Repetitive Loss Area Analysis

City of Arlington, Texas

Public Works and Transportation Department

January 2016

Table of Contents

*Appendices A, B, and C contain sensitive information for each property within the repetitive loss areas. In accordance with the Privacy Act of 1974, these appendices are considered confidential and will not be shared with the general public. Owners of the properties within the repetitive loss areas can view information related to their property by contacting the Public Works and Transportation Department.

List of Figures

List of Tables

1 Repetitive Loss Area Analysis

Background

Flooding is the most common natural hazard in the United States. More than 20,000 communities experience floods and this hazard accounts for more than 70 percent of all Presidential Disaster Declarations. In the United States, over 8 million residential and commercial structures are currently built in areas at risk to flooding. The cost of recovery is spread over local, state and federal governments and the victims themselves, who are directly affected by these disasters.

The National Flood Insurance Program (NFIP) is based on a cooperative agreement between the Federal Emergency Management Agency (FEMA) and local governments. FEMA agrees to underwrite flood insurance policies within a community and the community agrees to regulate development in the floodplain. Participation in the NFIP is voluntary, but communities have incentive to join because federally-backed flood insurance is not available to property owners in non-participating communities and a non-participating community will not receive federal aid for damages to insurable buildings in the floodplain.

The NFIP is continually faced with the challenge of balancing the financial soundness of the program with the competing expectation of keeping premiums affordable. Repetitive loss properties are one of the two largest obstacles to achieving financial soundness of the NFIP. Since the inception of the NFIP, almost $9 billion have been paid to repetitive loss properties, about one-fourth of all NFIP payments. While the NFIP has resulted in forty years of successful floodplain management, and many of these structures are no longer insured, repetitive loss properties are still a drain on the NFIP. Currently, repetitive loss properties represent 1.3% of all policies, but are expected to account for 15% to 20% of future flood losses.

Terminology

A Repetitive Loss property (RL) is any insurable building for which two or more claims of more than $1,000 have been paid by the NFIP during any rolling 10-year period since 1978. Claims must be at least 10 days apart but within 10 years of each other.

Repetitive Loss properties may be classified as a Severe Repetitive Loss (SRL) under certain conditions. A **Severe Repetitive Loss property (SRL)** has had four or more claims of at least $5,000, or at least two claims that cumulatively exceed the structure's reported value.

Floodplain management regulations can mitigate some repetitive flood losses when a building is substantially damaged. For the City of Arlington, a structure where the cost to repair is equal to or exceeds 25 percent of the building's value is considered to be substantially damaged. A substantially damaged building must be brought up to the same flood protection as a new building as required by the City's Flood Damage Prevention Ordinance (Ordinance No. 10-011). However, many repetitive loss structures are not in a regulated floodplain or they do not sot suffer substantial damage and continue to be at risk for future flood damages.

The City of Arlington, Texas (CID-485454) has been participating in the regular phase of the NFIP since December 30, 1970. In addition to meeting the basic requirements of the NFIP, Arlington has adopted additional regulations and procedures in order to participate in the Community Rating System (CRS) program. The City of Arlington is currently a CRS Class 7 which rewards all policyholders in the SFHA with a 15 percent reduction in their flood insurance premiums. Non-SFHA policies (Standard Zone X policies) receive a 5 percent discount and preferred risk policies do not receive a discount in their flood insurance premiums. The City of Arlington has participated in the CRS program since October 1, 1991.

Figure 1 A Swift Water Rescue from a flooded neighborhood on September 8, 2010.

As of November 30, 2015 there are 1,524 NFIP Policies in force in Arlington with annual premiums of $930,753. The City of Arlington has had 644 paid losses against the NFIP totaling more than $18,275,566 since 1977. A repetitive loss property is not required to carry a flood insurance policy to be considered a RL property or SRL property. In some cases a community will find that properties on its repetitive loss list are not currently insured. Once it is designated as a repetitive loss property, that property remains as a repetitive loss property from owner to owner whether it is insured or not and even after the property has been mitigated.

According to repetitive loss data received from FEMA dated June 30, 2015, there are a total of 33 unmitigated and 53 mitigated RL properties within the City of Arlington. Fifteen properties are classified as severe repetitive loss. Of the 15 SRL properties, 4 remain unmitigated. Many more properties in Arlington may have reached the damage threshold to become a repetitive loss property, but are not included in this list because they may not be covered by flood insurance or flood insurance claims are not submitted for all flood damages sustained.

Owners of properties that experience repetitive flooding often are locked into a cycle of damage and repair. Many owners may not be aware of the nature of the hazard that they face, in part because they have purchased the property after the last flood or the seller did not disclose past flooding. Disclosure of repetitive flooding is a problem because repetitive loss areas are not shown on Flood Insurance Rate Maps (FIRMs) and are often located outside of the Special Flood Hazard Area (SFHA).

The City of Arlington has opted to complete a Repetitive Loss Area Analysis (RLAA) using the 2013 CRS Coordinator's Manual as a guide. The RLAA will benefit the City by examining potential mitigation measures for specific repetitive loss areas and increasing its credit in the CRS Program.

Setting

The City of Arlington is located in Tarrant County in north-central Texas between the cities of Fort Worth and Dallas. The City occupies a total land area of about 99 square miles of the approximate 900 square miles in the county. The City is served by two Interstate Highways, I-20 and I-30 and lies between I-35 W and I-35 E. Texas State Highway 360 is also a limited-access freeway, running on the eastern border, located just five miles from the Dallas/Fort Worth International Airport. According to U.S. Census Bureau, the City of Arlington has an estimated population of 383,204 as of 2014.

Flooding within the City of Arlington can be attributed to two sources:

1. Flash flooding resulting from heavy rainfall that overwhelms the drainage system;
2. Riverine flooding resulting from heavy and prolonged rainfall over a watershed that causes the capacity of the main channel to be exceeded.

Figure 2 depicts the City of Arlington's location within the County as well as the surrounding cities. Figure 3 depicts the major watersheds within the City. All drainage within the City of Arlington eventually flows to the West Fork of the Trinity River.

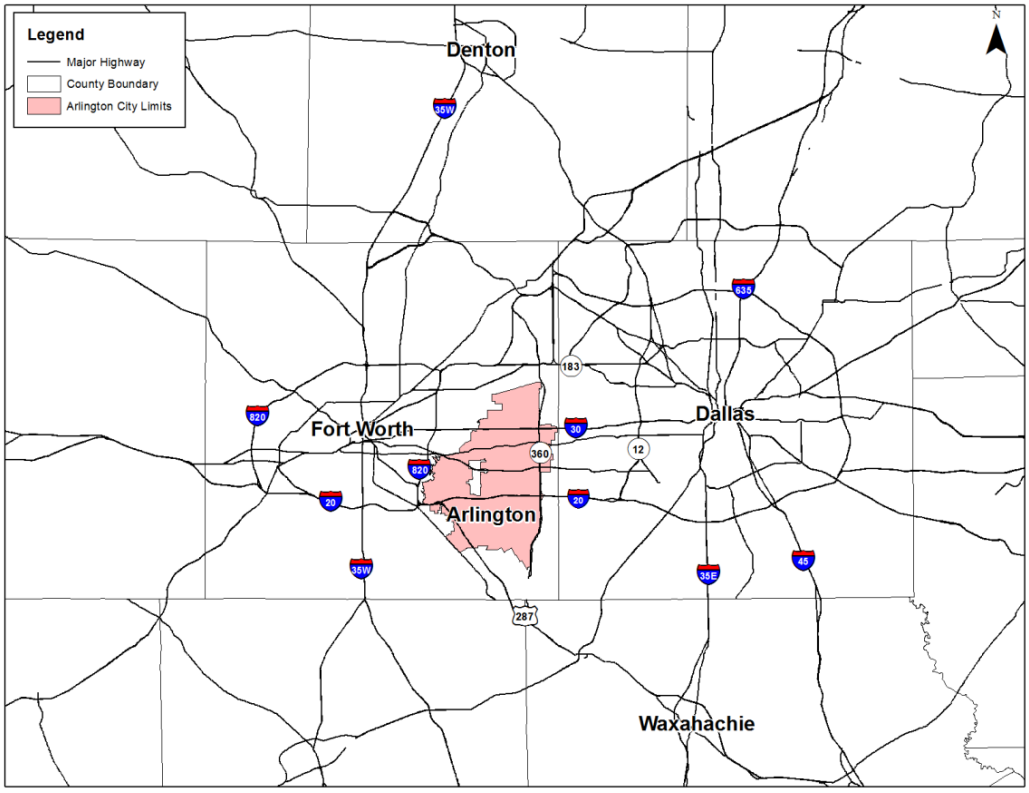


Figure 2 City of Arlington Location

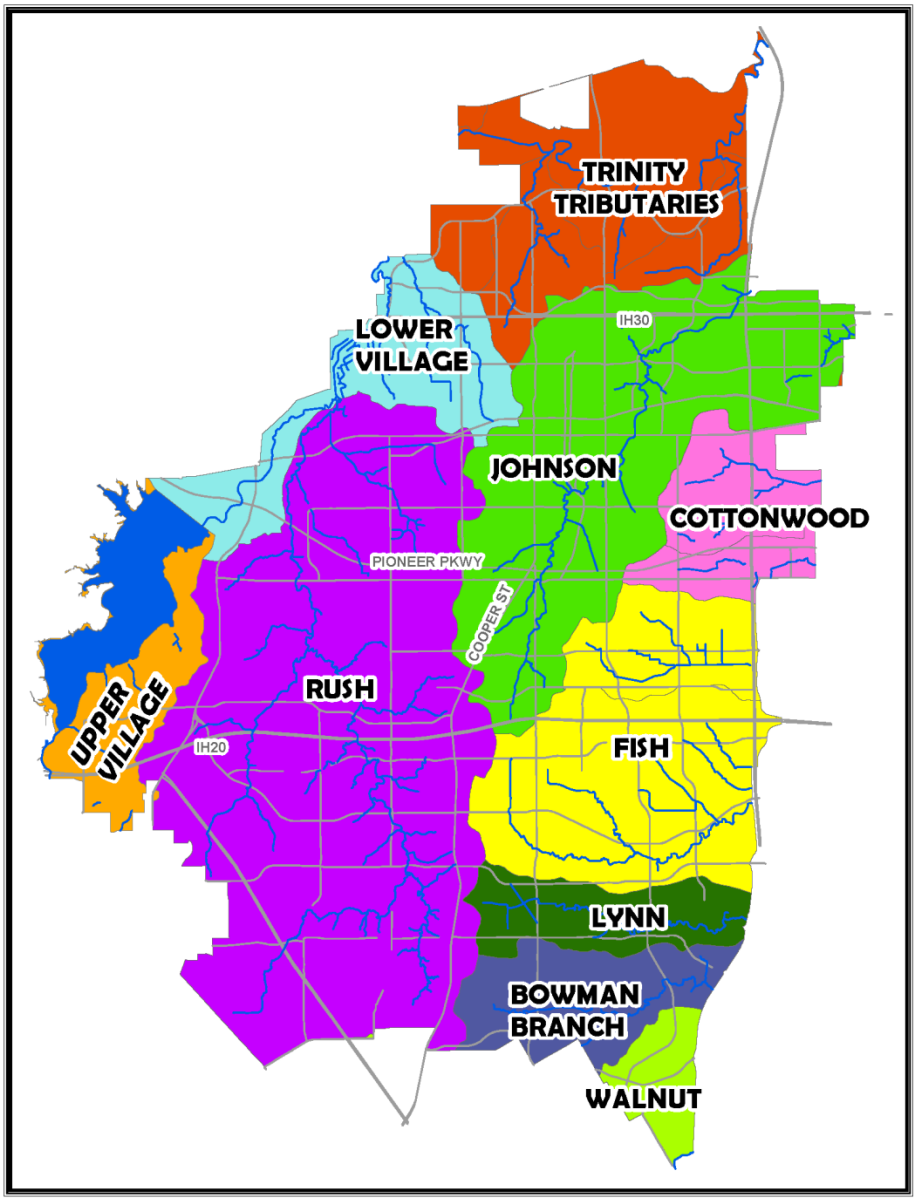


Figure 3 Major Watersheds in the City of Arlington

Repetitive Loss Requirement

The CRS Program makes it a priority to address RL properties because many of the losses under the NFIP come from repetitively flooded properties. Repetitive loss data must be maintained and updated annually in order to participate in the CRS Program. There are three categories of repetitive loss communities based upon the number of properties on the updated repetitive loss list from FEMA. Each category has specific requirements that a community must meet based upon the number of properties on the repetitive loss list.

- **Category A:** A community with no unmitigated repetitive loss properties. No special requirements from CRS.
- **Category B:** A community with at least one, but fewer than 10, unmitigated repetitive loss properties. Category B communities are required by the CRS Program to research and describe their repetitive loss problem, create a map showing the location of all repetitive loss areas, and undertake an annual outreach project to all properties within a repetitive loss area.
- **Category C:** A community with 10 or more unmitigated repetitive loss properties. Category C communities must do the same things as a Category B community and prepare either a Floodplain Management Plan that covers all repetitive loss areas or prepare a Repetitive Loss Area Analysis (RLAA) for all repetitive loss area.

The City of Arlington is designated as a Category C repetitive loss community because it has a total of 33 unmitigated repetitive loss properties.

2 The RLAA Process

This Repetitive Loss Area Analysis (RLAA) follows the planning process outlined in Section 510 of the 2013 *CRS Coordinator's Manual*. Two additional steps were added to this process: an initial step for identifying the RL areas and a final step to ensure collaboration with the entire community. The RLAA process that the City of Arlington followed is shown in detail below.

Initial Step: Conduct a thorough review of the repetitive loss properties, flood insurance claims information, and reported drainage concerns from the residents around each repetitive loss property. Identify which repetitive loss properties may be subject to isolated flooding and which RL properties may have neighbors who are subject to flooding. Based upon that information , delineate the RL areas using a combination of the contour data, the location of the floodplain, the location of storm drain infrastructure and the location and frequency of drainage concerns and flood insurance claims.

Step 1: Advise all the properties in the repetitive loss areas that the analysis will be conducted and request their input on the hazard and recommended actions.

Step 2: Contact agencies and organizations that may have plans or studies that could affect the cause or impacts of the flooding. The agencies and organizations must be identified in the analysis report.

Step 3: Visit each building and collect basic data.

Step 4: Review alternative approaches and determine whether any property protection measures or drainage improvements are feasible.

Step 5: Document the findings. A separate analysis report must be prepared for each area.

Final Step: The RLAA Report must be submitted to the community's governing body and made available to the media and the public. The complete RLAA Report must be adopted by the community's governing body or by an office that has been delegated approval authority by the community's governing body.

Beyond the five major planning steps of the RLAA process, additional activities are required on an annual basis. An outreach project must be sent to all properties in each RL Area. This outreach project must:

- Inform each owner that their property is located in an area that is subject to flooding;
- Provide information on how to prepare for a flood;
- Identify available sources of financial assistance;
- Provide contacts for available city services such as site visits for property protection advice;
- Provide basic facts about flood insurance.

To fulfill this outreach project requirement, the City of Arlington mails a letter to all property owners and tenants in each mapped RL Area each year. A copy of the annual outreach project is located in Appendix A.

The City is also required to provide annual updates to the RLAA Plan about any changes to the RLAA Plan and report the status of each identified mitigation activity.

This report includes a detailed analysis of the 21 repetitive loss areas in the City of Arlington.

Initial Step: Mapping Repetitive Loss Areas

A repetitive loss area (RLA) is a portion (or portions) of a community that includes buildings on FEMA's list of repetitive loss properties and also any nearby properties that are subject to the same or similar flooding conditions. Twenty one Repetitive Loss Areas were identified within the City of Arlington in accordance to the guidelines in the CRS Handout *Mapping Repetitive Loss Areas* dated October 2015. The 21 Repetitive Loss Areas included 33 unmitigated repetitive loss properties plus an additional 362 properties that are subject to similar flooding conditions.

An overview map of the City of Arlington RLA is shown in Figure 4 on the following page.

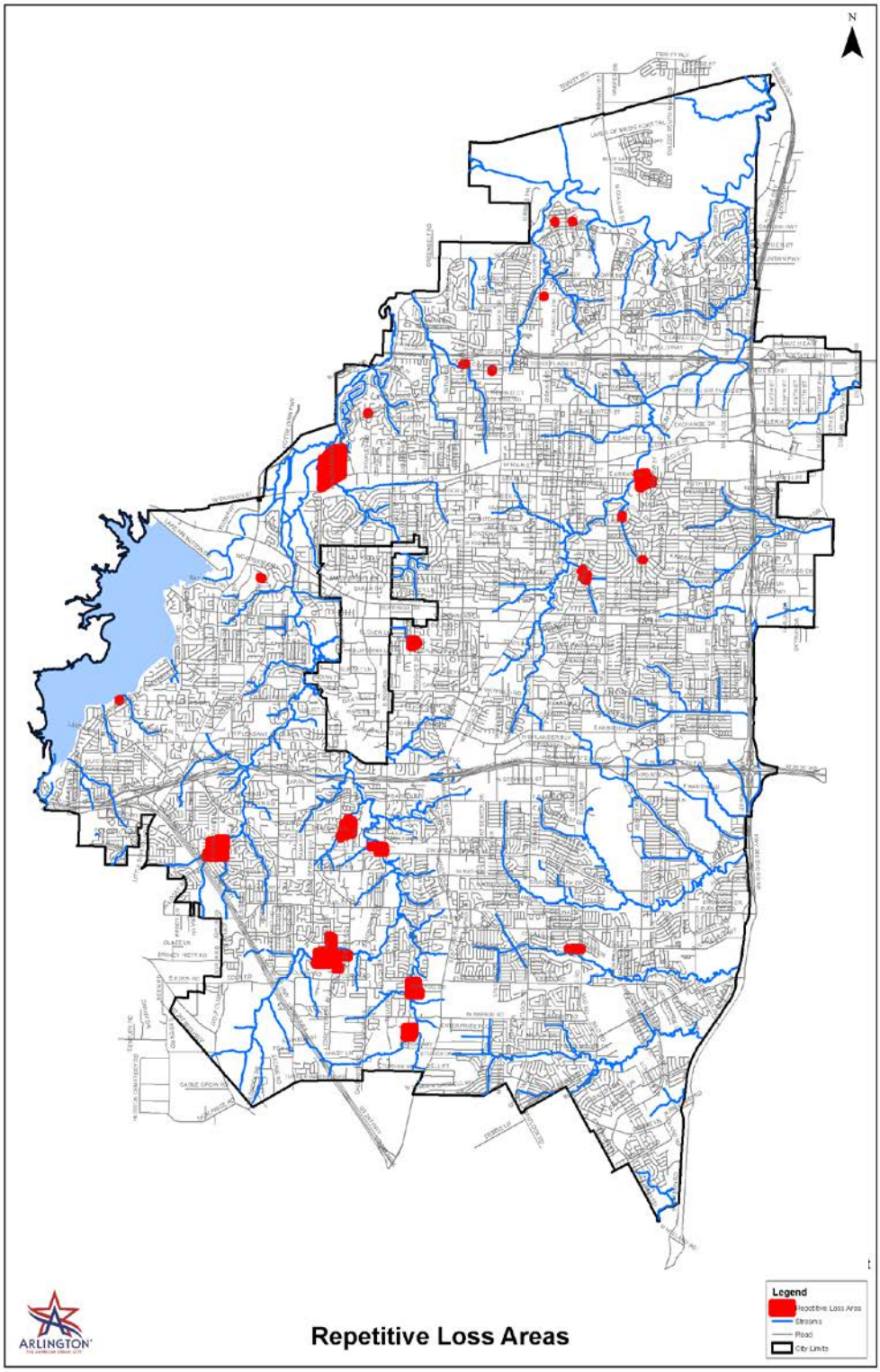


Figure 4 Repetitive Loss Area Overview Map

Step 1. Advise All Property Owners

Before field work began on the RLAA, individual letters were mailed to property owners within the 21 identified Repetitive Loss Areas. Figure 5 on the following page shows an example of the property owner notification letter. Letters were mailed to repetitive loss properties, historical repetitive loss properties (those with one paid claim against the NFIP), and additional properties added to the repetitive loss areas which have no claims paid against the NFIP. A total of 159 letters were sent to property owners on December 23, 2015.

