0	0
3	Grand Prairie	10/27/96	0	0	\$4,000
4	Grand Prairie	05/17/99	0	1	\$10,000
5	Grand Prairie	07/10/99	0	0	0
6	Grand Prairie	07/01/01	0	0	0
7	Grand Prairie	03/13/07	0	0	0
8	Grand Prairie	09/8/2010-09/9/2010	0	0	0
9	Grand Prairie	08/18/2012	0	0	0
10	Grand Prairie	06/25/2014	0	0	0
11	Grand Prairie	05/17/2015-05/29/15	0	0	\$198,200

Note: Data Source [www.gptx.org](http://www.gptx.org)

Floodplains

The City’s floodplains are identified on the Federal Emergency Management Agency’s (FEMA) Flood Insurance Rate Maps (FIRMs). The City’s Stormwater Department maintains current FIRMs that can be found at the following link on the City’s Website:

<http://www.gptx.org/residents/public-safety/floodplain-stormwater>

**STEP 5. ASSESS THE PROBLEM**

A number of factors can contribute to flooding, including wind, severe thunderstorms, and large rainfall events. There are approximately 295 structures located in the floodplains within the City of Grand Prairie. Some structures may be subject to repeat flooding, but may not be recorded. Using repetitive flood insurance claims, and FEMA’s Repetitive Flood Loss Report, the City has identified one repetitive loss property located in the vicinity of Interstate 20 and Robinson Road. In previous years, there were additional repetitive loss properties listed, but City officials have worked with homeowners and businesses over the years to mitigate these structures from flood risk through acquisition, elevation, or through other mitigation measures, thus removing them from FEMA’s Repetitive Flood Loss list.

When Grand Prairie applied for initial membership in the Community Rating System (CRS) program, there were approximately 350 homes and businesses located within the FEMA designated 1% annual chance (100-year) flood risk area that had experienced some degree of flooding. There were also approximately 300 homes and businesses outside the designated floodplain areas that flooded.

Since 1999, the City has spent in excess of \$10 million to construct new drainage facilities to relieve flooding. Several of these projects addressed flooding in areas that previously included repetitive flood loss properties.

**Major projects that have significantly reduced flooding in Grand Prairie include:**

1. The Johnson Creek USACE 205 project, the Dorchester Levee project, and the Dry Branch USACE 205 project removed over 150 homes from the 50-year floodplain and 140 homes from the 1% annual chance floodplain.
2. Dorchester Levee Project removed 12 Repetitive Loss residences from FEMA's Repetitive Loss Report.
3. Nottingham Drainage Improvements Project removed the last 6 repetitive loss homes from the 1% annual chance floodplain adjacent to Johnson Creek. All of the homes in the Nottingham area adjacent to Johnson Creek have been officially removed from the 1% annual chance floodplain (and the FEMA Repetitive Loss Report upon approval).
4. The Dry Branch Channel Improvement Project removed one Repetitive Loss property from the 1% annual chance floodplain.
5. The City purchased one Repetitive Loss structure in the vicinity of Carrier Parkway.
6. Completion of the Dalworth Creek Channel Improvement Project removed 18 additional homes from the 1% annual chance floodplain.
7. The Airport Detention Pond reduced the peak discharges for Kirby Creek resulting in removal of 20 structures from the 1% annual chance floodplain.

**Miscellaneous Drainage Projects** – Includes construction of smaller projects to provide relief from localized flooding:

- City-Wide Drainage Master Plan Studies
- Dickey Road – roadway and storm drain improvements
- Oakdale-culvert improvements
- 3<sup>rd</sup> and Alice Street – storm drain improvements
- Skyline and 3<sup>rd</sup> Street – storm drain improvements
- Pioneer and Great Southwest Parkway at Cottonwood Creek
- Cedar Creek and Prairie Creek miscellaneous erosion
- Ed Smith Court storm drain outfall improvements
- Outfall rehabilitation along Waterford Drive
- Main Street- Jefferson Street box culverts
- Skyline at Henry Branch
- Marshall and Robinson at Cottonwood Creek
- East Main Street at Railroad Bridge
- Phillips Storm Drain
- Great Southwest Parkway at Prairie Creek
- Miscellaneous public erosion repair
- Miscellaneous outfall rehabilitation
- Miscellaneous drainage projects

- Annual study for outfall rehabs
- Miscellaneous engineering projects

**FY 2014 Capital Improvement Projects (CIP)** – The following projects were approved:

- Main Street – Jefferson Street box culverts
- Culvert at Martin Barnes Road at Garden Branch
- Skyline at Henry Branch
- Pond maintenance
- Miscellaneous outfall rehabilitation
- Annual study for outfall rehabs
- Miscellaneous engineering projects

**Other Projects:**

- Street drainage crews perform routine checks on all bridges, culverts, and other drainage structures throughout the City, especially following a storm event.
- Street drainage crews completed several small drainage projects that relieved localized flooding within the storm drain system.
- Pond maintenance
- Ongoing culvert maintenance at major thoroughfares ensures culverts are functional.
- Ten years ago, the City initiated a Vegetation Management program to reduce dense growth of woody vegetation in some streams. This program, along with selective tree clearing, has re-established the flood carrying capacity of most of the streams in Grand Prairie while retaining the vegetation necessary for erosion protection.

**Future Drainage Projects** – As part of the Fiscal Year 2016 CIP, the City has approved the following projects:

- Capetown – Denmark to Sweden
- NE 20<sup>th</sup>/Walnut Drainage/Erosion
- Drainage Problem Area Assessment
- Neighborhood Flooding Drainage Improvements
- Bar Ditch Improvements
- GPMURD Repairs
- Miscellaneous drainage projects to address localized flooding
- Miscellaneous outfall rehabilitation
- Annual study for outfall rehabs
- Miscellaneous engineering projects

### Warnings and Evacuations

The City of Grand Prairie is vulnerable to a number of natural hazards such as tornados and flooding. Consequently, monitoring weather for flash floods, violent storms and tornadoes is extremely important. Planning for evacuation of residents is both a necessity and major concern for community officials. The ability to safely evacuate residents during a disaster depends on strong disaster preparedness planning and requires the cooperation of all affected citizens. Evacuations require the establishment of emergency shelters during disasters for evacuees. Significant coordination among City departments during disasters is critical in order to maintain essential City services.

The City of Grand Prairie has 21 real-time rain and stream gauges throughout the City. This is a major step towards implementing the City's Flood Warning System. The Emergency Management Department's website provides information on the City's warning siren system and instructions on responding to the alerts. The City's Warning Siren System may be activated for any kind of emergency – not just severe weather. The Warning Siren System consists of 26 strategically placed sirens that are activated for one or more of the following conditions:

- A tornado warning issued by the National Weather Service in the City of Grand Prairie
- Tornado, funnel cloud or rotation reported by a reliable source
- Destructive winds in excess of 70 mph
- Reports of hail larger than 1.75 to 2 inches
- Chemical spill
- State or national emergency
- Other emergencies as appropriate

Information about the City's warning system is located at [www.gptx.org/disasters](http://www.gptx.org/disasters) and published annually in the City's 'Pipeline' newsletter. As part of the City's emergency preparedness efforts, the website provides resources on how to prepare for a wide range of emergencies and disasters along with information on preparing and planning for a full range of natural and man-caused hazards.

### Blackboard Connect Mass Notification System

'Blackboard' capability allows the City to send important messages within minutes via phone, text, email and social media for quick and reliable notifications and community outreach. The system is used for emergencies, public education, and engagement opportunities. Each department will have the ability to deliver recipient-specific information to a single address, street, or entire neighborhood.

The system includes weather warn functions for tornado warnings.

### RACES

Founded in 1952, the Radio Amateur Civil Emergency Service (RACES) is a public service provided by a reserve (volunteer) communications group within government agencies in times of extraordinary need. During periods of RACES activation, certified unpaid personnel are called upon to perform many tasks for the government agencies they serve. Although the exact nature of each activation will be different, the common thread is communication. RACES supports the City of Grand Prairie by providing federal, state, and local agencies with supplemental emergency communication, services, and equipment during a disaster, and providing SKYWARN ground truth reports to the National Weather Service during severe weather, supporting public service events, and any event at the request of the City.

### Online Weather Center

Residents can view current weather conditions and forecasts for Grand Prairie via the Online Weather Center powered by WeatherBug. Additional Weather/Emergency Links:

- The Weather Channel Map for Grand Prairie, Texas (for public use)
- www.KnoWhat2Do.com (for public use)
- CASA radar (City staff use, password protected)
- DW10 real-time stream gauge, and rain gauge system (for public use)
- NWS Chat (National Weather Service chat room with local meteorologist and emergency managers (City staff use)
- Weather-Ready
- USGS gauges (for public use)
- USACE gauges/dam operations (for public use)

### StormReady

The City of Grand Prairie is a 'Weather-Ready Nation' focused on building community resilience in the face of increasing vulnerability to extreme weather and water events. Americans live in the most severe weather-prone country on Earth. Some 98% of all Presidentially Declared Disasters are weather related, leading to around 500 deaths per year and nearly \$15 billion in damage.

StormReady is part of the National Weather Service's 'Weather-Ready Nation' program, which helps arm America's communities with the communication and safety skills needed to save lives and property before, during and after the event. StormReady helps community leaders and emergency managers strengthen local safety programs. StormReady communities, counties, universities, military bases, Indian nations, commercial enterprises and other groups are better prepared to save lives from the onslaught of severe weather through advanced planning, education and awareness.

### Identification of Critical Facilities

The Grand Prairie HMPT determined potential monetary losses for all critical facilities in the City of Grand Prairie. No critical infrastructure buildings are located in high-risk flood zones.

### Areas of Natural and Beneficial Functions

#### Wetlands

Wetlands are the transitional zones between uplands and deep water -- they are areas that are dependent on the presence of water periodically, or, all of the time. Because of this, wetlands, and other flood control structures such as detention and retention ponds that do not have water in them year-round can sometimes be difficult to recognize. However, their presence in the landscape is still significant, as they will fill with water during a flood or storm event and perform important wetland functions, such as sediment stabilization, flood attenuation, and nutrient cycling, along with many others. Unlike some other areas of the State, the City of Grand Prairie is essentially urbanized and developed. Therefore wetlands are not as abundant in the City. However, as wetlands have come to be understood and appreciated for their role in flood control, water quality, and wildlife habitat, many state and federal incentives have been created to help conserve, restore, and create wetlands.