Copies of all mailed letters are maintained on file with the City of Arlington Public Works and Transportation Department. In accordance with the Privacy Act of 1974, the letters will not be shared with the general public.

Mailed Questionnaire

A property owner questionnaire was included with each letter mailed to property owners. The questionnaire asks about the type of foundation the building has, if the building has experienced any flooding and the type of flooding, cause of flooding, flood protection measures and whether the owner has flood insurance. The Flood Protection Questionnaire is shown in Figure 6 on the following pages.

Department of Public Works and Transportation

December 23, 2015

«OWNER»
«ADDRESS»
«CITY_» «STATE» «ZIP»

RE: «PROPERTY_ADDRESS»

The City of Arlington participates in the National Flood Insurance Program's (NFIP) Community Rating System (CRS) which provides discounts on flood insurance based on the City's floodplain management activities. For continued participation in this program, the City is evaluating areas that contain properties that have experienced repetitive flood damage. This analysis will include the review of all previous flood data and studies conducted in these locations.

You can help us perform this analysis by completing and returning this questionnaire by January 6, 2016.

A report called a "Repetitive Loss Area Analysis" will be created that uses the information provided on the questionnaire along with building permit records, tax records for properties in the area and general City codes, ordinances and historic flooding information.

The results of the analysis will include a review of alternative approaches for property protection measures or drainage improvements where feasible. Once the analysis is complete, a draft of the report will be placed on the City's website at http://www.arlington-tx.gov/stormwater/flood-information-services-and-elevation-certificates/ for review and comment.

In certain areas, the City may have ongoing drainage projects or be applying for FEMA buyout grants. This analysis is not related to those efforts.

If you have any questions, please call me at 817-459-6592 or email me at mandy.clark@arlingtontx.gov.

Sincerely,

Samantha W. (Mandy) Clark, P.E., CFM
Stormwater Engineering Operations Manager

Si necesita una copia de esta carta y el cuestionario en español, por favor llame al 817-459-6550.

Nếu bạn cần một bản sao của bức thư này và bảng câu hỏi bằng tiếng Việt, xin gọi 817-459-6550.

Mail Stop 01-0220 • 101 West Abram Street • Box 90231 • Arlington, Texas 76004-3231• 817-459-6550 • Fax 817-459-6585 • www.arlingtontx.gov

Figure 5 Example Property Owner Notification Letter

«PROPERTY_ADDRESS»

Name: _____ Phone Number: _____

Email: _____

1. Do you live in the home that is the subject of this survey? ☐Yes ☐No

   If yes, how many years have you lived in your home? _____

   If no, how many years have you owned the home? _____

2. What type of foundation does the home have? ☐Slab ☐Crawl Space ☐Other _____

3. Has this home/building or property ever been flooded or had a water problem? ☐Yes ☐No

4. In what year(s) did it flood? _____

5. Where did you get water and how deep did it get?

   ☐Over first floor: _____ deep ☐Crawl space: _____ deep ☐Yard only: _____ deep

   ☐Water kept out of house by sandbagging or other protective measures

6. Where did the water come from?

   ☐Street ☐Neighbors Yard ☐Inlet/Flume ☐Drainage System

   ☐Saturated Ground/Groundwater ☐Other_____

7. Have you installed any flood protection measures on the property? ☐Yes ☐No

   If so, what did you install? _____

   Did the measures work? _____

8. Do you have flood insurance? ☐Yes ☐No

9. Are you aware of any of your neighbors flooding? ☐Yes ☐No

   If so, what is/are the address(es)? _____

Additional Comments:_____

_____

_____

_____

_____

Figure 6 Flood Protection Questionnaire

Of the 159 mailed flood protection letters and questionnaires, the City of Arlington received 25 responses which correspond to a response rate of 16 percent. Copies of the completed questionnaires are located in Appendix B (Note in accordance with Privacy Act of 1974, Appendix B will not be shared with the general public). Questionnaire responses are summarized below. For the purposes of this report, all personal information provided by the respondents is not included in the summary. Note: Respondents may have skipped questions and/or provided more than one response to a question.

1. **How long have you owned the property?**

Responses Received	Percentage	Number Responding
<10 years	8.0%	2
10-20 years	44.0%	11
20-30 years	24.0%	6
30-40 years	12.0%	3
> 50 years	8.0%	2
No Response Provided	4.0%	1
Total	100.0%	25

2. **What type of foundation does the building have?**

Responses Received	Percentage	Number Responding
Slab	76.0%	19
Crawl Space	4.0%	1
Other	8.0%	2
None- Vacant Lot	8.0%	2
No Response Provided	4.0%	1
Total	100.0%	25

3. **Has this home/building or property flooded or had a water problem?**

Responses Received	Percentage	Number Responding
Yes	60.0%	15
No	40.0%	10
Total	100.0%	25

4. In what year did it flood?

Responses Received	Percentage	Number Responding
1980	0.6%	1
1984	0.6%	1
1985	0.6%	1
1986	0.6%	1
1987	0.6%	1
1989	0.6%	1
1990	0.6%	1
1992	0.6%	1
1993	1.8%	3
1994	1.2%	2
1995	4.3%	7
1996	3.7%	6
1997	4.3%	7
1998	3.7%	6
1999	3.7%	6
2000	3.7%	6
2001	4.3%	7
2002	3.7%	6
2003	3.7%	6
2004	4.9%	8
2005	3.7%	6
2006	4.9%	8
2007	4.3%	7
2008	3.7%	6
2009	4.3%	7
2010	3.7%	6
2011	4.3%	7
2012	4.3%	7
2013	4.3%	7
2014	4.3%	7
2015	4.3%	7
Unsure which year	1.2%	2
No Response	4.9%	8
Total	100.0%	163

5a. Where did you get the water?

Responses Received	Percentage	Number Responding
Over first floor	54.5%	12
Crawl Space	0.0%	0
Yard Only	27.3%	6
Sandbags/Protective Measures Used	18.2%	4
Total	100.0%	22

5b. How deep did the water get?

Responses Received	Percentage	Number Responding
<1 inches	8.3%	1
1-2 inches	33.3%	4
2-3 inches	8.3%	1
4-5 inches	25.0%	3
12 inches	16.7%	2
Depth Unknown	8.3%	1
Total	100.0%	12

6. Where does the water come from?

Responses Received	Percentage	Number Responding
Street	26.7%	8
Neighbor's Yard	20.0%	6
Inlet/Flume	3.3%	1
Drainage System	13.3%	4
Groundwater	23.3%	7
Other	13.3%	4
Total	100.0%	30

7a. Have you installed any flood protection measures on the property?

Responses Received	Percentage	Number Responding
Yes	40.0%	10
No	60.0%	15
Total	100.0%	25

7b. What flood protection measures have you installed?

Responses Received	Percentage	Number Responding
Sump Pump	13.0%	3
Re-graded yard to direct water away	21.7%	5
Berm	4.3%	1
Barrier Wall	17.4%	4
Drainage System	21.7%	5
Sandbagged	4.3%	1
Other - City Drainage Project	17.4%	4
Total	100.0%	23

7c. Did the Flood Protection Measure Work?

Responses Received	Yes	No	Somewhat Effective
Sump Pump			3
Re-graded yard to direct water away			5
Berm	1		
Barrier Wall	1	1	2
Drainage System	3	1	1
Sandbagged		1	
Other - City Drainage Project	4		

8. Do you have flood insurance?

Responses Received	Percentage	Number Responding
Yes	28.0%	7
No	72.0%	18
Total	100.0%	25

9. Have your neighbors flooded?

Responses Received	Percentage	Number Responding
Yes	72.0%	18
No	28.0%	7
Total	100.0%	25

The following trends in survey responses should be considered when evaluating mitigation alternatives for all repetitive loss areas:

- 60 percent of respondents have experienced flooding on their property.
- Only 28 percent of the respondents have flood insurance.
- 55 percent of respondents have had flooding on the first floor of their building.
- 72 percent of respondents reported that their neighbors have experienced flooding.
- Flooding from the street appears to be the most common source of flooding.
- Groundwater and flooding from a neighbor's yard appear to be the second most common source of flooding.
- The majority of the structural flooding is 1-2 inches in depth on the first floor of the structure.
- 27 percent of respondents have experienced yard flooding that ranges from 4 to 12 inches in depth.
- 40 percent of respondents have installed flood protection measures.
- Of the flood protection measures the respondents have used, re-grading the property and installing small drainage systems were the most popular method. The small drainage systems appear to be the most effective measure and re-grading the property has been somewhat effective in reducing the structural flooding.
- City drainage projects appear to be one of the most effective mitigation measures

The National Climatic Data Center (NCDC) has a database of local flooding events in Arlington and North Texas beginning in 1985. The table below lists dates of area floods, including fatalities, property damage and a description of the events. This table corresponds with several of the years that the respondents experienced flooding at their property.

Table 1 Summary of Flood Events in Arlington and North Texas, January 1985 - September 2015

Location	Date	Number of Fatalities	Property Damage	Description
North Texas	4/27/1985	8	unknown	Intense thunderstorms covered most of North Texas during the late evening Apr. 27 and early morning Apr. 28. About 10 in. of rain fell 9:00 to 11:00 p.m. near Rockwall in Rockwall County.
Fort Worth	5/24/1986	2	$2 million	The storm produced winds as strong as 95 miles per hour, hail as large as 3-in. in diameter, and about 4 in. of rain during an hour
North Texas	5/1/1990	unknown	unknown	Heavy rainfall May 1-4 produced major flooding in North Texas during early May. Rainfall was 5-9 in. on north-central sections of North Texas
Arlington	10/18/1993	0	$50,000	A few houses were flooded and cars stalled in high water. Blair Street was reported flooded.
Arlington	3/25/1995	0	$0	Flooding was reported on Collins and Abrams streets

Location	Date	Number of Fatalities	Property Damage	Description
Arlington	5/5/1995	0	?	Twenty five homes were flooded in east Arlington after a creek overflowed.
Dallas and Tarrant County	5/5/1995	120 injured, 20 deaths	$2 billion	Damage caused by wind speeds up to 70 miles per hour, softball-size hail, and high-intensity rain caused this storm to be deemed the "costliest thunderstorm event in history" by the National Weather Service. The maximum rainfall intensity was almost 3 in. in 30 minutes.
Tarrant County	5/8/1995	0	$0	Many streets covered in high water.
Arlington	7/31/1995	0	$0	Widespread street flooding was reported in Arlington along Division street
Arlington	10/21/1996	0	$0	Heavy rain caused flash flooding over roads.
Arlington	11/24/1996	0	$0	Water was reported over a road.
North Texas	11/25/1996	4	?	Flash flooding of creeks made many roads impassable.
Arlington	1/24/1998	0	$0	Several streets were flooded
Arlington	7/7/1999	0	$0	Parts of South Davis St. were flooded, as well as some underpasses
Arlington	4/16/2000	0	?	Cars were stranded in one to two feet of water from thunderstorm rain. April 15, 2000 – Scattered thunderstorms between Olney and Dallas from 8pm to midnight.
Arlington	7/1/2001	0	$20,000	Widespread reports of street flooding and cars stalled in high water in west and east central Arlington. $20K damage at a Baptist church.
Arlington	6/9/2004	0	$0	Water was over roads in Northeast Arlington.
Arlington	6/15/2004	0	?	High water was reported at the Highway 287/Interstate 20 interchange, street flooding occurred in south Arlington, and one room of a house was flooded.
Arlington	6/28/2004	0	$10,000	The Six Flags Over Texas amusement park was flooded by Johnson Creek and closed. 6 persons were rescued from a railroad car where they had taken refuge from high water.
Arlington	7/29/2004	1	$15,000	One man drowned when his SUV was swept down Rush Creek by high water.
Arlington	7/29/2004	0	$50,000	Across southern Tarrant County, mostly in Arlington, there were 27 high water rescues, 12 streets closed, and 7 homes evacuated.

Location	Date	Number of Fatalities	Property Damage	Description
Tarrant County	3/19/2006	0	$300,000	Significant flooding occurred across the county. Numerous streets were barricaded with water flowing over them. Several high water rescues and home evacuations were necessary. Numerous homes and businesses suffered water damage. In Mansfield, street flooding was reported, with several streets, including Walnut Creek Drive and Retta Road closed and impassible. In Arlington, apartment complexes and homes sustained water damage. Six Flags over Texas in Arlington was under several feet of water. Numerous cars were underwater and high water rescues were needed. Shady Valley Country Club was also underwater. In Kennedale, Village Creek was over its banks and flooding parts of I-20.
Tarrant County	7/5/2006	0	$0	Flash flooding was reported at several intersections in Watauga, along Mid-Cities Boulevard in North Richland Hills, and at Highway 114 and Dove Road in Southlake.
Arlington	1/12/2007	0	$5,000	A high water rescue was required in North Arlington near Interstate 30. A strong cold front spawned a couple weak tornadoes and caused flash flooding as it moved through North Texas.
Arlington	3/13/2007	0	$0	Flash flooding reported on roads in Arlington. An upper level low pressure system remained over west and central Texas for several days. Numerous shortwaves traveled from this system and over north Texas. This energy combined with ample moisture to create several rain events over much of the region. A large amount of rain in a short time triggered flash flooding in many counties. A few hail and wind reports were received as well.
Arlington	7/2/2007	0	$0	A high water rescue was required for three children who had been playing in Johnson Creek and were swept away. The children were treated for minor injuries. Upper level energy combined with high moisture to create several rounds of showers and thunderstorms. This resulted in flooding as rain fell on already saturated grounds.

Location	Date	Number of Fatalities	Property Damage	Description
Arlington	4/17/2008	0	$0	A car stalled out in high water along Cooper Street and Randol Mill. A potent supercell developed during the afternoon and moved eastward along a cold front. This storm was responsible for hail as large as baseballs as it moved across Jack, Stephens, Palo Pinto, Parker and Tarrant Counties. A squall line developed along the southward moving cold front later that evening, producing a few reports of thunderstorm winds and large hail
Arlington	11/10/2008	0	$0	Vehicles were stranded at I-30 and North Collins Street. A warm front draped across the region helped initiate thunderstorms as an upper low pressure system moved through the Southern Plains.
Dallas and Tarrant Counties	9/8/2010	2	$20 Million	The remnants of Tropical Storm Hermine moved through the western portions of north Texas dropping several inches of water in some locations and producing 8 tornadoes. Significant flash flooding occurred during the late evening hours of September 7th through September 8th. Up to 12 inches of rain fell across the area with the highest totals along the Interstate 35 corridor. Numerous high water rescues and evacuations were conducted across the region. Two fatalities occurred during the event due to the flooding. Heavy rain began to fall before sunrise and several intersections across Tarrant County had to be closed due to high water as numerous vehicles stalled. High water rescues and evacuations were conducted at an apartment complex in Arlington as high water entered numerous apartment buildings. At least 129 homes and 68 apartment units in Arlington suffered damage as the water levels reached 8 feet in some structures. Several creeks across the county flooded over 100 additional homes. The most significant flooding occurred along Johnson Creek, Kee Branch, Bear Creek, and Rush Creek.
Arlington	6/25/2014	0	$7,000	Johnson Creek in Arlington overflowed its banks due to several inches of rain. The creek flooded part of Six Flags Over Texas.

Location	Date	Number of Fatalities	Property Damage	Description
Arlington	5/24/2015	0	$0	Broadcast media reported that Abrams Road and a nearby shopping center in Arlington were flooded. Arlington police reported a swift water rescue at the 1300 block of Abram Street in Arlington. For several days, a stalled cold front, combined with abundant moisture from the Gulf of Mexico to produce widespread rain and thunderstorms in Texas. Several rounds of strong to sever thunderstorms occurred during a four day period, producing flash flooding, and numerous reports of large hail.

Note: The NCDC database is only updated through September 30, 2015. The flooding events that occurred in the remainder of 2015 are not shown in the table above.

Step 2. Contact Agencies and Organizations

The City of Arlington contacted external agencies and city departments that have plans or studies that could affect the cause or impacts of flooding within the identified repetitive loss areas. The data collected was used to analyze the problems further and to help identify potential solutions and mitigation measures for property owners. Those reports which were analyzed and reviewed included:

- City of Arlington Capital Improvement Plan, FY15-17
- Tarrant County Flood Insurance Study, effective September 25, 2009
- Tarrant County Multi-Jurisdictional Hazard Mitigation Plan, updated June 2015
- FEMA – Repetitive Loss and Flood Insurance Data
- Lake Arlington Emergency Action Plan, completed 2012
- Sublett Creek Neighborhood Drainage Improvements Conceptual Study, completed October 2015
- Conceptual Study of Parkchester-Wolff Drainage Improvements Project, completed May 2015
- Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan, completed 2012
- Rush Creek Watershed Study, scheduled completion in 2016
- Johnson Creek Watershed Study, scheduled completion in 2016

Summary of Studies and Reports

City of Arlington Capital Improvement Plan

The City's Capital Improvement Program (CIP) is approved annually by the City Council. The program is a rolling three year program with the current year adopted as the Capital Budget and the two subsequent years shown as preliminary for planning/information purposes. The projects are primarily related to improvement in public service, parks, public utilities, and facilities. The FY2015 Stormwater Capital Budget is $5.8 million. Projects included in the Stormwater CIP are generated either through drainage concerns that are reported by property owners or through identification in a watershed study. These projects are ranked based on number of properties impacted, how long they have been reporting the concern, how frequently they flood and other considerations such as coordination with other city projects. Watershed studies, flood mitigation buyouts, stream gauges, major maintenance projects, and administrative costs are also included in the Stormwater CIP.