### Development Requirements in the Floodplain

The City of Grand Prairie participates in the National Flood Insurance Program (NFIP). As a participating community, the City has adopted Floodplain Management practices through several ordinances that severely limited development allowed in 1% annual chance floodplains (the area inundated by a storm that has a 1% chance of occurring in any year). The City of Grand Prairie standards require all new structures be constructed 2.0 feet above the existing water surface elevation of the 1% annual chance floodplain, or 1.0 foot above the "ultimate" water surface elevation, whichever is higher. Mobile homes must be elevated 3.0' above the 1% annual chance floodplain elevation. When developing along a major creek within the City of Grand Prairie, the developer must submit a Flood Study to the City showing the 1% annual chance floodplain and water surface elevation based on both current land-use and future land-use assumptions. For property with any portion located within the 1% annual chance floodplain, regardless of structure location, a flood insurance policy may be required by the mortgage lender.

The North Central Texas Council of Governments (NCTCOG) established additional development requirements through a cooperative management program comprised of participating agencies and communities. This program establishes additional permit criteria for the Trinity River Corridor, or *Corridor*. This area is defined by the bed and banks of the Trinity River and the adjacent river floodplain within the City of Grand Prairie. A Corridor Development Certificate (CDC) is a permit issued by the City prior to development within the Regulatory Zone of the Corridor, which is similar to the 1% annual chance floodplain. The CDC process does not prohibit floodplain development, but ensures that any development that does occur in the floodplain will not raise flood water levels or reduce flood storage capacity. Additionally, 'valley storage,' defined as the temporary storage of floodwater provided by the channel and overbank areas of the floodplain, must be maintained. The CDC permitting process allows participating communities upstream and downstream of the project to be informed of a proposed development in the Corridor and to voice any concerns about the project prior to development.

### Economic Impact

The amount of economic impact by flooding and its duration depends on the severity of the storm event. A storm event with heavy rain and little wind may only result in flooding in a limited area of the City and would have relatively little long-term economic impact. Conversely, torrential rains over an extended period of time could result in citywide damage and long-term financial impacts. Property tax revenue could decline significantly in the year following such a storm. The return of property tax revenues to pre-storm levels would depend on how quickly structures are repaired or rebuilt. Other citywide damages could impact public buildings and parks. Temporary loss of City franchise fees resulting from shutdown of utility services could have a financial impact until damaged areas are rebuilt and utility services are restored. On the other hand, building permit revenues would increase in the months following such a storm, as insurance claims are settled and property owners begin the process of rebuilding. The sales revenue generated from purchases of supplies and replacement goods (e.g. lumber, plumbing fixtures, furniture, appliances, and electronics) may offset, at least in part, the loss of property tax revenue.

## **STEP 6. SET FLOODPLAIN MANAGEMENT GOALS**

- Maximize use of all resources by promoting interagency and interdepartmental coordination and partnerships in the public and private sectors.
- Strengthen the City against the effects of disasters through the development of mitigation strategies and strict enforcement of current regulations that have proven effective.
- Reduce and, where possible, eliminate repetitive damage, loss of life, and loss of property caused by disasters.
- Raise community awareness about potential hazards and the need for community preparedness.

### **STEP 7a. REVIEW CURRENT ACTIVITIES**

Activities initiated by the City of Grand Prairie in Step 7 include current or ongoing measures to address flood-related hazards facing the community based on the following 6 categories: Preventative, Property Protection/Flood Hazard Mitigation, Natural Resource Protection, Emergency Services, Structural Projects, and Public Information/Flood Information Assistance.

#### **1. Preventative**

##### Drainage Design Manual

There are over 19,000 acres of floodplain in the City of Grand Prairie. This accounts for 36.7% of the total City area, more than any other City in the region. Large floodplain areas include Joe Pool Lake, Mountain Creek, and the West Fork Trinity River floodplain. City flooding and drainage problems are key issues when planning for the safety, health, and quality of life for Grand Prairie citizens. As of 2012, over 2,500 drainage complaints had been submitted to City staff. Also, land development in Grand Prairie continues to increase over time, thus increasing the potential for faster and greater flooding chances at many locations across the City. Many successful projects have been built in the City to provide flood control, including channels, culverts, bridges, levees, detention facilities, and ponds. Earthen channels are encouraged throughout the City, particularly for channels draining areas of more than 4,000 acres. However, many areas are still in need of additional flood control measures or repairs and improvements to existing flood control structures.

##### Stormwater

Stormwater quality management programs are a response to regulations from the Environmental Protection Agency (EPA) connected to the federal Clean Water Act. In Texas, these regulations require cities to obtain a permit under the Texas Pollutant Discharge Elimination System (TPDES) and to create a comprehensive program to seek out and eliminate pollutants carried by storm water. The City of Grand Prairie, in conjunction with the Dallas County Flood Control District #1 (DCFCD) developed the Stormwater Management Program (SWMP) in accordance with the TPDES requirements. The SWMP will facilitate the City's and DCFCD's efforts in reducing stormwater pollutants, thereby protecting the City's stormwater quality to the maximum extent practicable. The SWMP includes specific Best Management Practices (BMP) that will be implemented to reduce pollutants, measurable goals for each BMP, and an implementation schedule developed for the five-year permit term, effective 2013-2018.

In October 1993, the City established a Stormwater Utility District. Fees were established to assist in resolving stormwater related problems, construct drainage systems, increase stream monitoring, permitting, and pollution control. These fees generate funds that are used to eliminate residential

flooding, eliminate or reduce non-residential flooding, reduce street flooding, and maintain existing drainage structures in the City.

### Land Development Regulations

The City of Grand Prairie adopted the Unified Development Code on November 20, 1990 by Ordinance No. 4779. The Unified Development Code (UDC) is a single comprehensive document that is used as the primary guide for development within the City. The Unified Development Code incorporates procedures, standards, and regulations for zoning and land use applications.

The Unified Development Code is adopted for the following purposes:

- To protect, promote, improve and provide for the public health, safety, and general welfare of the citizens of the City of Grand Prairie;
- To ensure the safe, orderly and efficient development and expansion of the City of Grand Prairie, in accordance with and pursuant to its Comprehensive Plan;
- To conserve, develop, protect and utilize natural resources, in keeping with the public interest;
- To prevent the overcrowding of land and avoid undue concentration or diffusion of population or land uses;
- To protect and preserve places and areas of historical, cultural or architectural importance and significance to the community;
- To protect and conserve the value of land throughout the City and the value of buildings and improvements upon the land, and to minimize the conflicts among the uses of land and buildings;
- To provide for open spaces through the most efficient design and layout of the land;
- To prevent the pollution of air and water, to assure the adequacy of drainage facilities, to safeguard water resources and to preserve the integrity and aesthetic quality of the community;
- To lessen congestion in the streets and provide convenient, safe and efficient circulation for vehicular and pedestrian traffic;
- To facilitate the adequate and efficient provision of transportation, water, wastewater, schools, parks, public safety and recreational facilities, and other public facilities and services; and
- To treat in one unified text those areas of regulation more typically dealt with in separate ordinances such as, but not exclusively, the zoning ordinance, the subdivision rules and regulations, the fence ordinance, the mobile home ordinance, etc.

## **2. Property Protection**

The City of Grand Prairie has initiated numerous property protection measures to reduce flood risk in the community. The City has adopted more stringent building requirements in flood hazard areas within the City, and along the Trinity River Corridor. The Stormwater Department reviews all building permits that are within 200 feet of the floodplain to check that structures are built to an elevation above the 1% annual chance floodplain, and address localized flooding in proximity to the floodplain area.

The City requires a Floodplain Development permit for proposed development or improvements within 200 feet of the floodplain. Grand Prairie's Unified Development Code Article 15 requires the lowest floor be set at least 2.0 feet above the existing FEMA 1% annual chance flood elevation or 1.0 foot above the ultimate developed conditions, whichever is higher. When developing along a major creek within the City of Grand Prairie, the developer must submit a Flood Study to the City showing the 1% annual

chance floodplain and water surface elevation based on both current land-use and future land-use assumptions.

In addition to these efforts to protect life and property from the flood hazard, the City participates in the Community Rating System (CRS). The CRS is a subset of the National Flood Insurance Program (NFIP). It is a voluntary incentive program, which recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, properties are further protected from flood risk, and flood insurance premium rates are discounted to reflect community actions meeting the three goals of the CRS program: 1) Reduce flood losses, 2) Facilitate accurate insurance rating, and 3) Promote the awareness of flood insurance. In September 2012, the City of Grand Prairie obtained a CRS ranking of 5, which qualifies its residents and businesses for a 25% discount on flood insurance premiums for properties in the Special Flood Hazard Area (SFHA). The SFHA is the 1% annual chance floodplain.

### **Completed Flood Mitigation Activities:**

#### Levee Recertification

The City has constructed two levees to protect life and property from flooding: Dorchester Levee and Grand Prairie Landfill Levee. Grand Prairie Municipal Utility and Reclamation District (GPMUR) owns and operates a private levee system on the Northeast side of the City. The City has completed the certification of all levees within the City limits. Consultants were hired by each responsible entity to perform engineering analysis on each levee and certify its level of protection and susceptibility to overtopping. This process allows areas behind the levees to keep their flood protection status from the 1% annual chance storm.

#### City-Wide Drainage Master Plan Road Map

The City-Wide Drainage Master Plan Road Map establishes the processes for future flood control planning for the City of Grand Prairie. The City's primary goal and objective of the Drainage Master Plan is to cost-effectively manage flood or storm waters within budgeting constraints so that conditions don't get worse as new and infill areas are developed – while evaluating and making conditions better in the areas of the City that are already developed. The Plan was finalized and accepted by City Council in August 2010.

The Joe Pool Lake Watershed Report was also completed and accepted by City Council in February 2011. Contracts for Fish Creek Watershed, Cottonwood Creek Watershed, Cedar Creek Watershed, and Arbor Creek Watersheds are currently being studied as part of FEMA's Cooperating Technical Partner (CTP) grant program. A portion of the Trinity River is also being analyzed as part of FEMA's Risk Assessment, Mapping, and Planning Partners (RAMPP) project, a joint venture of Dewberry and AECOM Corporations, and ESP Associates, three Production and Technical Services (PTS) contractors under FEMA's Risk Map phase of the National Flood Insurance Program. RAMPP will provide comprehensive floodplain mapping, GIS, and hazard mitigation services for FEMA.

#### City-Wide Drainage Master Plan for Joe Pool Lake

This project includes an update to the hydrology and hydraulics for all of the mapped streams within the Joe Pool Basin of the city limits and Extraterritorial Jurisdiction (ETJ). The study was performed in accordance with the City Wide Drainage Master Plan Road Map. The final report was delivered and accepted by City Council in February 2011. The mapping updates have been submitted to FEMA for inclusion into the Map Modernization program; however, FEMA only updates DFIRM panels as funding

is available. All mapped streams for the Joe Pool Basin are still pending FEMA review, with the exception of Soap Creek. The Soap Creek 'Letter of Map Revision' (LOMR) was approved by FEMA in April 2015.