Tarrant County Flood Insurance Study

FEMA's Flood Insurance Study (FIS) for Tarrant County is dated September 25, 2009. The FIS includes flood risk data for specific streams, creeks, rivers, and lakes within the City of Arlington. The FIS report contains detailed flood elevation data in flood profiles and data tables.

Tarrant County Local Mitigation Action Plan, updated June 2015

The Tarrant County Local Mitigation Action Plan is a multi-jurisdictional plan that identifies the hazards faced by each participating community, the vulnerabilities to these hazards, and mitigation strategies for

the future. The City of Arlington is a participant in the Tarrant County Local Mitigation Action Plan. The Plan contains mitigation actions for flooding hazards.

FEMA Repetitive Loss and Flood Insurance Claims Data

The Privacy Act of 1974 restricts the release of flood insurance policy and claims data to the public. This information is only released to state and local governments for the use in floodplain management related activities. All claims and flood insurance policy data in this report is only discussed in general terms to be incompliance with the Privacy Act.

Lake Arlington Emergency Action Plan, Completed June 2012

Lake Arlington is classified as a high hazard dam by the Texas Commission for Environmental Quality (TCEQ). This dam has the potential to affect the City of Arlington in the event of dam failure. The Lake Arlington Emergency Action Plan was adopted in June 2012. It details emergency operations procedures and includes inundation maps to show which areas are at the highest risk in the event of a dam failure.

Sublett Creek Neighborhood Drainage Improvements Conceptual Study, Completed October 2015

This study includes existing flood conditions information and proposed mitigation alternatives for the Hollow Creek Road/Doty Lane and Redstone Drive Repetitive Loss Areas. The existing flood conditions data produced flood elevation data for multiple return intervals and to assist the property owners with mitigation on their properties.

Conceptual Study of Parkchester-Wolff Drainage Improvements Project, Completed May 2015

This study includes existing flood conditions information and proposed mitigation alternatives for the Parkchester Drive Repetitive Loss Area. The existing flood conditions data produced flood elevation data for multiple return intervals and to assist the property owners with mitigation on their properties.

Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan, Completed 2012

The Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan is an engineering analysis of the flooding risks of the Cottonwood Creek and Fish Creek watersheds. This study extended the engineering analysis to the most upstream limits of each watershed. It includes a planning analysis that identified locations subject to severe flood risks and developed mitigation actions for each location. The mitigation actions have been incorporated into the City of Arlington Capital Improvement Plan. The engineering analysis from this Plan was submitted to FEMA in 2015 to be incorporated into the Tarrant County FIS and FIRM data. Neither the Cottonwood Creek nor Fish Creek watersheds include repetitive loss areas as of 2015.

Rush Creek Watershed Study, scheduled completion in 2016

The Rush Creek Watershed Study is an engineering analysis of the flooding risks within the Rush Creek Watershed. The watershed study included an engineering analysis of the flooding and erosion risks along Rush Creek, Sublett Creek, and Kee Branch and their tributaries. Areas subject to severe flood risks were identified and mitigation actions were developed. The mitigation actions have been

incorporated into the City of Arlington Capital Improvement Plan. The Rush Creek Watershed includes 10 Repetitive Loss Areas.

Johnson Creek Watershed Study, scheduled completion in 2016

The Johnson Creek Watershed Study is an engineering analysis of the flooding risk within the Johnson Creek Watershed. The watershed study included an analysis of erosion risks along the main stem of Johnson Creek. The Johnson Creek Watershed includes 4 Repetitive Loss Areas.

Steps 3, 4, and 5

Steps 3, 4, and 5 were performed for each Repetitive Loss Area and individual reports for each area that include these steps are presented in the upcoming sections.

Step 3: Building Data Collection

All properties in the repetitive loss area were visited to assess the cause of repetitive flooding and evaluate the potential mitigation measures required for each area. The on-site survey for this analysis was conducted January 4-8, 2016. The data collected from these on-site surveys is included in Appendix C of this report. In accordance with the Privacy Act of 1974, Appendix C will not be shared with the general public.

The following information was recorded for each property:

- If structure was still present on the lot
- Existing mitigation observed
- Type and condition of the structure and foundation
- Number of stories
- Height above street grade and height above site grade
- Presence and type of appurtenant structures
- Likely areas of damage on property
- Presence of any HVAC units that would be vulnerable to flood damage.

A summary of the building data for each Repetitive Loss Area is included in this report within the individual sections for each area.

Step 4: Review Alternative Mitigation Approaches

There are many ways to protect a property from flood damage. Different measures are appropriate for the level of each flood hazard, the building types, building conditions, and adjacent land use. In addition to projects the city may construct, the property owners can take mitigation measures to protect their building and its contents from flooding. Typical property protection measures can include:

- Demolish the building or relocate it out of harm's way.
- Elevate the building above the flood level.
- Elevate damage-prone components, such as the furnace, air conditioning unit, or water heater.
- Dry floodproof the building so water cannot get into it.
- Wet floodproof portions of the building so water will not cause damage.
- Construct a berm or redirect drainage away from the building.
- Maintain nearby stream, ditches, and storm drains so debris does not obstruct them.
- Correct sewer backup problems.

Mitigation measures should fall into one of the mitigation categories listed below based upon the CRS planning process:

- Prevention
- Property Protection
- Natural Resource Protection
- Emergency Services
- Structural Projects
- Public Information and Outreach

This section includes a description of the mitigation measures and potential funding sources that were considered for all repetitive loss areas included in this RLAA.

Mitigation Measures Overview

Structural Mitigation Methods

Structural mitigation methods are used to control or manage floodwaters away from an area. These types of projects result in a change to the drainage infrastructure within an area and help to protect both the streets and the buildings within a project area. These are designed by engineers and are typically funded by the local government, though federal funding is available for some structural mitigation projects. These projects are constructed and maintained by the government agency that constructs them.

Levees and Floodwalls

Levees and floodwalls confine water to a stream channel by raising its banks. A levee is a barrier of earth while a floodwall is a concrete wall. Levees and floodwalls must be designed for large floods, underground seepage, pumping internal drainage, and erosion and scour. Levees and floodwalls can by constructed around a structure or a group of structures to hold back floodwaters.

Table 2 Advantages and Disadvantages of Levees and Floodwalls

Advantages	Disadvantages
• No alterations to the adjacent structures or foundations are required.	• Property is still located within the floodplain and has potential to be damaged by a flood if the levee/floodwall fails or is overtopped by water. • Cannot be used to bring a substantially damaged or improved structure into compliance with the Flood Damage Prevention Ordinance. • Internal drainage or surface flows from the area inside the levee/floodwall can be disrupted. • Long term maintenance costs. • Creates a false sense of security.

Drainage Improvements

The drainage system moves surface water through storm drain systems and channels to a receiving body of water. Drainage improvements can include any improvement to the existing stormwater drainage system in order to improve its capacity and reduce the frequency of flooding. These improvements can include changes to the storm drain system, channels, streets, and bridges and culverts, and construction of detention ponds. Drainage improvements are typically identified and evaluated in watershed studies and are included in the Capital Improvement Program. Drainage improvements can be funded both be the City of Arlington and through some federal grants. The advantages and disadvantages for drainage improvements that have been identified for each repetitive loss area are discussed in the area's individual section.

Table 3 Advantages and Disadvantages for Drainage Improvements

Advantages	Disadvantages
• Can increase the drainage system capacity through storm drain improvements, channel improvements, restrictive road crossing replacements, or rainfall storage in detention ponds. • Minor projects may be fundable under the FEMA mitigation grant programs.	• Channel improvements can increase the capacity to accumulate and carry sediment thereby potentially adversely affecting the surrounding areas and the stream system's equilibrium. • May help one area but create new problems upstream or downstream of the proposed improvements. • Right of way acquisition may be required.

Non-Structural Mitigation Methods

Nonstructural mitigation methods are permanent measures that are applied to a structure and its contents to prevent or provide resistance to reduce damage from flooding. Nonstructural mitigation methods differ from structural mitigation methods in that they reduce the consequence of flooding rather than reducing the frequency of flooding. These types of mitigation methods can be funded both by a government agency through a grant or by the individual property owner.

Elevation

Elevating a structure to prevent floodwaters from reaching living areas is an effective mitigation method. The goal of the elevation process is to raise the lowest floor to or above the required level of protection. For the City of Arlington, structures would be required to be raised 2-feet above the ultimate base flood elevation. Elevation can include lifting the entire structure or by leaving the structure in its existing posting and constructing a new elevated floor within it.

Table 4 Advantages and Disadvantages of Elevation

Advantages	Disadvantages
• Elevating to or above the BFE allows a substantially damaged or improved structure to be brought into compliance with the Flood Damage Prevention Ordinance. • Often reduces flood insurance premiums. • Reduces or eliminates road closures due to overtopping. • May be funded by FEMA mitigation grant programs.	• Construction costs may be prohibitive for some structures. • Additional cost are likely if the structure must be brought into compliance with current building code requirements. • The appearance of the structure and access to it may be adversely affected. • Requires property owner cooperation and right of way acquisition. • May require road closures during construction.

Acquisition

Property acquisition is a complex process requiring the transferring of private property to the City for open space purposes. Acquisition can be a relatively expensive mitigation measure, but provides the greatest long term benefit in the lives and property that are protected from flood damage. Acquisition is usually recommended when the flood hazard is so frequent that it is not safe to leave the structure on the site. The major cost for the acquisition method is for purchasing the structure and land. The total estimated cost of acquisition is based on the following:

- Purchase of structure and land
- Asbestos survey and abatement (if required)
- Demolition
- Debris removal, including any landfill processing fees
- Grading and stabilization of the property sites
- Permits and plan review

Table 5 Advantages and Disadvantages of Acquisition

Advantages	Disadvantages
• Allows a substantially damaged or improved structure to be brought in compliance with the City's Flood Damage Prevention Ordinance. • Expands open space and enhances the natural function of the floodplain. • May be eligible for funding under the FEMA mitigation grant programs.	• Resistance may be encountered due to loss of tax base, maintenance of empty lots, and liability for injuries on community owner lots.

There are three criteria that must be met to be eligible for FEMA funds:

1. The City must inform property owners interested in acquisition that the City will not use condemnation to purchase the property and that participation in the program is strictly voluntary.
2. The subsequent deed to the property will be amended such that the landowner will be restricted from receiving any further Federal disaster assistance grants, the property shall remain in open space in perpetuity, and the property will be retained in ownership by the city, and
3. Any replacement housing or relocated structures will be located outside the 100-year floodplain.

Relocation

Relocation involves moving a structure out of the floodplain to higher ground where it will not be exposed to flooding. This process includes raising the structure and placing it on a wheeled vehicle to move it to the new location.

Table 6 Advantages and Disadvantages to Relocation

Advantages	Disadvantages
• Allows a substantially damaged or improved structure to be brought into compliance with the Flood Damage Prevention Ordinance. • May be eligible for funding under the FEMA mitigation grant programs. • Expands open space and enhances the natural function of the floodplain.	• Costs may be prohibitive. Additional costs are likely if the structure must be brought into compliance with current building codes for plumbing, mechanical, electrical, and energy systems.

The cost for relocation will vary based on the type of structure and the condition of the structure. It is considerably less expensive to relocate a structure that is built on a basement or crawl space as opposed to a structure that has a slab on grade foundation. Additionally wood sided structures are less expensive to relocate than structures with brick veneer. Items to consider in estimating cost for relocation include the following:

- Site selection and analysis and design of the new location
- Analysis of existing size of structure
- Analysis and preparation of the moving route
- Preparation of the structure prior to the move
- Moving the structure to the new location
- Preparation of the new site
- Construction of the new foundation
- Connection of the structure to the new foundation
- Restoration of the old site

Barriers

A flood protection barrier is usually an earthen berm or concrete retaining wall. While floodwalls can be large and span several miles along a creek or river, they can also be constructed on a smaller scale to protect a single structure or a group of structures. As nonstructural measures, barriers should be constructed to no higher than 6-feet above grade and should not be considered for certification through the NFIP, meaning that flood insurance and floodplain management requirements are still applicable in areas where these barriers are constructed.

Table 7 Advantages and Disadvantages to Barriers

Advantages	Disadvantages
• Relative cost of mitigation is less expensive than other alternatives. • No alterations to the actual structure are required. • Property owners can typically construct their own barriers that will complement the style and functionality of their property.	• Property is still located within the floodplain and has the potential to be damaged by a flood if the barrier fails or is overtopped. • Solution is only practical for flooding depths less than 3 feet. • Barriers cannot be used in areas with soils that have high infiltration rates.

The cost of constructing a barrier will depend on the type of barrier and the size required to provide adequate protection. An earthen berm will generally be less expensive compared to an equivalent concrete barrier primarily due to the cost of the materials. Another consideration is space; an earthen barrier requires a lot of additional width per height of the structure compared to a concrete barrier to ensure stability. Key items to consider for barriers:

- There needs to be adequate room on the lot
- A pump is required to remove water that either falls or seeps onto the protected side of the barrier
- Human intervention is required to sand bag or otherwise close any opening in the barrier during the entire flood event.

Floodproofing

Wet floodproofing a structure consist of modifying the uninhabited portions (such as crawlspace or an unfinished basement) to allow floodwaters to enter and exit. This includes properly anchoring the structure and using flood resistant materials below the base flood elevation, protection of mechanical and utility equipment, and use of opening or breakaway walls. This ensures equal hydrostatic pressure on the interior and exterior of the structure which reduces the likelihood of wall failures and structure damage. Wet floodproofing is limited to enclosures below an elevated residential or non-residential structures and to accessory and agricultural structures that have been issue variance by the city.

Table 8 Advantages and Disadvantages of Wet Floodproofing

Advantages	Disadvantages
• Allows internal and external hydrostatic pressures to equalize, lessening the loads on walls and floors and reducing the risk of structural collapse during a flood. • Often less costly than other mitigation measures.	• Extensive cleanup may be necessary if the structure becomes wet inside and possibly contaminated by sewage, chemicals, and other materials that are within the floodwaters. • Pumping floodwaters out of a basement too soon after a flood may lead to structural damage. • Does not minimize the potential damage from a high-velocity flow and wave action • Allowed in limited circumstances.

Dry floodproofing involves sealing structure to make it watertight in order to prevent floodwaters from entering. Making the structure watertight involves sealing the walls with waterproof coatings, impermeable membranes, or a supplemental layer of masonry or concrete; installing watertight shields over windows and doors; and installing measures to prevent sewer backups.

Table 9 Advantages and Disadvantages of Dry Floodproofing

Advantages	Disadvantages
• Does not require additional land that may be needed for floodwalls. • May be funded by a FEMA mitigation grant program.	• Does not minimize the potential damage from high-velocity flood flow. • May not be aesthetically pleasing. • Ongoing maintenance is required. • May not be used to bring a substantially damaged or improved residential structure into compliance with the Flood Damage Prevention Ordinance.

Mitigation Funding

There are several types of mitigation measures which can be considered for each repetitive loss property. Each mitigation measure may qualify for one or more grant programs listed below. Depending on the type of structure, severity of flooding and proximity to additional structures with similar flooding conditions, the most appropriate measure can be determined. In addition to these grant funded projects, several mitigation measures can be taken by the homeowner to protect their home. Table 2 below gives an overview of each grant program.

Table 10 Mitigation Grant Programs

Types of Projects Funded	HMGP	FMA	PDM	SRL	ICC	SBA
Acquisition of the entire property by a gov't agency	X	X	X	X		
Relocation of the building to a flood free site	X	X	X	X	X	X
Demolition of the structure	X	X	X	X	X	X
Elevation of the structure above flood levels	X	X	X	X	X	X
Replacing the old building with a new elevated one	X			X	X	X
Local drainage and small flood control projects	X			X		
Dry floodproofing (non-residential buildings only)		X	X	X	X	X
Percent paid by Federal Program	75%	75%	75%	75%	100%	0%

Step 5: Document the Findings

Step 5 is the requirement to document the findings of Steps 1 – 4. Steps 1 and 2 are documented at the beginning of the report. Steps 3 and 4 are documented specifically for each Repetitive Loss Area in the following section.

3 Summary of Findings and Recommendations

Area #1 – Arlington West Industrial Park

Building Data Collection/Problem Statement

The Arlington West Industrial Park is generally located north of West Division Street between Dottie Lynn Parkway and Bowen Road. This area is near the confluence of Rush Creek with Stream RC-1 as well as the confluence of Rush Creek with Village Creek. This area consists of light industrial and commercial development as well as a residential area that consists of manufactured homes.

In the Industrial Park, the building uses are generally commercial to light industrial. The buildings are all single story, slab-on grade buildings that are either metal, masonry or stucco. The Industrial Area was platted in the 1970s and developed in the 1970s and 1980s. Property values for the sites vary from the low $100,000s for the smaller sites to just over $1,000,000 for the largest of the sites. The condition of the facilities have been rated as fair to good based upon the on-site survey conducted in January 2016.

The manufactured home community developed in the early 1970s and is currently almost 100% occupied with 263 manufactured homes.

A substantial portion of the area is located within the 100-year (Zone AE) floodplain. Portions of this area are subject to periodic flooding from Stream RC-1. The flooding from Stream RC-1 is generally broad, shallow flooding. This type of flooding typically occurs when Rush Creek and Village Creek are at flood stage and flow from Stream RC-1 overflows into this area. Though the area is partially mapped within the Rush Creek and Village Creek floodplain, flooding from these creeks is less frequent. There have been reports of flooding at W Division Street at Stream RC-1, a general flooding complaint for the manufactured home park, and a request to remove debris within the creek adjacent to the industrial park.

As of November 30, 2015, there are 6 repetitive loss properties located in this area that have made a total of 17 claims for a total of $87,533 since 1977. The average RL flood claim in this area is $6025. A majority of the claims occurred between 1981 and 1992.

Past Capital Improvement Projects Affecting Arlington West Industrial Park RLA

In the early 1990s, the US Army Corps of Engineers and the City partnered to line the channel that runs between the industrial park and manufactured home community from Division St. to the outfall into Lower Village Creek for approximately 2,300 feet. About 2/3 of the channel (upstream) was lined with articulated concrete block and the downstream 1/3 was grass lined. Based on the claims information and drainage complaints in the area, it appears that this channel was successful in reducing the frequency of the flooding in the area.

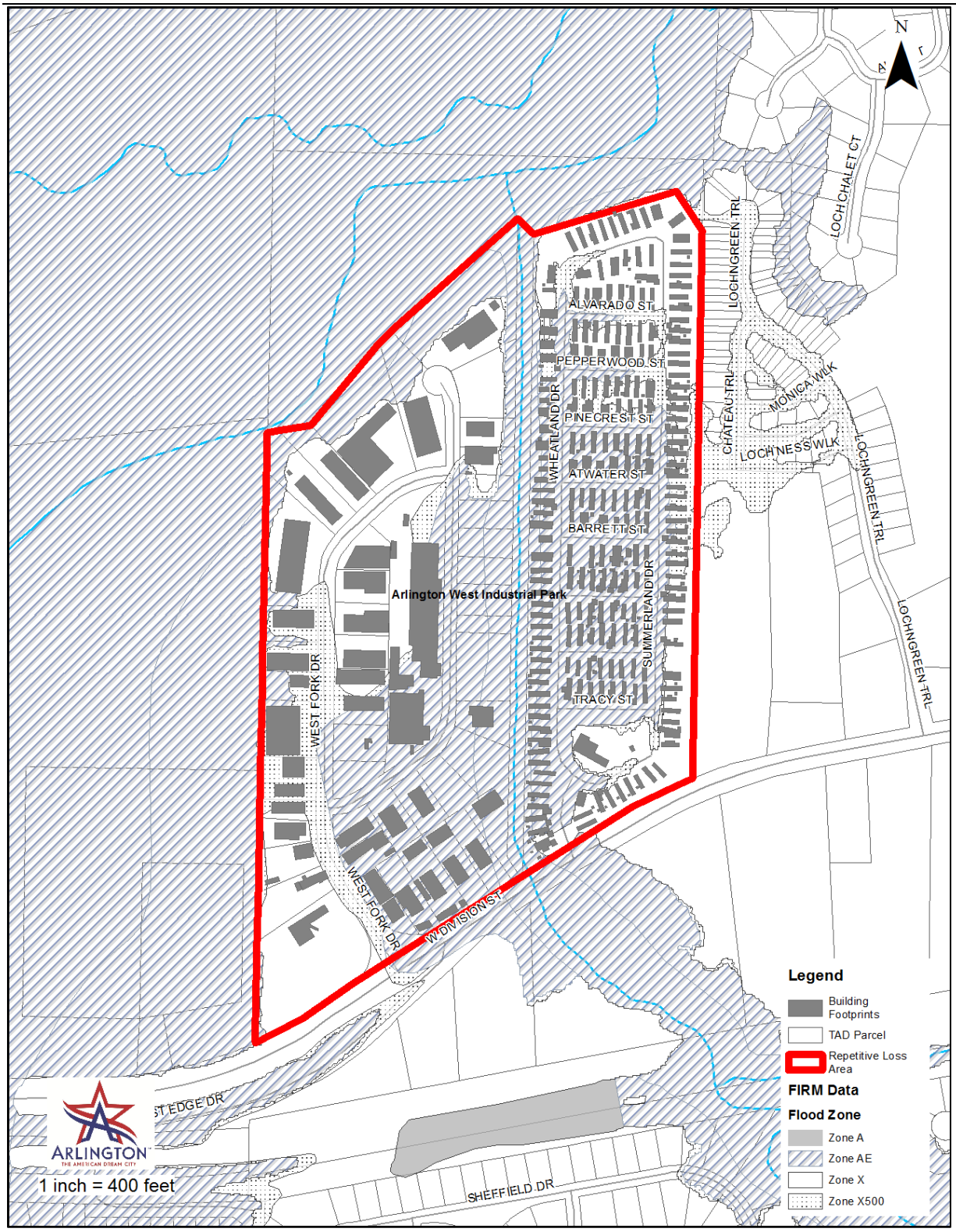


Figure 7 Area #1 Arlington West Industrial Park

Table 11 Area #1 Arlington West Industrial Park On-Site Survey Data

Area #1 - ARLINGTON WEST INDUSTRIAL PARK		
Total Properties	51*	
Properties with Structure	40	
Vacant	11	
Foundation Type	39	Slab-on-Grade
Structure Type	8	Masonry
	8	Metal
	7	Stucco
	235	Mobile Homes
	16	Combination
Structure Condition	13	Good (optional minor repairs)
	25	Fair (needs minor repairs)
	1	Poor (needs significant repairs
Number of Stories	38	1
	1	2
Height Above Street	0	Below Street Grade
	7	At Street Grade
	3	0 - 1 Feet
	16	1 - 2 Feet
	7	2 - 3 Feet
	3	3 - 4 Feet
	3	> 4 Feet
Height Above Site Grade	22	At Grade
	10	0 - 1 Feet
	5	1 - 2 Feet
	0	2 - 3 Feet
	1	3 - 4 Feet
	1	> 4 Feet
Appurtenant Structures	34	None visible
	0	Carport
	0	Detached Garage
	0	Deck
	0	Shed
	5	Other
Likely Areas of Damage on Property	0	Water in Primary Structure
	0	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	39	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	14	Yes
	4	No
	21	Unknown
Drainage Complaints on File	2	

* 51 Individual Lots. One lot contains a mobile home park with approximately 235 units. Each unit was not individually inspected.

Review Alternative Mitigation Approaches – Arlington West Industrial Park

This area was identified in the Rush Creek Watershed Study as a potential project area. The study indicates that the 100-year flood would inundate 46 residential structures in the mobile home park and 18 commercial structures. The 100-year flood would also inundate 284 residential lots and 49 commercial lots and could obstruct first responder access to 283 residential structures and 38 commercial structures. The study proposed two options that are a combination of structural and non-structural mitigation measures:

Option 1: Complete buyout of mobile home park property and all property in the Arlington West Industrial Park ($21.79M)

Option 2: Complete buyout of the mobile home park and selected structures within the Arlington West Industrial Park to construct a floodwall, averaging 4 feet high, around the perimeter of the business park to protect the remaining commercial structures. ($12.77M).

The costs of these measures exceed the annual Stormwater Capital budget, so a funding strategy will need to be identified. This project has not been prioritized for the next three-year Capital Budget Cycle.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Elevating roadways and improving stormwater drainage systems can eliminate some of the flooding in this area. Flash flooding can occur in this area when the capacity of the Stream RC-1 is exceeded or if Rush Creek, Village Creek, or Stream RC-1 are obstructed by debris, sediment, and other materials that limit the capacity of each creek.
- Elevate manufactured homes above the base flood elevation and anchor to prevent flotation to meet NFIP standards.
- Wet floodproofing commercial and industrial structures within the area.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #2 – Hollow Creek Road/Doty Lane

Building Data Collection/Problem Statement

The Hollow Creek Road/Doty Lane are is generally located south of Sublett Road and west of Calendar Road in the southwest area of Arlington. Sublett Creek is a tributary of Rush Creek and flows through this area. This area is comprised of single-family homes on approximately one acre lots.

This area developed primarily in the 1970s. The roads were constructed in the 1970s and are county-type roads with bar ditches. The homes were primarily constructed in the 1970s and are typically valued between $150,000 and $300,000. There are a few homes that have been constructed recently either on infill lots or redeveloped lots. These homes are higher valued in the $400,000 - $700,000 range. All of the homes were given a condition rating of "good".

A substantial portion of the area (18 of 26 lots) is located within the 100-year (Zone AE) floodplain. Portions of this area are subject to periodic flooding from Sublett Creek. The flooding from Stream RC-1 is generally broad, shallow flooding. This area is very flat with limited drainage facilities in the area. Seventeen homes within the area have reported flooding concerns.

As of November 30, 2015 there are 6 repetitive loss properties located in this area that have made a 18 claims for a total of $475, 443 since 1977. One property is considered a severe repetitive loss property. The average RL flood claim for each RL property varies from $2,485 to $48,099. There have been 12 flood insurance claims at properties that are not repetitive loss properties. A majority of the claims occurred in 1991, 1992, 2004, 2010, and 2015.

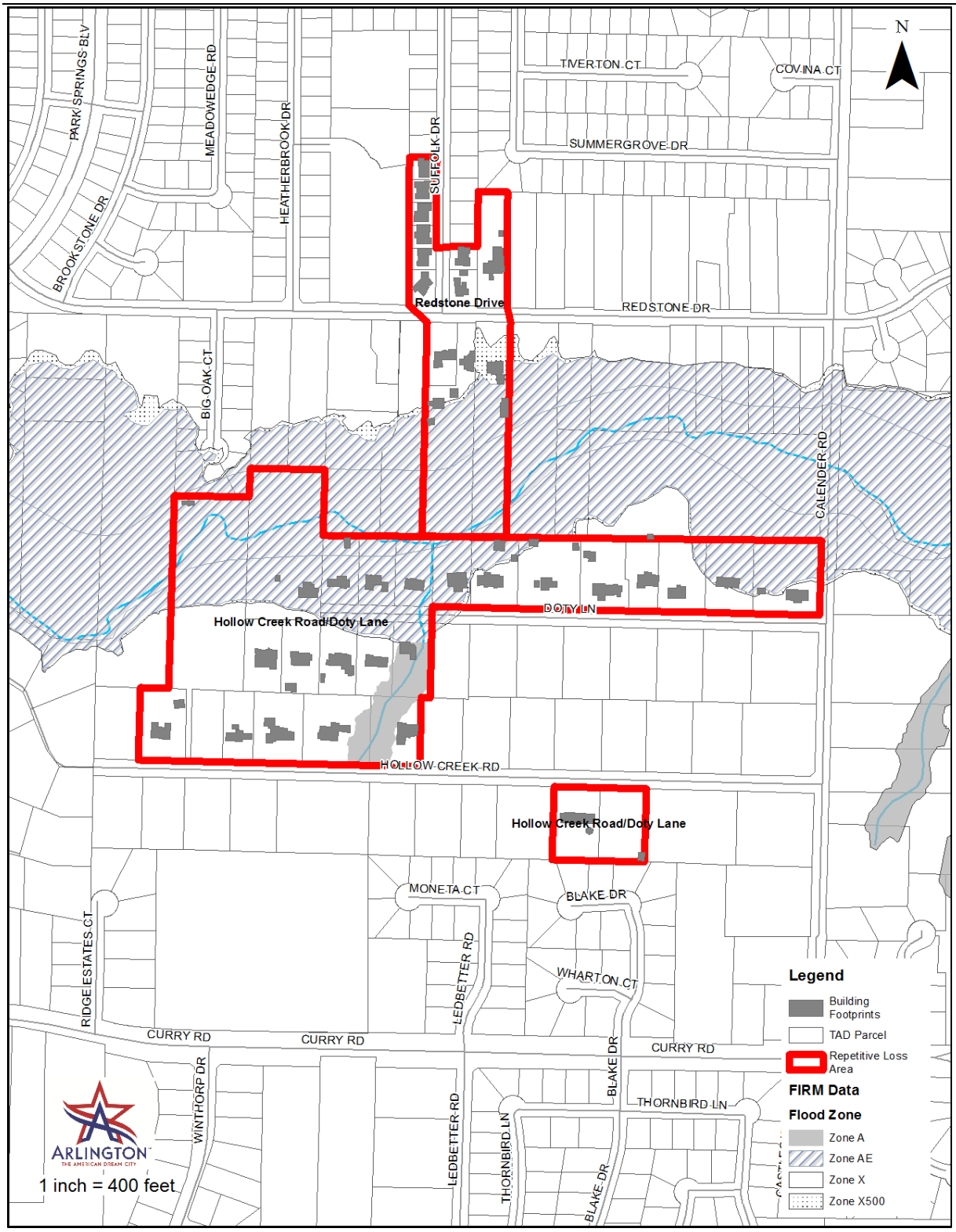


Figure 8 Area #2 Hollow Creek Rd./Doty Lane RLA

Table 12 Area #2 Hollow Creek Rd./Doty Lane On-Site Survey Data

Area #2 - HOLLOW CREEK RD/DOTY LANE		
Total Properties	26	
Properties with Structure	24	
Vacant	2	
Foundation Type	24	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	24	Masonry
	0	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	24	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	17	1
	7	2
Height Above Street	6	Below Street Grade
	4	At Street Grade
	9	0 - 1 Feet
	4	1 - 2 Feet
	1	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	10	At Grade
	13	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	10	None visible
	1	Carport
	7	Detached Garage
		Deck
	9	Shed
	2	Other
Likely Areas of Damage on Property	22	Water in Primary Structure
	2	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	0	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	1	Yes
		No
	23	Unknown
Drainage Complaints on File	17	

Review Alternative Mitigation Approaches – Hollow Creek Rd./Doty Ln.

Based on drainage concerns reported in the area and data obtained from the Rush Creek Watershed Study, this area has been identified for a flood mitigation project. A conceptual study of the area is complete and design plans are currently being prepared. The conceptual study indicates that the 100-year flood would inundate nine residential structures in this area (see Area #12 - Redstone Drive area for additional information).

2D hydraulic modeling was used to determine the areas of inundation for multiple storm events and several alternatives were evaluated. It was determined that the Doty Lane problem area was caused entirely by flooding from Sublett Creek and no construction project was feasible for eliminating the flood risk in this area. Purchase of 6 homes is proposed. In the Hollow Creek area, the recommended solution is to install a system adjacent to the existing channel to provide additional capacity.

Construction plans are currently being prepared for this project and a Flood Hazard Mitigation Grant has been submitted to FEMA for both the home buyouts and the construction project. A response to the grant application is anticipated mid-2016. If the grant is received, home buyouts will proceed immediately and construction of the improvements is planned for 2018. If the grant is not received, funding will be programmed into the Stormwater Capital Budget with buyouts occurring as funding is available in 2016 and 2017 and the construction project anticipated for 2019. The funding source is the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/goods above the flooding depth.

Area #3 – Inwood Drive/Meadow Lane

Building Data Collection/Problem Statement

The Inwood Drive/Meadow Lane area is generally located east of S. Center Street between Park Row and Pioneer Parkway in central Arlington. This area is comprised of single-family homes along JC-2 which is a tributary to Johnson Creek.

The homes were constructed in the 1950s and early 1960s and are valued between $50,000 and $150,000. There are 13 homes in this area and they are generally masonry with a couple of wood frame homes. Six of the homes were rated as "good" and seven were rated as "fair".

All of the lots are located within the 100-year (Zone AE) floodplain and all are subject to flooding from JC-2. Seven of the 13 lots have reported a drainage concern and there are also erosion concerns in the area.

As of November 30, 2015 there are 2 repetitive loss properties in this area that have made a total of 7 claims for a total of $61,226 since 1977. A majority of the claims were in 1981, 1995, 2001, and 2015.

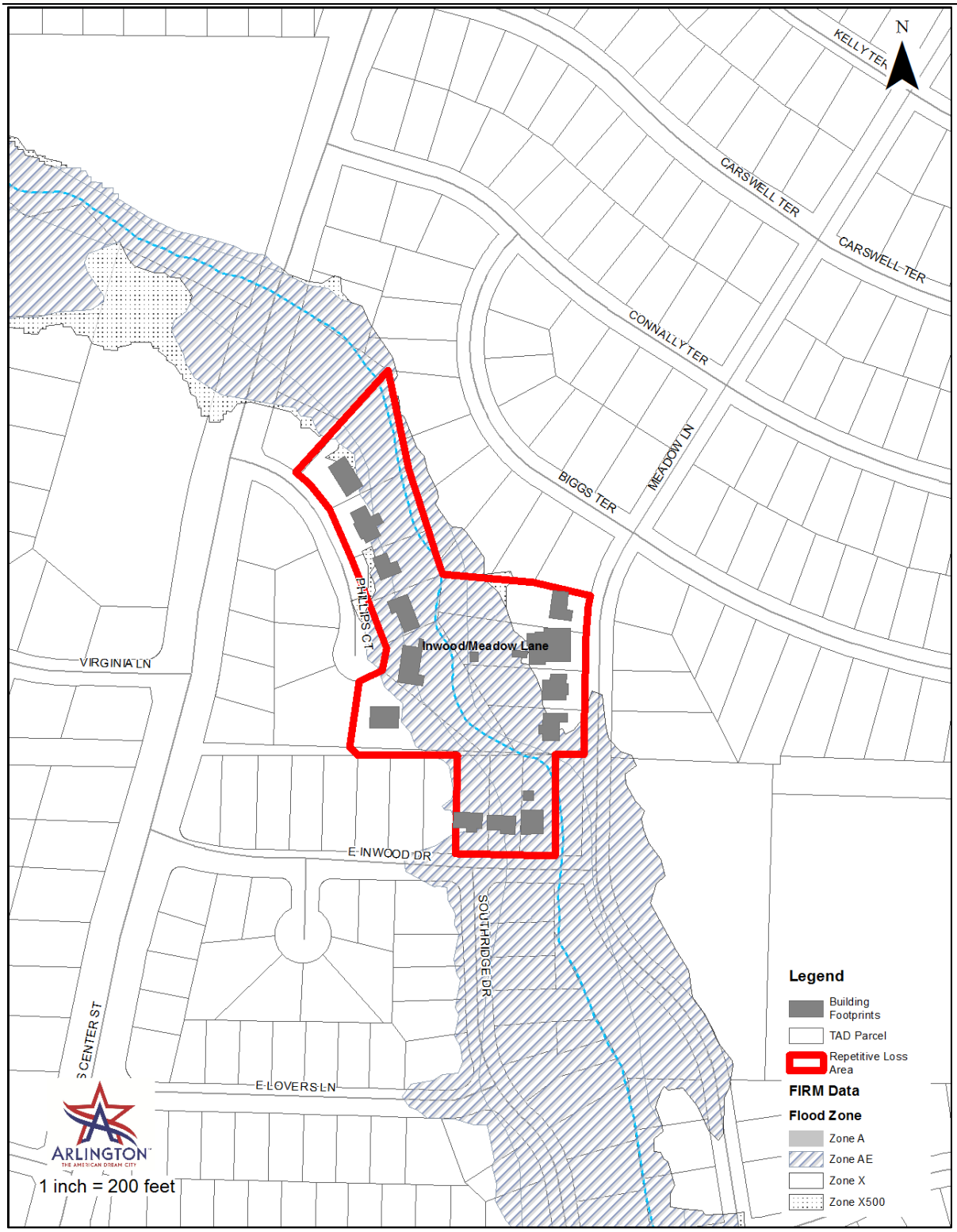


Figure 9 Area #3 Inwood Drive/Meadow Lane RLA

Table 13 Area #3 Inwood Dr./Meadow Lane On-Site Survey Data

Area #3 - INWOOD/MEADOW LANE		
Total Properties	13	
Properties with Structure	13	
Vacant	0	
Foundation Type	13	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	11	Masonry
	2	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	6	Good (optional minor repairs)
	7	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	10	1
	3	2
Height Above Street	0	Below Street Grade
	5	At Street Grade
	2	0 - 1 Feet
	6	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	13	At Grade
	0	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	10	None visible
	2	Carport
	0	Detached Garage
	0	Deck
	2	Shed
	0	Other
Likely Areas of Damage on Property	2	Water in Primary Structure
	1	Damage to Appurtenant Structure
	2	Yard Flooded
	2	Damage to HVAC Unit
	6	Cannot Tell
		Other
Presence of HVAC Units that Would be Vulnerable	2	Yes
	0	No
	11	Unknown
Drainage Complaints on File	7	

Review Alternative Mitigation Approaches – Inwood Dr./Meadow Ln.