*Cottonwood and Fish Creek Flood Protection Project (Texas Water Development Board (TWDB) grant)*

The Cottonwood and Fish Creeks Flood Protection Project is an engineering analysis of the flooding risks in the Cottonwood and Fish Creek Basins, as well as a planning analysis of mitigation of these flooding risks. The report was completed in March 2011. The City of Grand Prairie has contracted with a consulting firm to build on this study to develop Master Drainage Plans for Cottonwood and Fish Creek Basins, as per the City Wide Drainage Master Plan Road Map. This work is being done in conjunction with the FEMA CTP Mapping grant and is expected to be completed by September 2016.

*Kirby Creek Letter of Map Revision (LOMR)*

FEMA approved the Kirby Creek Letter of Map Revision (LOMR) in May 2011, which updates the hydrology, hydraulics, and floodplain for the Kirby Creek Basin. The Airport Drainage Detention Pond improvements, SH 161 Frontage roads, fill projects along SH 161, updated City 1.0-foot topography, and multiple survey sources throughout the Kirby Creek Basin were included in the LOMR.

*West Fork 1D/2D Hydraulic Analysis*

The West Fork Trinity River 1-Dimensional and 2-Dimensional Analysis focused on the downstream end of the West Fork Trinity River Basin. The study area is bounded on the upstream end by SH 161 and on the downstream limits by the confluence of Big Bear Creek with West Fork Trinity River, just downstream of MacArthur Blvd. The purpose of this study was to provide a hydrodynamic analysis of the drainage patterns along the West Fork Trinity River and Bear Creek, as well as the floodplain area between the river and creeks. Due to the complex nature of the flow interaction, the system has been modeled using the Innovyze RS/2D software capable of two dimensional modeling. The report was completed and accepted by City Council in July 2011.

*Mapping Activity Statement No. 2 (FEMA CTP Funding)*

FEMA has allocated \$300,000 for Grand Prairie to develop updated hydrology, hydraulics, and floodplain mapping utilizing a watershed approach. The scope of work includes Cottonwood, Fish, Cedar, and Arbor Creek Basins. The Cedar Creek Drainage Master Plan was adopted by City Council in October 2011. Arbor Creek Drainage Master Plan was adopted by Council in January 2012. The Cottonwood and Fish Creek Study is expected to be completed by September 2016.

*Mapping Activity Statement No. 3 (FEMA CTP Funding)*

FEMA allocated \$280,500 for Grand Prairie to develop updated hydrology, hydraulics, and floodplain mapping utilizing a watershed approach. The scope of work includes Alspaugh, Bear, Dalworth, Gopher-Turner, and Johnson Basins. Work was completed in 2014 and submitted to the RAMPP team for mapping.

*Lynn Creek Parkway LOMR*

The City of Grand Prairie obtained a LOMR following the construction of the Lynn Creek Parkway Bridge that crosses Lynn Creek. No new hydrologic analysis was completed. The Base Flood Elevation (BFE) was lowered by 0.3 feet approximately 100 feet upstream of the structure. The floodway was updated with the corrected alignment of the stream. The bridge did not result in any changes to the floodway. FEMA approved the LOMR on April 2, 2015.

### **3. Natural Resource Protection**

The City of Grand Prairie is a 'Water Wise' community, and has implemented a number of programs and ordinances to encourage residents to conserve water year-round, and avoid contaminating the soil and waterways. The City's Public Works Department works to educate residents regarding 'Don't Clog the Drain'. Code Enforcement Officers help monitor activities associated with protecting the City's floodplains and waterways. The City offers residents a household waste recycling program in an effort to eliminate junk, litter, and debris left in yards which clog storm drains and block natural waterways. Removing these items along with tree trimmings and brush debris aides in preventing overbank flooding that could otherwise occur in low-lying areas and along waterways.

### **4. Emergency Services**

#### *Comprehensive Emergency Management Plan*

The City of Grand Prairie has a Basic Emergency Operations Plan along with 22 supporting annexes that are all reviewed annually and revised every 5 years. All annexes are approved by the Texas Department of Emergency Management (TDEM). The City of Grand Prairie has reached and maintained an advanced level of planning along with being National Incident Management System (NIMS) compliant. Grand Prairie also conducts, at minimum, three public safety exercises a year. All exercises are planned for, conducted, and evaluated using the Homeland Security Exercise Evaluation Program (HSEEP) and approved by TDEM.

This plan establishes uniform policy that the City uses to create specific procedures and guidelines during floods and other similar emergencies. In the event county or regional disaster response or emergency efforts are needed, the City of Grand Prairie will jointly participate in coordinating the appropriate response through a Unified Command with neighboring communities or stakeholders.

#### *Flood Warning and Monitoring*

The City of Grand Prairie has 21 real-time rain and stream gauges throughout the City. This is a major step towards implementing the City's Flood Warning System. The data is available on the City's website for the general public. The first phase of gauge installation was completed in August 2009. Phase II of the gauge installation was completed in January 2011. Future work will include website refinements, software updates, and discharge versus stage rating curve development. The City recently upgraded its platform for monitoring its rain and stream gauges.

The City of Grand Prairie has two flood-warning systems to warn citizens of high water and flooded roadways. On Cottonwood Creek at Carrier Parkway, the Traffic Division has constructed a flashing "Do Not Enter" light which is operated by rising water levels. The light warns citizens of hazardous or flooding conditions. On East Main Street (SH 180) in east Grand Prairie, water depth actuated signs have been installed near a railroad underpass. These signs, that include flashing lights, warn motorists when the underpass is impassable due to high water. There are 3 warning signs going each direction at low water crossings on Carrier Parkway. Messages read, "Flash Flood Zone Next ¼ Mile," "Watch For Water On Road," and "Water Over Road When Flashing".