Storm events in May and June of 2015 flooded several homes in this area. Six of the homes in the Inwood Dr./Meadow Ln. area reported flooding and were substantially damaged. Two of the six have agreed to a city-funded voluntary buyout and have been purchased. The remaining four have been included in a Flood Hazard Mitigation Grant package which has been submitted to FEMA. If the grant is received, home purchases will occur in 2016. If the grant is not received, funding will be programed into a future Stormwater Capital Budget.

Flooding in the area is severe and a flood mitigation/construction project is not feasible, so buyouts in this area have been determined to be the best option.

The funding source is the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #4 – Peyco Industrial Park

Building Data Collection/Problem Statement

The Peyco Industrial Park area is generally located west of S. Cooper Street and south of Eden Rd. in south Arlington. This area is comprised of light industrial buildings along Upper Rush Creek.

Peyco Industrial Park developed in the early 1970s and the combined 2012 value of the six buildings in the area is approximately $7,000,000 (based on data in Rush Creek Watershed Study, 2012). Individual property values range from $300,000 to over $3,000,000. All of the buildings in the area are tilt wall construction and the condition rating for all buildings is "good".

Six light industrial warehouses are subject to structural flooding for events up to the 1% annual probability event. Of these, two are subject to flooding during the 4% annual probability event, and one is subject to flooding during the 10% annual probability event. The industrial park encroaches into the floodway of Upper Rush Creek, with paved areas extending to and encroaching the natural banks of the channel. The buildings have a history of significant repetitive flood losses, and there was a flood related fatality in 2004.

As of November 30, 2015 there are 2 repetitive loss properties in this area that have made 6 claims for a total of $762,035 since 1977. The average flood claim ranges between these two properties from $41,927 to $297,163. A majority of the claims occurred in 2004, 2006, and 2010.

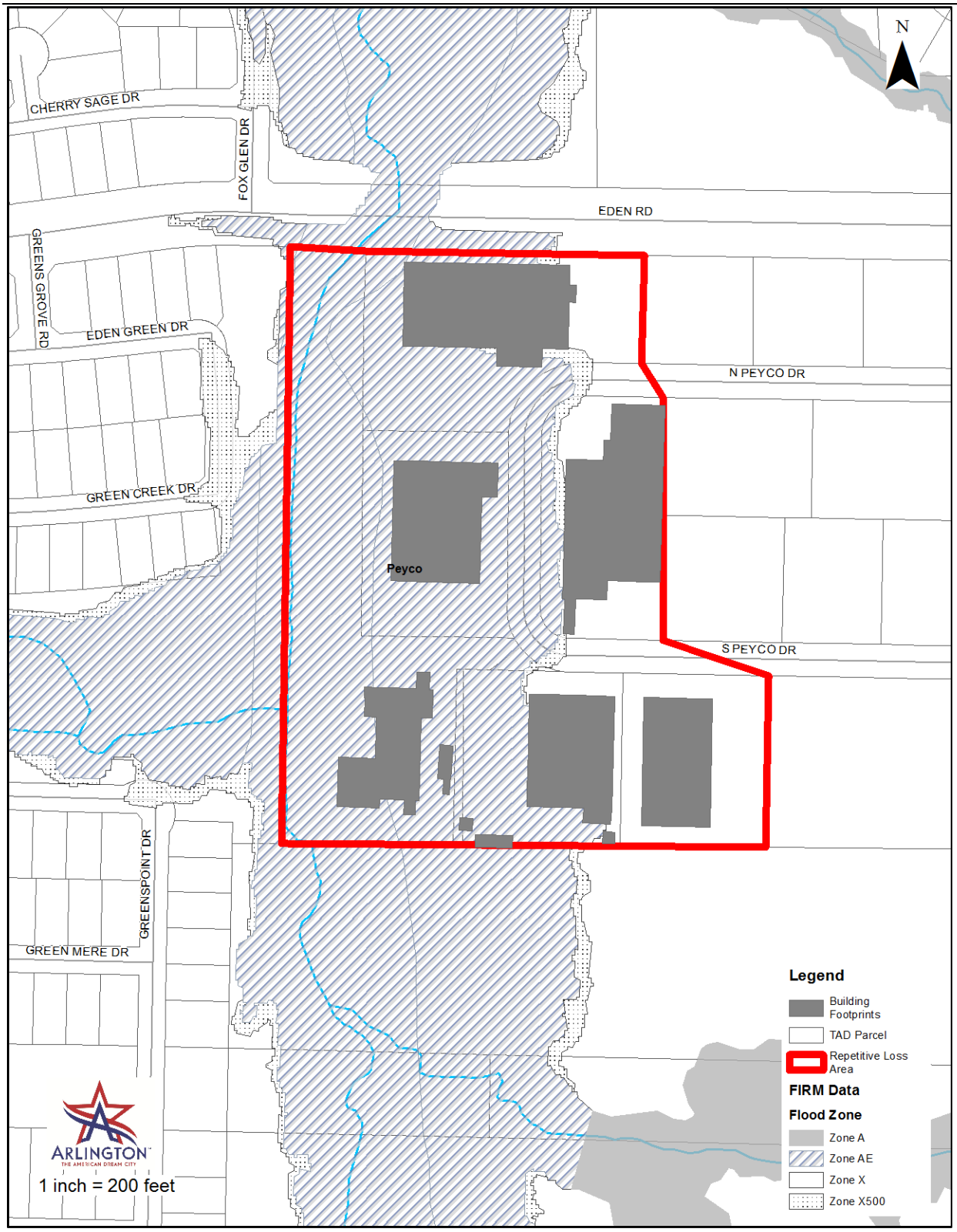


Figure 10 Area #4 Peyco Industrial Park RLA

Table 14 Area #4 Peyco Industrial Park On-Site Survey Data

Area #4 - PEYCO		
Total Properties	6	
Properties with Structure	6	
Vacant	0	
Foundation Type	6	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	0	Masonry
	0	Wood Frame
	6	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	6	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	6	1
	0	2
Height Above Street	0	Below Street Grade
	1	At Street Grade
	0	0 - 1 Feet
	1	1 - 2 Feet
	1	2 - 3 Feet
	3	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	3	At Grade
	2	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	6	None visible
	0	Carport
	0	Detached Garage
	0	Deck
	0	Shed
	2	Other
Likely Areas of Damage on Property	2	Water in Primary Structure
	0	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	4	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	6	Yes
	0	No
	0	Unknown
Drainage Complaints on File	1	

Review Alternative Mitigation Approaches – Peyco Industrial Park

This area was identified in the Rush Creek Watershed Study as a potential project area. The study indicates that the 100-year flood would inundated the six light industrial structures. The study proposes two options:

Option 1: Rush Creek Study Recommended Alternative. Buyout and demolition of one light industrial building. This plan also calls for the removal of all paving on site and regrading the acquired property in a manner to restore a portion of the channel and adjacent floodplain. This includes the installation and establishment of vegetation in the restored area.

Option 2: Complete Solution Alternative. Buyout of all six light industrial warehouses and the restoration of a portion of the floodplain.

The funding source for either option is the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing commercial and industrial structures by installing shields over doors or windows.
- Wet floodproofing commercial and industrial structures.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #5 – Hidden Oaks Lane

Building Data Collection/Problem Statement

The Hidden Oaks Lane area is generally located south of SW Green Oaks Blvd. south of IH20 and northeast of SH287. This area is comprised of single-family homes along Kee Branch which is a tributary of Rush Creek.

Homes in this area were generally constructed in the 1970s and are valued between $150,000 and $300,000. There are three homes that have been constructed since the 1970s and are valued between $300,000 and $600,000. Redevelopment and infill development are occurring in this area. Most of the homes in this area are masonry and the condition rating for all homes is "good".

While there have been flood insurance claims in this area, the drainage concerns in this area have been mostly related to creek maintenance and erosion. This area is flat and the floodplain associated with Kee Branch leads to broad, shallow flooding.

As of November 30, 2015 there is one severe repetitive loss property located in this area that has made 5 claims for a total of $231,351 since 1977. The average RL flood claim is $46,723. A majority of the claims occurred between 1090 and 1991 with the most recent in 2010. Additionally there have been 5 flood insurance claims in this repetitive loss area at other properties. Most claims occurred in the early 1990s, while the most recent were in 2010.

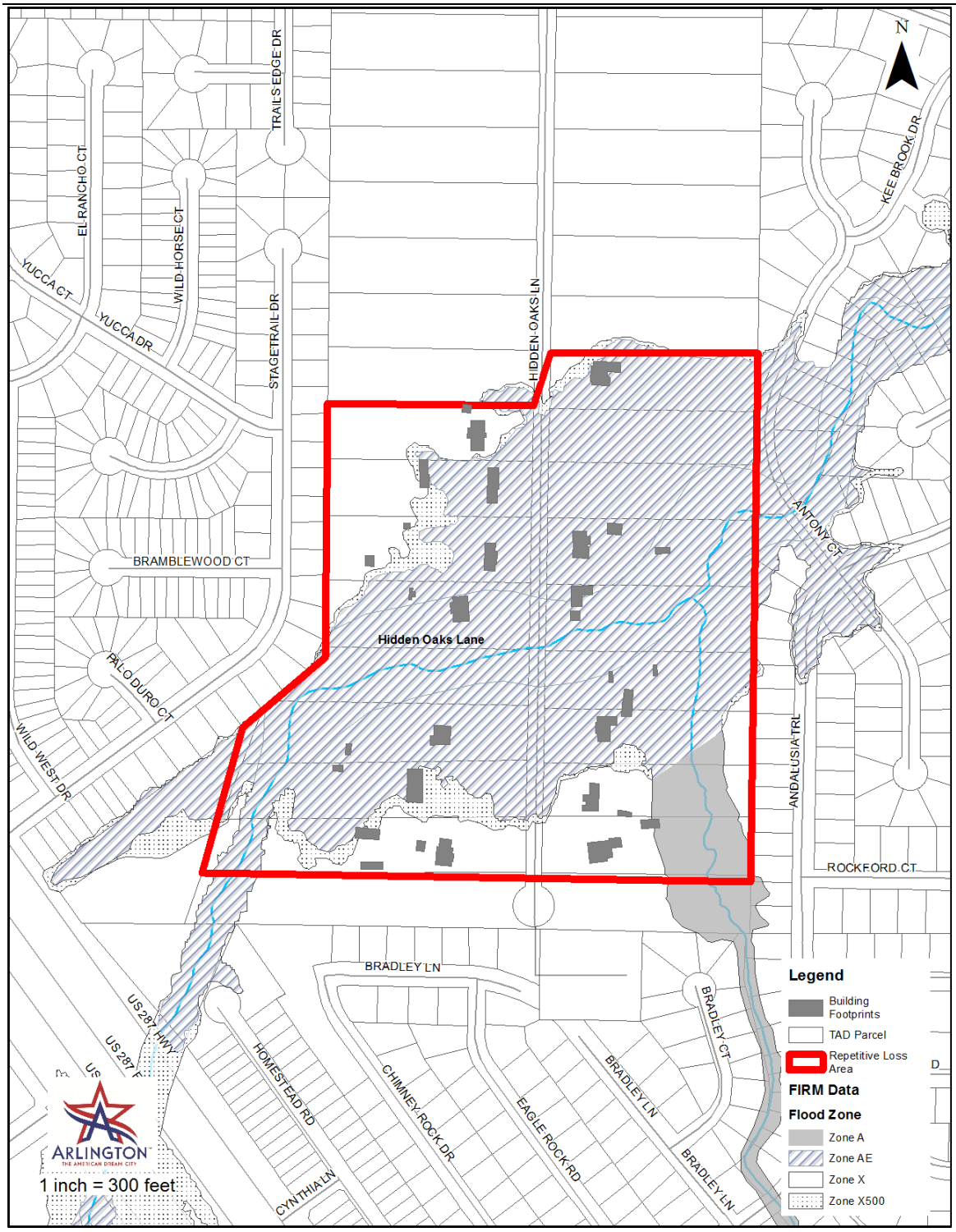


Figure 11 Area #5 Hidden Oaks Lane RLA

Table 15 Area #5 Hidden Oaks Lane On-Site Survey Data

Area #5 - HIDDEN OAKS		
Total Properties	17	
Properties with Structure	14	
Vacant	3	
Foundation Type	14	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	10	Masonry
	3	Wood Frame
	0	Tilt Wall
	0	Stucco
	1	Other
	0	Combination
Structure Condition	14	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	11	1
	3	2
Height Above Street	3	Below Street Grade
	7	At Street Grade
	2	0 - 1 Feet
	0	1 - 2 Feet
	1	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	14	At Grade
	0	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	6	None visible
	2	Carport
	3	Detached Garage
	0	Deck
	5	Shed
	0	Other
Likely Areas of Damage on Property	0	Water in Primary Structure
	2	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	11	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	4	Yes
	0	No
	9	Unknown
Drainage Complaints on File	5	

Review Alternative Mitigation Approaches – Hidden Oaks Lane

Flooding between SH287 and IH-20 was identified as a problem area in the Rush Creek Watershed Study. This area is included in that problem area, but was identified as a potential location for small regional detention ponds to alleviate flooding downstream. This would have the benefit of removing the flood prone properties from the floodplain and alleviating additional flooding downstream. The conceptual plan includes the removal of nine homes on the west side of Hidden Oaks Lane.

This project will be evaluated with the City's annual Capital Improvement program in the future. The potential for this project is uncertain due to the cost and the limited protection it provides downstream.

If a project is determined to be feasible, the funding source will be the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct engineered barrier, berms, or floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #6 – Green Oaks Blvd

Building Data Collection/Problem Statement

The Green Oaks Blvd area is generally located north of SW Green Oaks Blvd. and west of Bowen Rd. This area is comprised of single-family homes along Rush Creek.

Homes in this area were constructed between 1969 and 1976 and are valued from the low $200,000s to low $300,000s. There is significant erosion on Rush Creek in this area which is threatening two of the homes. The homes in this area are classified as “fair” or “poor”.

As of November 30, 2015 there is one repetitive loss property in this area that has made 4 claims for a total of $141,053 since 1977. The average flood claim is $35,263. A majority of the flood claims occurred in 2004, 2006, and 2010.

The repetitive loss claims for this area are related to an accessory structure. The structure has been removed. Three properties in this area have reported drainage concerns. All of the concerns are related to erosion along the creek.

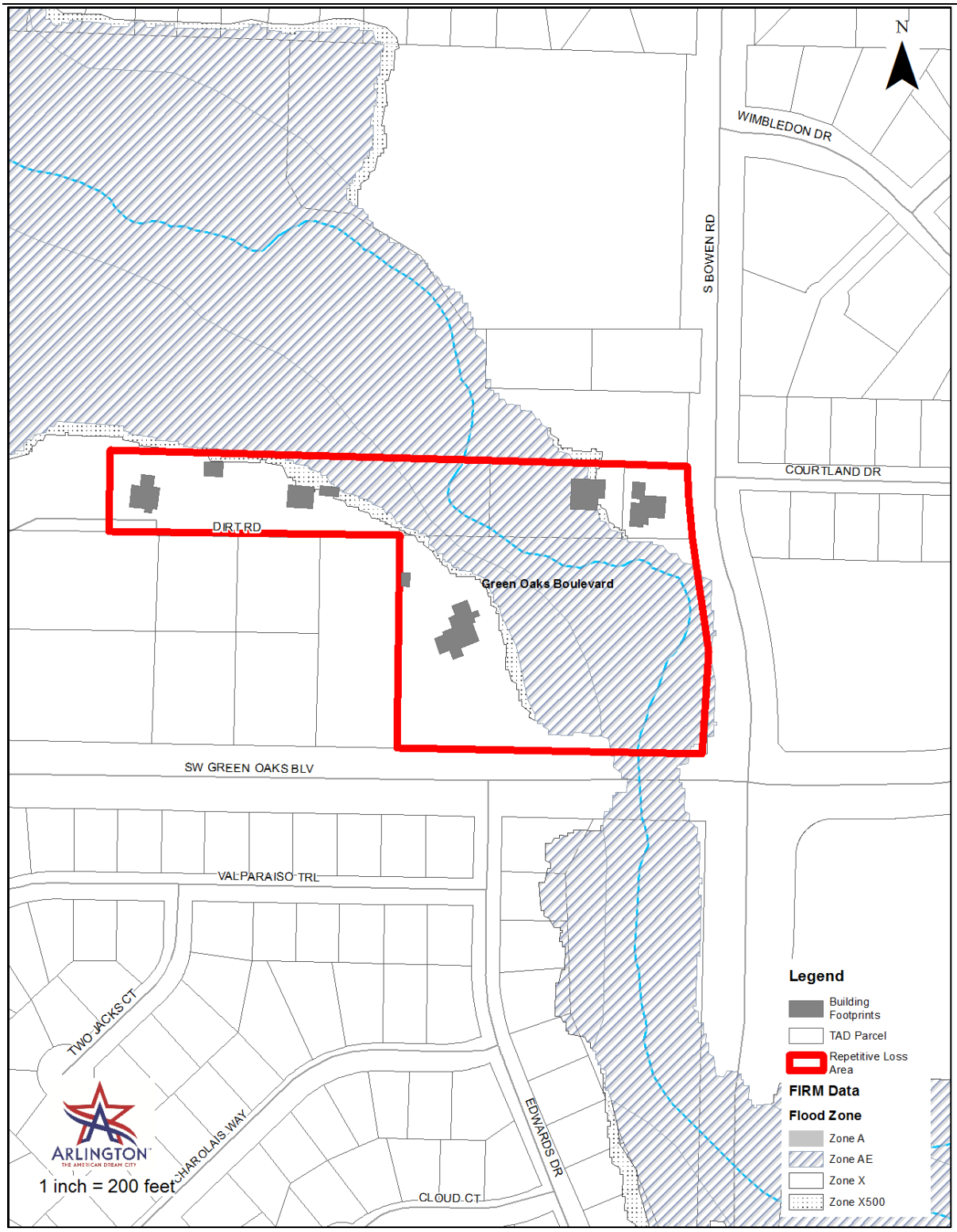


Figure 12 Area #6 Green Oaks Blvd RLA

Table 16 Area #6 Green Oaks Blvd. On-Site Survey Data

Area #6 - GREEN OAKS		
Total Properties	4	
Properties with Structure	4	
Vacant	0	
Foundation Type	4	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	2	Masonry
	1	Wood Frame
	0	Tilt Wall
	0	Stucco
	1	Other
	0	Combination
Structure Condition	0	Good (optional minor repairs)
	3	Fair (needs minor repairs)
	1	Poor (needs significant repairs
Number of Stories	1	1
	3	2
Height Above Street	3	Below Street Grade
	1	At Street Grade
	0	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	1	At Grade
	3	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	0	None visible
	0	Carport
	1	Detached Garage
	2	Deck
	1	Shed
	0	Other
Likely Areas of Damage on Property	2	Water in Primary Structure
	2	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	0	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	4	Yes
	0	No
	0	Unknown
Drainage Complaints on File	3	

Review Alternative Mitigation Approaches – Green Oaks Blvd.

As stated above, this area is a Repetitive Loss Area due to claims on an accessory structure on one lot. The last claim was dated 2010 and the structure was removed in 2011 at the owner's option. Flooding in this area has been mitigated. There are erosion problems associated with the creek and the City has retained a consulting engineer to evaluate the erosion to ensure that the structural integrity of Bowen Rd. is intact. The City will take appropriate action upon completion of the evaluation.

Other Potential Mitigation Measures

- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Consider expanding riparian impervious surface setbacks.
- Promote the purchase of flood insurance in the area.

Area #7 – Westhaven Road

Building Data Collection/Problem Statement

The Westhaven Road area is generally located between SW Green Oaks Blvd. and W. Bardin Road and between Park Springs Blvd. and S. Bowen Rd. This area is comprised of single-family homes along Rush Creek. Homes along Flintridge Dr., Jerry Ln., Caliente Ct., and Churchill Ct. are located on lots between ¼ and 1/3 acre in size. Homes along Westhaven Rd. are larger, between 2 and 4 acres. These homes are located along a Zone A tributary of Rush Creek.

Most of the homes in this area were constructed in the mid 1980s and are valued around $200,000. There are a few outliers which were constructed in the 1960s or 1990s and are valued in the low $100,000s or over $400,000. Most of the homes in this area were given a condition classification of "good".

Eight properties have reported drainage concerns in this area. Most of them have been either erosion or creek maintenance related. One of the repetitive loss properties floods due to lot to lot drainage. The other floods related to the convergence of the tributary with the main stem of Rush Creek.

As of November 30, 2015 there are 2 repetitive loss properties in this area that have made 5 claims for a total of $286,919 since 1977. The average flood claim ranges from $19,628 to $82, 554. A majority of the flood claims occurred in 2004 and 2007.

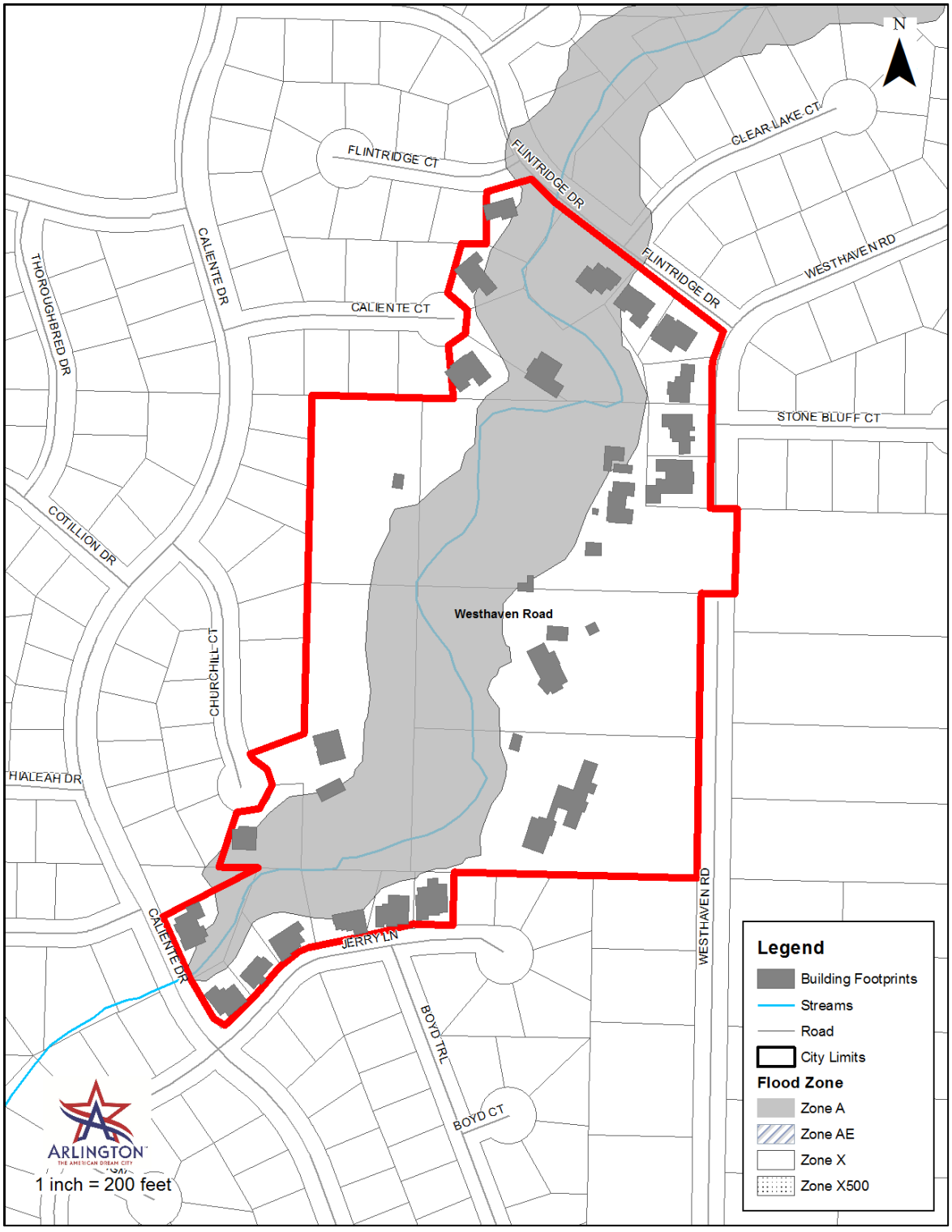


Figure 13 Area #7 Westhaven Road RLA

Table 17 Area #7 Westhaven Rd. On-Site Survey Data

Area #7 - WESTHAVEN		
Total Properties	23	
Properties with Structure	23	
Vacant	0	
Foundation Type	23	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	22	Masonry
	1	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	22	Good (optional minor repairs)
	1	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	14	1
	8	2
Height Above Street	13	Below Street Grade
	3	At Street Grade
	6	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	16	At Grade
	5	0 - 1 Feet
	0	1 - 2 Feet
	2	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	13	None visible
	0	Carport
	0	Detached Garage
	2	Deck
	4	Shed
	4	Other
Likely Areas of Damage on Property	3	Water in Primary Structure
	5	Damage to Appurtenant Structure
	0	Yard Flooded
	1	Damage to HVAC Unit
	14	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	20	Yes
	0	No
	3	Unknown
Drainage Complaints on File	8	

Review Alternative Mitigation Approaches – Westhaven Rd.

The two Repetitive Loss properties in this area are not adjacent to each other, nor are the flood sources related.

One property is flooding related to lot to lot issues. City staff has met with this homeowner and recommended lot grading solutions.

Flooding on the other property is related to the proximity to the Rush Creek floodway and it's convergence with a tributary. This homeowner has constructed a floodwall and no recent complaints have been received, nor have any claims been filed recently. We will monitor flooding on this property. If we receive subsequent complaints or claims, then we will consider it for inclusion in the City's flood mitigation buyout program.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct engineered barrier, berms, or floodwalls to protect structure from shallow overland flow.
- Consider expanding riparian impervious surface setbacks within the area.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #8 – Abram St./Overhill

Building Data Collection/Problem Statement

The Abram St./Overhill area is generally located along Abram St. between Collins St. and Stadium Drive. This area is comprised of commercial and light industrial buildings and single-family homes within the 100-year floodplain of Johnson Creek (Zone AE).

Buildings along Gay St. were constructed between 1956 and 1966 and are generally valued between $100,000 and $250,000. The use of the buildings is commercial and light industrial.

Buildings along E. Abram St. are larger and more intense commercial uses. They were constructed in 1951, 1983 and 1999 and are valued between $200,000 and $1.2M.

Homes along Meadowbrook, Overhill, and Ruth were constructed in the 1950s and are valued between $75,000 and $100,000. Most of them are on pier and beam foundations and vary between masonry and wood frame.

Five properties have reported drainage concerns in this area. The concerns vary from street related to lot to lot drainage issues. Most are private property issues that have been addressed through coordination with adjacent property owners. One is related to flows coming from Abram Street. This will be addressed through the Abram Street rebuild which is currently occurring.

As of November 30, 2015 there are 4 repetitive loss properties in this area that have made 8 claims for a total of $130,805. Two repetitive loss properties have been purchased and demolished by the City of Arlington and are considered to be mitigated. The average flood claim for the repetitive loss property ranges from $3,297 to $25,681. A majority of the flood claims occurred in 1995.

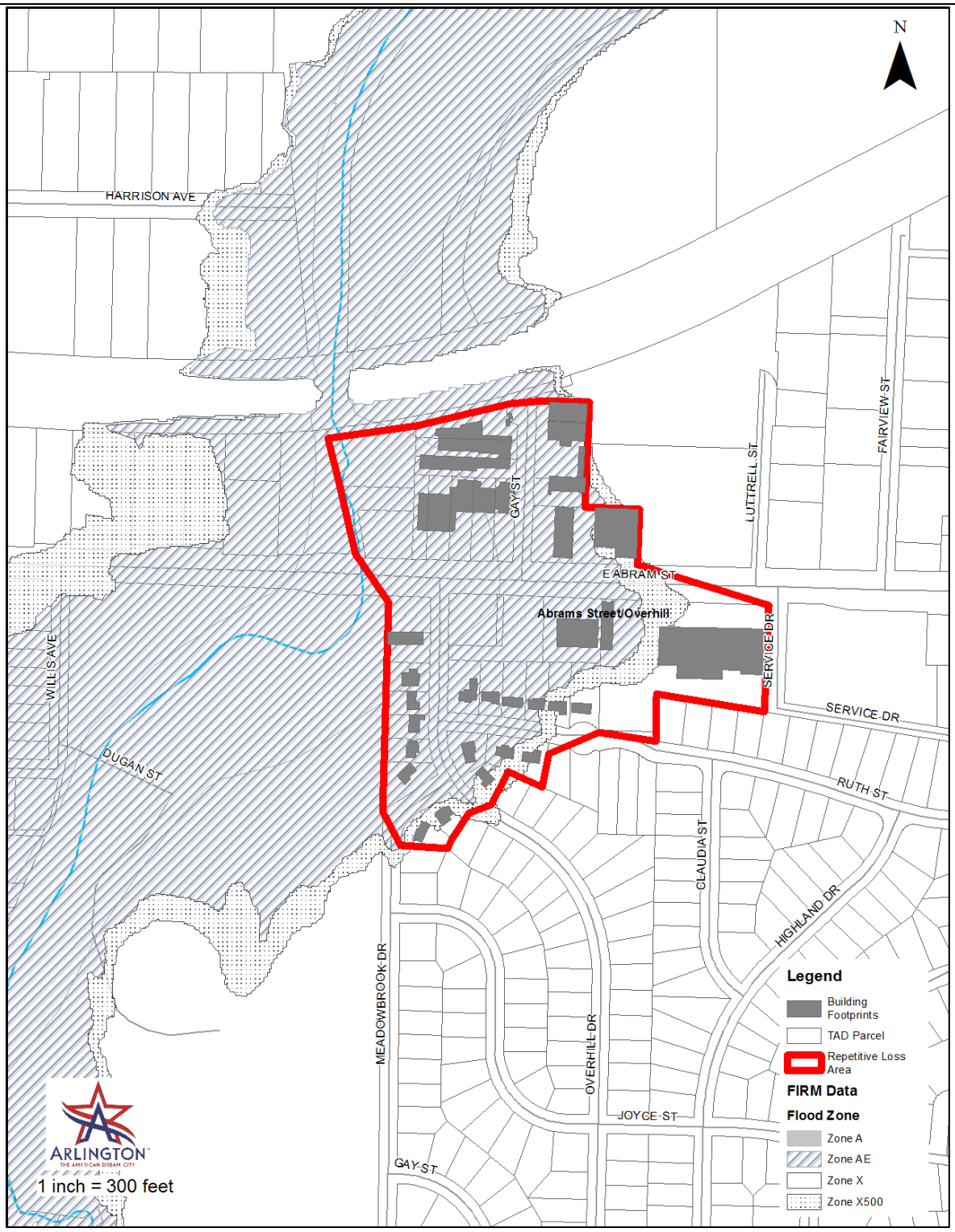


Figure 14 Area #8 Abram St/Overhill RLA

Table 18 Area #8 Abram St./Overhill. On-Site Survey Data

Area #8 - Abram St./Overhill		
Total Properties	31	
Properties with Structure	30	
Vacant	1	
Foundation Type	13	Slab-on-Grade
	17	Pier and Beam with Crawlspace
Structure Type	21	Masonry
	6	Wood Frame
	1	Tilt Wall
	2	Metal
	0	Stucco
	0	Other
	0	Combination
Structure Condition	6	Good (optional minor repairs)
	24	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	29	1
	1	2
Height Above Street	0	Below Street Grade
	3	At Street Grade
	20	0 - 1 Feet
	3	1 - 2 Feet
	2	2 - 3 Feet
	1	3 - 4 Feet
	1	> 4 Feet
Height Above Site Grade	13	At Grade
	17	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	18	None visible
	2	Carport
	1	Detached Garage
	0	Deck
	9	Shed
	0	Other
Likely Areas of Damage on Property	7	Water in Primary Structure
	1	Damage to Appurtenant Structure
	2	Yard Flooded
	1	Damage to HVAC Unit
	19	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	14	Yes
	0	No
	15	Unknown
Drainage Complaints on File	5	

Review Alternative Mitigation Approaches – Abram St./Overhill

There are two repetitive loss properties in this area. Drainage from E. Abram Street reportedly enters the property and causes flooding. E. Abram Street will be reconstructed in 2016 – 2017. These areas have been evaluated and reconstruction of E. Abram will alleviate some of the flooding concerns. The city will continue to utilize voluntary property acquisition for the properties that are substantially damaged or substantially improved. The acquired properties will be incorporated into the Johnson Creek Linear Park corridor that is managed by the Parks and Recreation Department.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Elevate structures that are on pier and beam foundation to be above the base flood elevation.
- Consider expanding riparian impervious surface setbacks within the area.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Wet floodproofing remaining commercial structures.
- Wet floodproofing residential structures with pier and beam foundations and crawlspaces.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #9 – Betsy Ross Drive

Building Data Collection/Problem Statement

The Betsy Ross Drive area is generally located between Sublett Road and Eden Road and between Matlock Road and Silo Road. This area is comprised of single-family homes within the 100-year (Zone AE) floodplain of Lynn Creek .

The homes in this area were constructed in the mid 1980s and are valued around $90,000 and $130,000. The homes are predominantly slab-on-grade with masonry exteriors. All of the homes were classified as being in “good” condition.

There are three properties that have reported drainage concerns in this area. Two of the three reported structural flooding and all mentioned the maintenance condition of the creek as a concern.

As of November 30, 2015 there is one repetitive loss property in this area that has made 3 claims for a total of $11,564 since 1977. The average flood claim is $5,782.