In 2015, the City received 32 calls pertaining to water rescues and flood emergencies. A number of the calls were for the same location. The Emergency Management Department reported dispatching City personnel for 2 of the service calls.

During periods of heavy rainfall, the City of Grand Prairie's street drainage crew is on 24-hour call and inspects roadways to monitor flooding. City crews use barricades to close roads that are inundated with water and to discourage traffic from driving through these areas. The City also uses its real-time rain and stream gauge monitoring system to assist in determining road closures. The monitoring system consists of 21 rain and stream gauges located throughout the City. Grand Prairie participates in the CASA radar system, which provides current weather conditions.

## **5. Structural Projects**

### *Drainage Design Manual*

The purpose of drainage policies and standards is to protect the general health, safety, and welfare of the public by reducing flooding potential, controlling excessive runoff, minimizing erosion and siltation problems, and eliminating damage to public facilities resulting from uncontrolled stormwater runoff. Engineering staff reviews drainage plans for building permits, development, and erosion control. The Stormwater and Engineering Department issues Clearing and Grubbing/Earthwork permits. All development within the City of Grand Prairie must comply with the requirements of the City Drainage Design Manual (as currently amended) as well as City erosion control standards. The procedures, policies and standards of the manual govern storm drainage facilities within the City of Grand Prairie and its extraterritorial jurisdiction.

The Stormwater Department responds to local drainage complaints. The complaints are investigated and recorded in a database. Improper lot grading by homebuilders in new subdivisions previously constituted a significant number of the complaints. To reduce this problem, the City implemented a program that requires homebuilders to certify lot grading is consistent with the final approved lot grading and drainage plan for the recorded subdivision. A Precise Grading Certificate must be sealed by a Registered Surveyor before a Certificate of Occupancy is issued.

## **6. Public Information and Flood Information Assistance**

### *Informational Flyers, Articles, and Internet Site*

The City's Stormwater Department, which also manages the CRS program, provides a comprehensive flood information program to the public. Residents may access flood information from the City by visiting the Stormwater Department in person, by phone, or online. The Stormwater Department provides flood information, including flood zone determination for specific addresses, floodplain permits for proposed or existing structures, lowest floor elevations, data on historical flooding in the City, and more. The City's Stormwater Department also assists residents in non-technical review of individual properties when requested. The City also provides guidance on floodproofing, and other mitigation techniques to reduce flooding. Financial options for structural mitigation, such as State and FEMA grant programs are also available to the property owner.

The City's website provides a wealth of information for those residents with computer access. Information regarding various hazard risks, evacuation, shelter locations, and emergency preparedness measures may be accessed online or by calling the City's Emergency Management Department.

Currently, the City sends information regarding availability of flood insurance to homeowners, banks, real estate companies, and insurance companies. Citizens are made aware that flood insurance is available for all properties located in the City, including properties located outside the 1% annual chance regulatory floodplain, or high-risk flood zone areas. This information is provided through letters mailed

via the U.S. postal service, flyers in the utility bills, and in response to phone calls and inquiries from residents.

### Flood Insurance Rate Maps

The City also provides a map information service enabling property owners, residents, developers, and insurance agents to determine the flood zone of a specific property. Paper copies are available for viewing at the City's Planning and Development Center. Electronic maps may be viewed and printed online for free at the FEMA Flood Map Store. The City's Stormwater Department maintains current Flood Insurance Rate Maps that can be found at the following link on the City's Website:

<http://www.gptx.org/residents/public-safety/floodplain-stormwater>

### FEMA Map Modernization

FEMA, with the cooperation of local communities and consulting engineers, is in the process of converting paper FIRMs into digital format and updating them with the latest data. This process began in the spring of 2004 for area counties of Dallas, Johnson, Ellis and Tarrant. Since that time, the maps for Tarrant County were finalized and became effective in September 2009. The maps for Johnson County were finalized and became effective in December 2012. The maps for Ellis County were finalized and became effective in June 2013. Dallas County maps became effective in 2014. The City of Grand Prairie has integrated effective Digital Flood Insurance Rate Map (DFIRM) data into the City's Geographic Information System (GIS). This integration allows property lines and aerial photos to be superimposed over the floodplain delineations for easier floodplain determination. The newer maps show areas that have been removed from the mapped limits of the floodplain and areas that have been included (that were not included before) in the mapped limits of the floodplain. Currently, the City is using the effective maps to regulate development based on the best engineering data available.

## **STEP 7b. REVIEW POSSIBLE ACTIVITIES**

A systematic review of possible measures to further prevent or reduce the severity of flood-related hazards described in Step 5 was explored for each of the 6 categories below. The full range of activities was evaluated based on the activity's cost and benefit. Status of the activity, along with a statement as to why the activity is or is not appropriate for the community is included.

### **1. Preventative**

The City has adopted more stringent floodplain regulations and stormwater regulations to minimize flood and storm damage for both new and existing development in floodplains. However, the City's Floodplain Management Committee and City staff recognize more work is needed to cost-effectively manage flood or storm waters within budgeting constraints so that flooding conditions do not get worse as new and infill areas are developed. The City will continue to evaluate fully-developed areas for potential improvement.