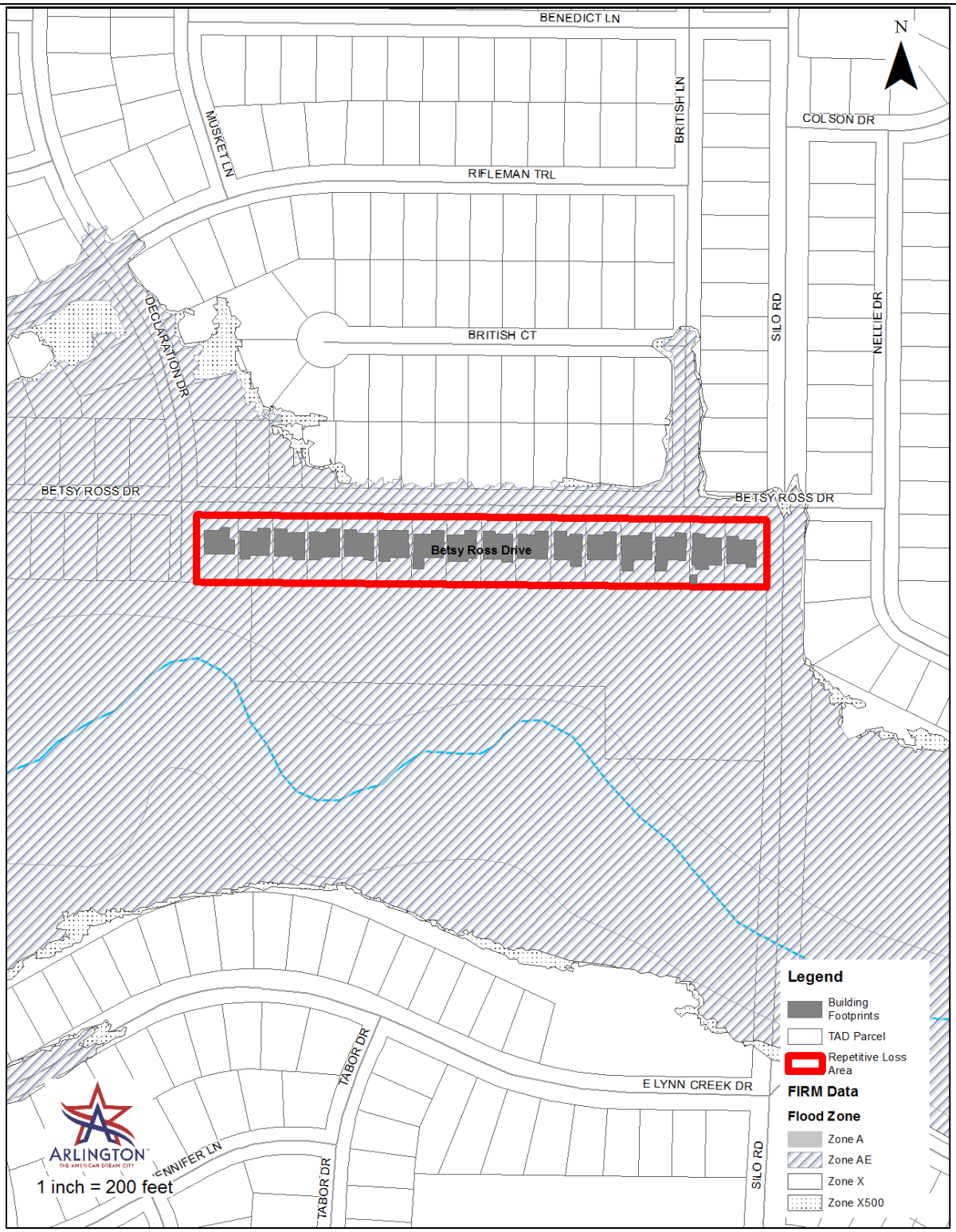


Figure 15 Area #9 Betsy Ross Drive RLA

Table 19 Area #9 Betsy Ross Drive On-Site Survey Data

Area #9 - Betsy Ross Drive		
Total Properties	16	
Properties with Structure	16	
Vacant	0	
Foundation Type	16	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	16	Masonry
	0	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	16	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	16	1
	0	2
Height Above Street	0	Below Street Grade
	1	At Street Grade
	11	0 - 1 Feet
	2	1 - 2 Feet
	2	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	15	At Grade
	1	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	13	None visible
	0	Carport
	0	Detached Garage
	0	Deck
	3	Shed
	0	Other
Likely Areas of Damage on Property	0	Water in Primary Structure
	0	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	16	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	15	Yes
	0	No
	1	Unknown
Drainage Complaints on File	4	

Review Alternative Mitigation Approaches – Betsy Ross Drive

A comprehensive watershed study for Lynn Creek is preliminarily scheduled to begin in 2017. The study will include an evaluation of problem areas and recommendations for solutions.

The vacant property within the floodplain is currently a City park. The Parks Department is aware of concerns in this area. This area is classified as a wetland, so there are limited major maintenance options. The City periodically removes trash in the area and checks adjacent roadway crossings for debris that could block the drainage.

The funding source for any alternatives identified will be the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct engineered barrier, berms, or floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #10 – Willow Oak Lane

Building Data Collection/Problem Statement

The Willow Oak Lane area is generally located south of Harris Road and west of S. Cooper Street. This area is comprised of single-family homes along Upper Rush Creek. Seven of the ten properties in this area are located within the 100-year floodplain (Zone AE).

The homes in this area were constructed in the 1970s and 19802 and are valued between $150,000 and $250,000. The structures are predominantly slab-on-grade with masonry exteriors. The condition classification for all of the homes in this area was "good". Willow Oak Ln. is a county-type road with bar ditches on either side.

Seven properties have reported drainage concerns in this area. The problems reported are either related to ditch grading and driveway culverts or the floodway crossing the roadway and causing flooding and access issues.

As of November 30, 2015, there is one repetitive loss property in this area that has made 2 claims for a total of $8,854 since 1977. The claims occurred in 2006 and 2015.

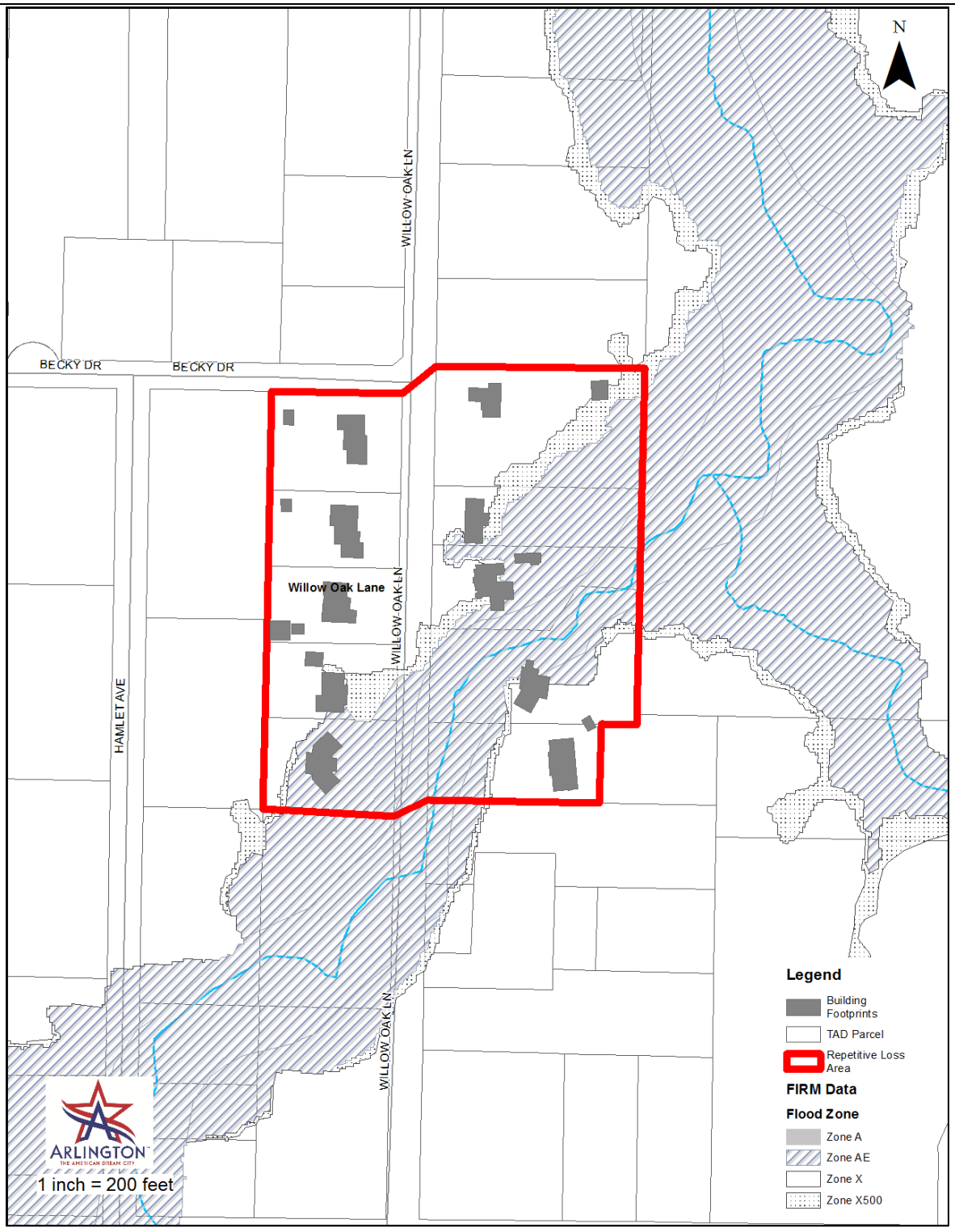


Figure 16 Area #10 Willow Oak Lane RLA

Table 20 Area #10 Willow Oak Lane On-Site Survey Data

Area #10 - WILLOW OAK		
Total Properties	10*	
Properties with Structure	10	
Vacant	0	
Foundation Type	9	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	9	Masonry
	0	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	9	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	8	1
	1	2
Height Above Street	2	Below Street Grade
	3	At Street Grade
	3	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	5	At Grade
	4	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	6	None visible
	1	Carport
	1	Detached Garage
	0	Deck
	0	Shed
	1	Other
Likely Areas of Damage on Property	7	Water in Primary Structure
	1	Damage to Appurtenant Structure
	1	Yard Flooded
	0	Damage to HVAC Unit
	1	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	1	Yes
	1	No
	7	Unknown
Drainage Complaints on File	7	

* One structure was not visible from the road, so data not provided.

Review Alternative Mitigation Approaches – Willow Oak Lane

As mentioned previously, reported flooding in the area is either related to bar ditch grading and driveways or the floodway crossing the roadway. This area is included on the City's Capital Improvement Plan and is preliminarily included for conceptual design in 2017 and design in 2018. Funding for construction has not been scheduled at this time, but will likely be in 2019 or 2020.

The funding source for this project is the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Consider expanding riparian impervious surface setbacks within the area.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct engineered barrier, berms, or floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #11 – Parkchester Drive

Building Data Collection/Problem Statement

The Parkchester Drive area is generally located north of California Ln. between Bowen Road and S. Cooper St. This area is comprised of duplexes and fourplexes. These homes are located outside of a Special Flood Hazard Area. There is a concrete channel that runs along the north side of this area that conveys flow from the south and east to the west toward Rush Creek.

The homes in this area were constructed in the late 1970s and are valued between $50,000 and $150,000. Approximately half the homes were given a condition classification of "good" and the other half were given a classification of "fair".

Four properties have reported drainage concerns in this area. The area is extremely flat, there is limited storm drain, and the channel is undersized.

As of November 30, 2015 there is one repetitive loss property in this area that has made 2 claims for a total of $4,535 since 1977. The average flood claim is $2,268. The flood claims occurred in 1989 and 1991.

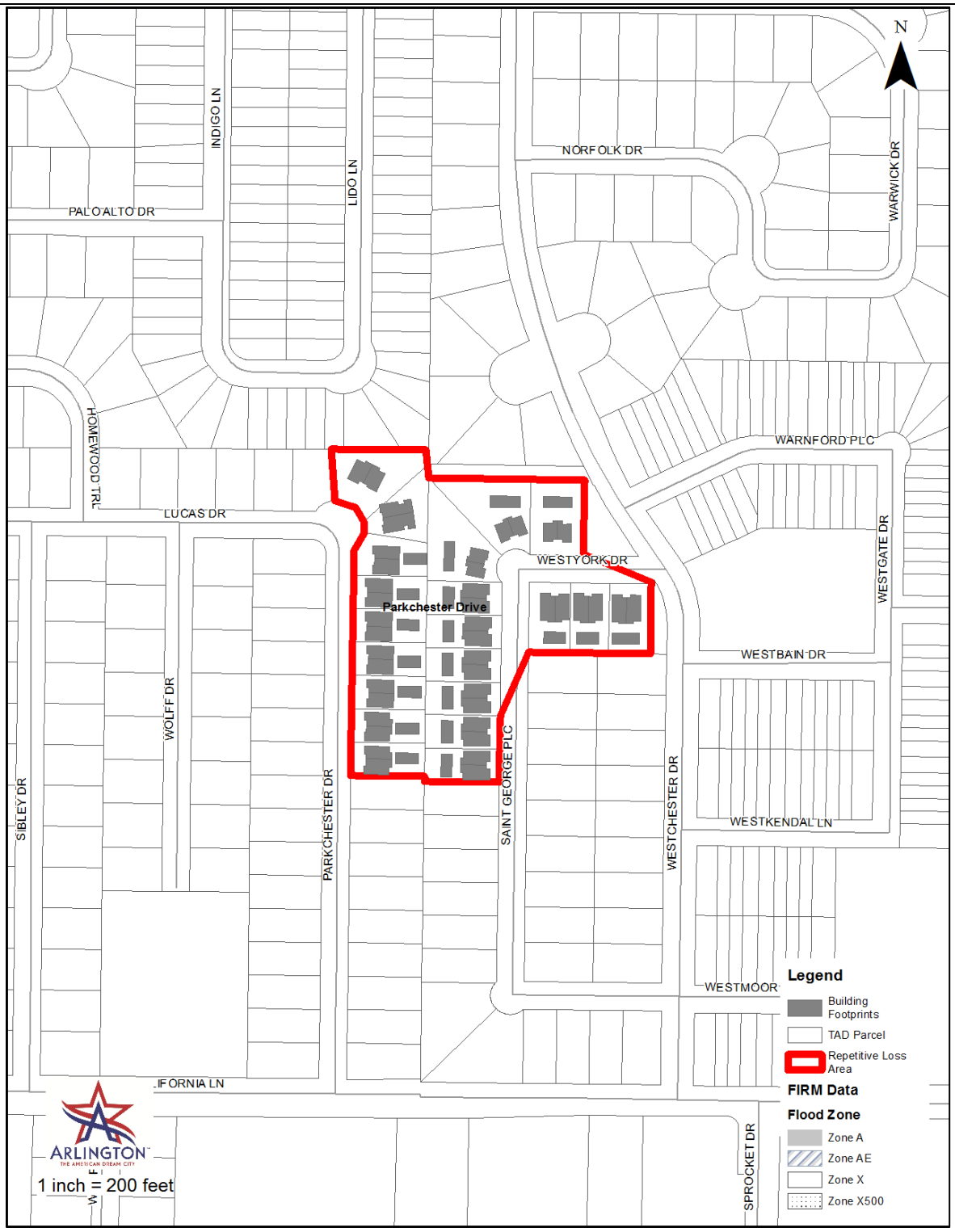


Figure 17 Area #11 Parkchester Drive RLA

Table 21 Area #11 Parkchester Drive On-Site Survey Data

Area #11 - Parkchester		
Total Properties	23	
Properties with Structure	23	
Vacant	0	
Foundation Type	23	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	14	Masonry
	0	Wood Frame
	0	Tilt Wall
	9	Stucco
	0	Other
	0	Combination
Structure Condition	10	Good (optional minor repairs)
	13	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	20	1
	3	2
Height Above Street	0	Below Street Grade
	2	At Street Grade
	18	0 - 1 Feet
	1	1 - 2 Feet
	1	2 - 3 Feet
	1	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	9	At Grade
	14	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	7	None visible
	13	Carport
	1	Detached Garage
	0	Deck
	2	Shed
	0	Other
Likely Areas of Damage on Property	7	Water in Primary Structure
	0	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	16	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	11	Yes
	0	No
	12	Unknown
Drainage Complaints on File	4	

Review Alternative Mitigation Approaches – Parkchester Drive

As mentioned above, flooding occurs due to the flat topography, limited storm drain, and undersized concrete channel. The city has recently completed a study of this area. A 2D analysis was performed and shows that much of the area is inundated in the 5-year storm event.

Option 1: Flood Mitigation Construction Project – The study generated five different alternatives for construction projects to alleviate the flooding. Four of the alternatives protected homes from the 25-year event. The fifth alternative protected homes from the 5-year event which was deemed unacceptable due to the low level of protection. Cost estimates for the 25-year design ranged from $7,162,000 to $8,214,000. The solutions involved various combinations of an extensive storm drain system throughout the neighborhood, parallel storm drain to the channel, enlarging the channel, or stormwater detention. These solutions have been placed on hold due to the cost-benefit ratio and funding limitations.

Option 2: Buyout of the Repetitive Loss Property – The homeowner of the repetitive loss property has recently contacted the city regarding the design and potential for alleviating the flooding. The City is currently discussing the potential for a buyout using city funds. Use of City funds rather than a grant could allow future redevelopment of the property upon construction of the drainage improvements. It will likely be many years before funding of the construction project is available. The purchase of the home would be a relatively inexpensive solution.

The funding source for either option will be the Stormwater Utility Fee.

Other Potential Mitigation Measures

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct engineered barrier, berms, or floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Area #12 – Redstone Drive

Building Data Collection/Problem Statement

The Redstone Drive area is generally located south of W. Sublett Road between Park Springs Blvd. and Calender Rd in Southwest Arlington. This area is comprised of single-family homes, most of which are not located in a Special Flood Hazard Area. Three lots to the south of Redstone Drive are located in the 100-year floodplain of Sublett Creek which is a tributary to Rush Creek.

The homes in this area were constructed in the late 1980s. Homes along Suffolk Drive are on less than ¼ acre lots and are valued in the mid-$100,000s. Homes along Redstone are on larger (between one and three acre lots) and are valued between $180,000 and $330,000. Suffolk Drive is a curb and gutter roadway and Redstone Drive is a county-type roadway with bar ditches. All of the homes in this area were given a condition classification of "good".

Eight properties have reported drainage concerns in this area. Complaints to the west of Suffolk Drive are related to drainage from the west as well as lot to lot issues from north to south flow. Complaints on the east side of Suffolk Drive are related to the condition of a storm drain pipe that runs to the rear of the lots. Complaints to the south side of Redstone are related to the condition of an existing earthen channel.

As of November 30, 2015 there is one repetitive loss property in this area that has made 2 claims for a total of $24,303 since 1977. The average flood claim is $12,151. The flood insurance claims occurred in 2004 and 2006.