### **2. Property Protection**

The City has addressed property protection by requiring new construction in the high flood risk areas be constructed 2.0 feet above the existing water surface elevation of the 1% annual chance floodplain, or



1.0 foot above the “ultimate” water surface elevation, whichever is higher. Mobile homes must be elevated 3.0’ above the 1% annual chance floodplain elevation. Further, developers must submit a Flood Study to the City showing the 1% annual chance floodplain and water surface elevation based on both current land-use and future land-use assumptions. The Floodplain Management Committee and City officials agree that the City should continue participating in the Community Rating System (CRS) program to reduce flood premiums for resident policyholders, increase the number of flood policies City-wide, and guide residents in undertaking property protection measures to safeguard against flooding.

### **3. Natural Resource Protection**

To address water quality, the City of Grand Prairie is currently in the process of constructing a functioning wetland on deed restricted property between the City’s landfill and the Trinity River. This area, covering 77 acres, is being studied by the University of North Texas for baseline data regarding hydrologic cycle, annual water retention and existing macroinvertebrates and wetland vegetation. The use of storm water integrated site design to reduce runoff and pollutants in an effort to protect sensitive forests, wetlands, and habitats is also addressed in the City’s Drainage Design Manual. No additional activities are necessary with regard to natural resource protection.

### **4. Emergency Services**

The City continues to monitor the public warning system to keep up with growth, and adopts new methods of warning that increase the ability to reach citizens not well served by current systems. At this time, no updates are needed to the warning system or current Emergency Operations Plan.

### **5. Structural Projects**

The City has made significant improvements to address flood-prone areas and slow drainage issues. New development is managed through current stormwater, drainage, and development requirements. Several older, developed areas continue to be problematic due to flat terrain. These include Sandra Lane and Beltline at Springdale Street.

Possible structural projects for consideration include buyouts in flood-prone areas. The City is also considering adding electronic gates to low-water crossings that can be activated during a flood event. This would provide a greater degree of protection to those roads and bridges that currently have flashing warning lights but no gates. The City is investigating the feasibility of automating the gates at the Dorchester Levee and purchasing backup generators. The City is considering the FEMA Hazard Mitigation Assistance (HMA) grant program to assist with these projects.

### **6. Public Information and Flood Information Assistance**

The City’s Stormwater Department provides a comprehensive flood information program to the public. Residents may access flood information from the City by visiting the City’s Stormwater Department. The City of Grand Prairie Stormwater Department provides flood information, including flood zone determination for specific addresses, floodplain permits for proposed or existing structures, lowest floor elevations, data on historical flooding in the City, and copies of as-built Elevation Certificates, upon request. The City also assists residents in non-technical review of individual properties when requested, as well as guidance on floodproofing, and other mitigation techniques to reduce flooding.

The Program for Public Information (PPI) Committee is developing public outreach opportunities and messages to complement this Plan. There are numerous new outreach projects the PPI Committee plans to implement as part of the CRS recertification. As an example, one project includes an annual brochure mailed to owners and residents in high risk flood zones and special flood risk areas regarding availability of flood insurance to protect both their structure and contents. Other key flood topics such as disaster preparedness will also be included in the letter. Another outreach project is to install permanent 'Turn Around, Don't Drown' signs on flood gauge measurement signs. The City has also completed a project that overlays the digital FIRM maps with other map information and street maps to enable citizens to more easily determine the flood zone of a property.

## **STEP 8. DEVELOP AN ACTION PLAN**

Following the review of activities in Step 7b, an action plan was drafted that selects and specifies those activities relative to the City's resources, hazards, and risk. The City of Grand Prairie strives for a balanced program including preventative activities both to keep its flood problems from getting worse, and also to protect future development from effects of flooding and other natural hazards.

### **1. Preventative**

The Stormwater Department shall continue to evaluate the current NFIP Floodplain Ordinance and higher regulatory standards for development in flood hazard areas as it pertains to storm water management and future development.

**Action:** On a project-by-project basis, when proposals by developers or property owners are submitted, the Stormwater Department will evaluate compliance based on current regulations that include higher regulatory standards in high risk or flood-prone areas.

**Budget:** Staff time (Operating funds)

### **2. Property Protection**

The City will continue to work with the CRS Program for Public Information Committee and Floodplain Management Committee to review outreach projects to educate the public, area businesses, and all citizens about flood risk.

City staff will continue to evaluate and recommend improvements, as needed, to the City-wide Drainage Master Plan. The Stormwater Department will work with other City departments to fund projects, and implement improvements.

The City will also comply with CRS program recertification to maintain, or improve, the existing Class 5 rating.

**Action:** The Stormwater Department will work with other City departments to implement CRS outreach programs, and work with other City departments to make drainage system improvements, including system maintenance, planning, elimination of structural flooding, and reduction of stormwater pollutants carried by stormwater runoff into creeks and streams.

**Budget:** Staff time (Operating budget, Stormwater Utility fees)

### 3. Natural Resource Protection

The City of Grand Prairie will continue to work with the University of North Texas to study and construct a wetland on property located between the City's landfill and the Trinity River. Mitigation efforts may include using standing vegetation and seed bank community structures in development of a natural and compensatory wetland.

**Action:** No other activities are required to support natural resource protection at this time.

**Budget:** Staff time (Grants, Operating fees)

### 4. Emergency Services

Implement ongoing public education on warning systems and the actions that should be taken to prepare for hazards and disasters. Disaster related public education materials are available through the City's Public Information Office. Public education materials relating to emergency management are available from [www.fema.gov](http://www.fema.gov), [www.redcross.org](http://www.redcross.org), and [www.ready.gov](http://www.ready.gov).

**Action:** The City will continue to monitor and update emergency services as needed. Future work will include website refinements, software updates, and discharge versus stage rating curve development. The City recently upgraded its platform for monitoring its rain and stream gauges.

**Budget:** Staff time

### 5. Structural Projects

Based on discussions with the Floodplain Management Committee, the City continues to seek improvements to older areas of the City that are low-lying and areas of flat terrain that experience poor drainage and minor flooding. Areas include Sandra Lane and Beltline at Springdale Street, and Willow Bend Mobile Home Park and Fox Hollow Apartments. Other structural projects for consideration include adding gates to low-water crossings, automating the gates on the Dorchester Levee, and purchasing backup generators.

**Action:** Drainage issues have been minimized through additional flood control measures or repairs and improvements to existing flood control structures. City staff will continue to review alternatives to drainage issues in low-lying areas of the City. City staff will pursue possible FEMA grants and other funding sources in order to buyout flood-prone structures and install electronic gates at low-water crossings.

**Budget:** Staff time, CIP funding, FEMA funding

### 6. Public Information and Flood Information Assistance

The Public Information Office provides public information on disaster related materials; the Stormwater Department provides comprehensive flood information to the public. The Emergency Management Department provides disaster preparedness information to residents. The Public Works Department guides residents on protecting the City's waterways from household pollutants and contaminated runoff.

**Action:** Twenty-four community outreach activities have been identified for Year 2015-2016 under the CRS recertification.

**Budget:** Staff time, Volunteer time/labor by the Program for Public Information and Floodplain Management Committees

**TABLE 3. ACTION ITEMS, GOALS**

Action Item	Goal 1: Maximize use of all resources by promoting interagency and interdepartmental coordination and partnerships in the public and private sectors	Goal 2: Strengthen the City against the effects of disasters through the development of mitigation strategies and strict enforcement of current regulations that have proven effective	Goal 3: Reduce, and where possible, eliminate repetitive damage, loss of life, and loss of property caused by disasters	Goal 4: Raise community awareness about potential hazards and the need for community preparedness	Dept./Title Responsible	Timeline	Funding
Reduce Flood Losses and Increase Policy Count	X	X	X		Floodplain Administrator	Annual NFIP Workshops for Public/Stakeholders, ongoing CRS activity	TWDB, FEMA, NFIP
Attend NFIP/CRS Users Group Workshops to share information updates with City staff, Stakeholders	X	X	X		Emergency Manager, Floodplain Administrator	Ongoing. Attend Texas Floodplain Management Association (TFMA), NCTCOG meetings (as scheduled)	FEMA, TWDB, TFMA, TxDEM, NCTCOG
Establish City Disaster Response Team	X	X	X		Emergency Management Office	Ongoing	TXDEM, TWDB, NRCS
Ensure Flood Insurance Rate Maps (FIRMs) are updated	X	X	X		Emergency Management, Stormwater Depts.	FIRM update complete, monitor for Letters of Map Change (LOMCs)	Annual Budget, FEMA CTP program
Acquire, elevate, relocate structures in floodprone areas	X	X	X		Emergency Management, Stormwater Depts.	Ongoing	FEMA /HMGP grants, TWDB FMA grants
Improve CRS rating	X	X	X		Stormwater Dept.	Ongoing	Annual City Budget
Design, construct, maintain drainage improvement projects	X	X	X		Stormwater, Engineering Depts.	Ongoing	Stormwater fee, CIP

## **STEP 9. ADOPT THE PLAN**

Whereas, the City’s Floodplain Management Plan provides an overall strategy of programs, projects, and measures that will reduce the adverse impact of the flood hazard on the City of Grand Prairie. The Floodplain Management Plan provides a systematic process of planning to identify existing and future flood-related hazards and their causes, ensures a comprehensive review of all possible activities and mitigation measures so the most appropriate colutions will be implemented to address the flood hazard, educate residents and property owners about the flood hazard, build public and political support for activities and projects that prevent new problems, reduce losses, and protect the natural and beneficial functions of floodplain, and implement recommendations and activities as warranted by community resources, costs, and benefit.

**PASSED AND APPROVED BY THE CITY COUNCIL OF THE CITY OF GRAND PRAIRIE, TEXAS, ON THIS THE 13<sup>TH</sup> DAY OF OCTOBER, 2015.**

**APPROVED:**

See signed resolution

\_\_\_\_\_  
**Mayor**

**ATTEST:**

\_\_\_\_\_  
**City Secretary**

\_\_\_\_\_  
**City Attorney**

## **STEP 10. IMPLEMENT, EVALUATE, AND REVISE THE PLAN**

Implementation of the City’s Floodplain Management Plan will be administered by the Stormwater Department. The department(s) listed in the Action Plan shall be responsible for overseeing implementation of the Plan.

The Plan will be evaluated annually by the Floodplain Management Committee. Any Committee recommendations for adoption, deletions, or other changes will be included in an annual report to the City Council prior to October 13, 2015.

The annual report will be prepared by the CRS Coordinator and the Committee. It will provide an overview of the Plan and progress accomplished during the previous 12 months towards implementing the Action Plan. Any items not achieved will be specifically addressed in the annual report, and if appropriate, alternative recommendations for action provided. Any recommended amendments to the Plan will be presented to the City Council for adoption. The annual report will be available to the public, posted to the City’s website, and released through social media.