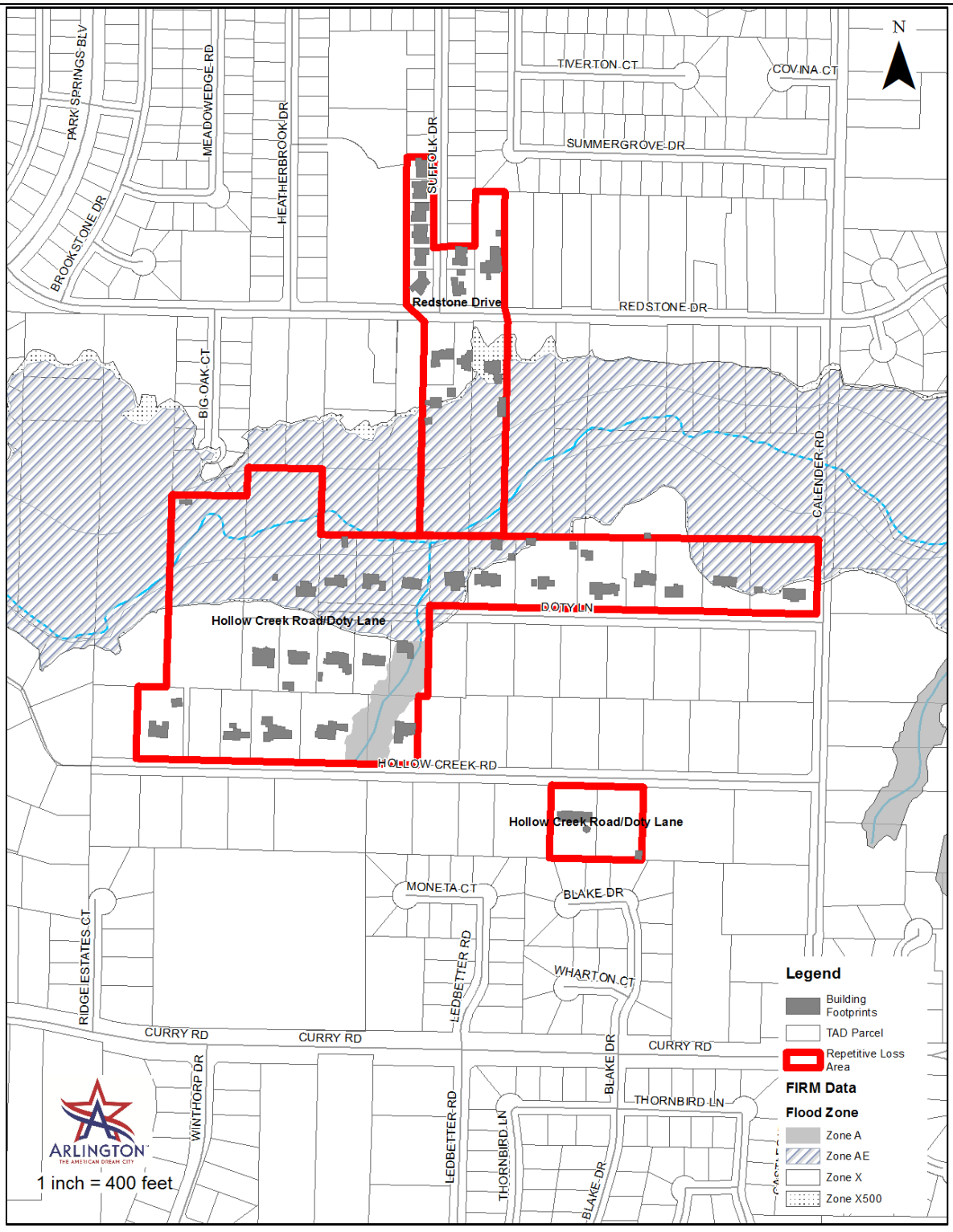


Figure 13 Area #12 Redstone Drive RLA

Table 22 Area #12 Redstone Drive On-Site Survey Data

Area #12 - Restone Drive		
Total Properties	12	
Properties with Structure	12	
Vacant	0	
Foundation Type	12	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	12	Masonry
	0	Wood Frame
	0	Tilt Wall
	0	Stucco
	0	Other
	0	Combination
Structure Condition	12	Good (optional minor repairs)
	0	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	11	1
	2	2
Height Above Street	0	Below Street Grade
	3	At Street Grade
	9	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	3	At Grade
	9	0 - 1 Feet
	0	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	6	None visible
	1	Carport
	2	Detached Garage
	0	Deck
	3	Shed
	0	Other
Likely Areas of Damage on Property	7	Water in Primary Structure
	0	Damage to Appurtenant Structure
	5	Yard Flooded
	0	Damage to HVAC Unit
	0	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	0	Yes
	1	No
	11	Unknown
Drainage Complaints on File	8	

Review Alternative Mitigation Approaches – Redstone Drive

This area is included in the Sublett Creek Neighborhood Drainage Project that was previously discussed in the Hollow Creek Rd/Doty Lane Area. The Redstone portion of this project was identified based on drainage complaints in the area. Due to its proximity to the Hollow Creek Rd/Doty Lane Area, the projects were combined.

Problems in this area are caused by inadequate infrastructure. A conceptual design analysis has been completed and design of construction plans has recently commenced. The plans will include:

- Extending a pipe from Suffolk Drive to the west to Heatherbrook Dr. to intercept flow that is exacerbating the lot to lot drainage issues along the rear of the lots to the east of Suffolk Dr.
- Extending a pipe within Suffolk Drive to provide additional capacity to the rear lot system to the west of Suffolk.
- Lining the existing pipe in the rear lots to the west of Suffolk Drive. It is in poor condition and we've had reports of sinkholes along it.
- Extending a pipe system to Summergrove Drive to increase the capacity.
- Extending box culverts from Redstone to Sublett Creek to provide additional capacity and eliminate the maintenance and capacity concerns with the existing earthen channel.

Construction plans are currently being prepared for this project and a Flood Hazard Mitigation Grant has been submitted to FEMA. A response to the grant application is anticipated mid-2016. If the grant is received, construction of the improvements is planned for 2018. If the grant is not received, construction funding will be programmed into the Stormwater Capital Budget for 2019. The funding source is the Stormwater Utility Fee and potentially grant funds.

Other Potential Mitigation Measures

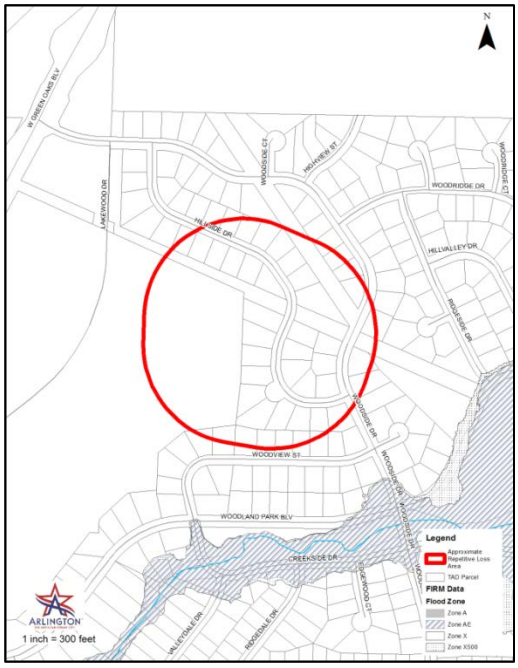
- Elevate damage-prone components such as the furnace or air conditioning unit above the base flood elevation.
- Implement volume control and runoff reduction measures for all upstream development projects as detailed in the City's Design Criteria Manual.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Individual Repetitive Loss Areas #13-21

There are ten properties within nine areas that are considered isolated problems where adjacent properties were not identified as threatened. Following is a summary of the properties and mitigation actions or alternatives that have either occurred or need to be evaluated. All of these properties are single-family residences. The funding source for any construction or buyout projects is the Stormwater Utility Fee.

Building Collection Data/Problem Statement

Hillside



Problem Statement

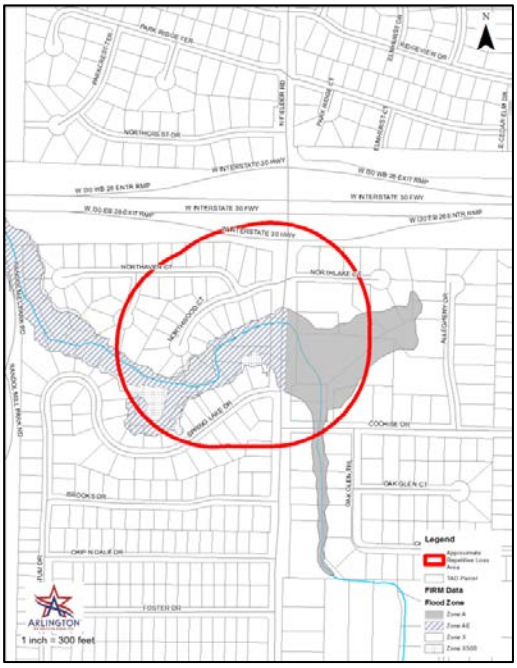
Flooding of this home was related to overflows from the adjacent water treatment plant during construction and operation. A settlement was reached with the contractor for the most recent flood. This property is not located in a Special Flood Hazard Area.

As of November 30, 2015 there is one repetitive loss property in this area that has made a total of 2 claims since 1977.

Potential Mitigation Approaches

The Arlington Water Utilities Department has made improvements to their infrastructure to minimize future flood risks.

Fielder Road



Problem Statement

This home is in the floodway. Adjacent homes are elevated out of the floodplain. The City has not received any drainage concerns from this property since the mid-1990s.

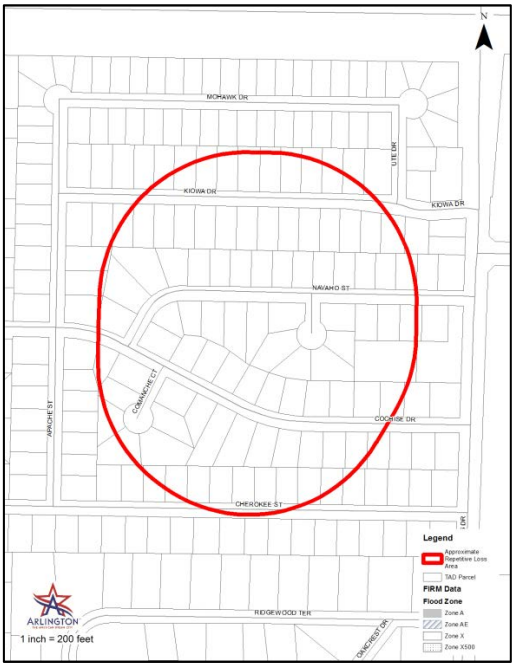
As of November 30, 2015 there is one repetitive loss property in this area that has made a total of two claims since 1977. Both claims occurred in 1992 and 1993.

Potential Mitigation Approaches

The watershed this property is located in is currently being studied. If this property is identified for acquisition during the study, it will be programmed into the Stormwater CIP and paid for using the Stormwater Utility Fund. Other potential mitigation measures for this property include:

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows..
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Navaho



Problem Statement

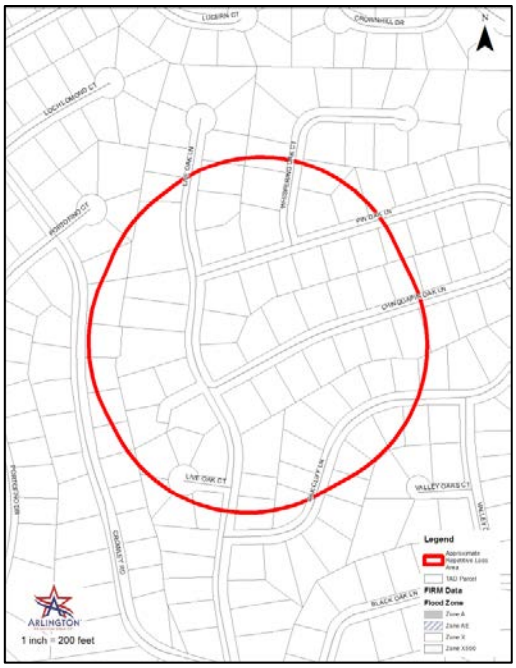
There are no drainage concerns on file for this address and there are no related concerns in the area. This property is not located in the Special Flood Hazard Area. Based on topography, it appears that the issue may have been related to lot to lot drainage patterns.

As of November 30, 2015, there is one repetitive loss property in this area that has made a total of two claims 1977. Both claims occurred in 2000 and 2002.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Chinquapin Oak



Problem Statement

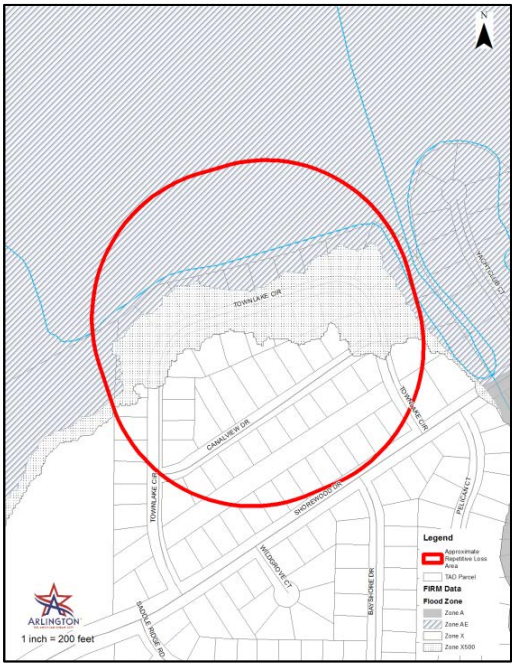
There are no drainage concerns on file for this address and there are no related concerns in the area. This property is not located in a Special Flood Hazard Area. Based on topography, it appears that the issue may have been related to lot to lot drainage patterns.

As of November 30, 2015 there is one repetitive loss property in this area that has made a total of two claims since 1977. Both claims occurred in 1990 and 1991.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Townlake Circle



Problem Statement

There are no drainage concerns on file for this address and there are no related concerns in the area. This property is located in the 500-year floodplain of Lake Arlington. A recent analysis of lake levels indicate that the lake has not been above the 10-year water surface elevation since the early 1990s. Based on topography in the area and lack of any other concerns, it appears that the flooding was related to lot to lot conditions.

As of November 30, 2015 there is one repetitive loss property in this area that has made a total of two claims since 1977. Both claims occurred in 2002 and 2004.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level .
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Daniel Drive

Problem Statement

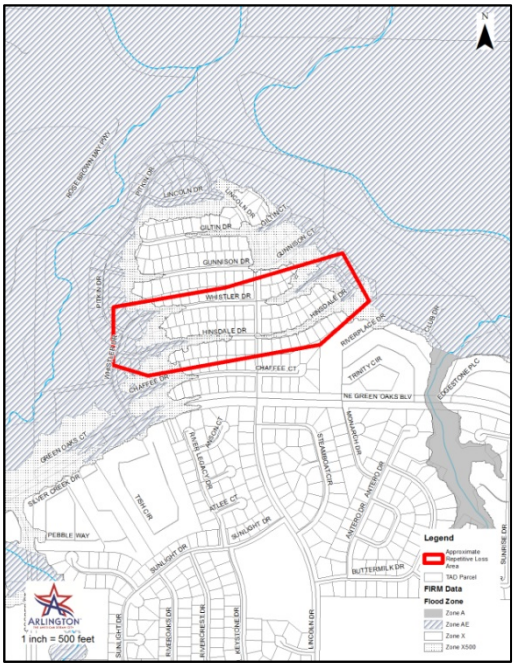
Inadequate drainage infrastructure in the subdivision led to flooding concerns. This area was addressed with the Lackland/Daniel Drainage Improvements project that was constructed in 1994, however the remaining property has experienced flooding since the construction of the project.

As of November 30, 2015, there is one repetitive loss property in this area that has made three claims since 1977. The claims occurred in 1980, 1981, and 1996.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows..
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Hinsdale



Problem Statement

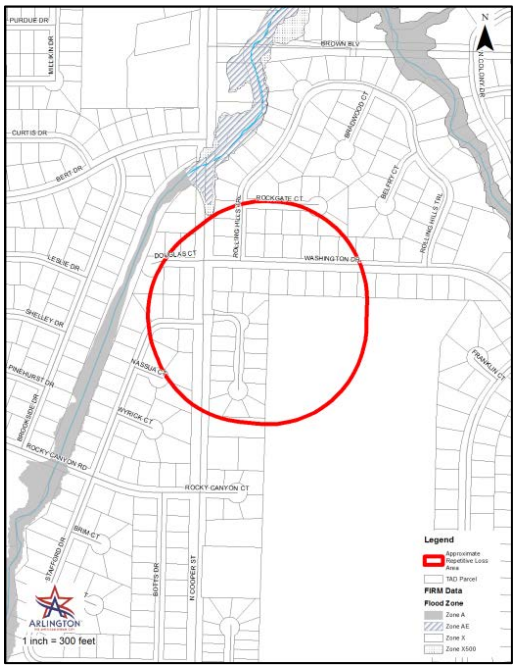
There are two properties associated with this area. There are no drainage concerns on file for these address and there are no related concerns in the area. Hinsdale Drive is impacted by the 500-year floodplain and one of the properties is within the 100-year floodplain. Based on topography and lack of adjacent complaints, it appears that the issue may have been related to lot to lot drainage patterns.

As of November 30, 2015 there are two repetitive loss properties in this area that have made 6 claims since 1977.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Royal Colonnade



Problem Statement

Flooding of this property is related to grading on the adjacent golf course. This property is not located in a Special Flood Hazard Area. There are a couple of related adjacent drainage concerns.

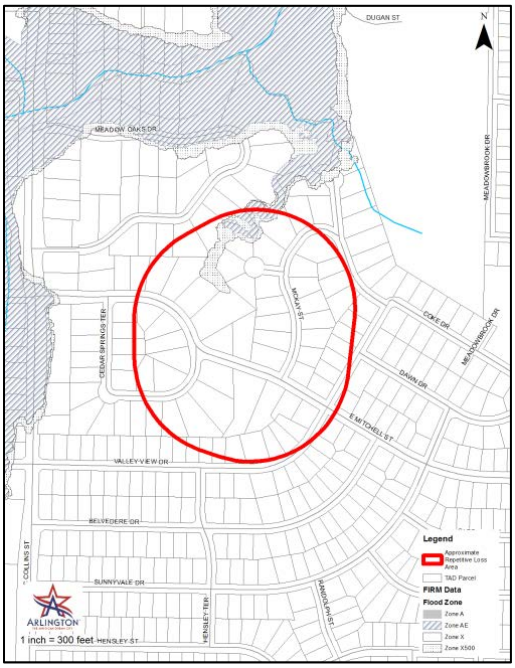
As of November 30, 2015 there is one repetitive loss property in this area that has made 2 claims since 1977. Both claims occurred in 2009.

Potential Mitigation Approaches

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Mitchell Street

Problem Statement



Flooding is related to adjacent earthen channel. This property is not within a Special Flood Hazard Area, but the channel conveys flow to an existing Zone A tributary to Johnson Creek that is located approximately 150 feet north of the property line. The City's drainage concern database has three reports dating back to 1995. In 1996, City forces widened the existing channel. In 2001, the homeowner reported flooding again. The May/June 2015 rain events flooded the home again. This property has been included in a FEMA Flood Hazard Mitigation Grant (HMGP) for buyout.

As of November 30, 2015, there is one repetitive loss property in this area that has made 2 claims for since 1977. The claims occurred in 1979 and 1981.

Potential Mitigation Approaches

If the HMGP grant is approved, this property will either be purchased with the FEMA grant funding later in 2016. If the grant is not received, then City funds will likely be used to purchase the property at a later date.

- Elevate damage-prone components such as the furnace or air conditioning unit above flood protection level.
- Dry floodproofing residential structures by installing shields over doors or windows.
- Construct structural barriers, berms, and floodwalls to protect structure from shallow overland flow.
- Promote the purchase of flood insurance in the area.
- Relocate internal supplies, products/good above the flooding depth.

Table 23 Individual Repetitive Loss Areas On-Site Survey Data

Isolated Areas		
Total Properties	10	
Properties with Structure	10	
Vacant	0	
Foundation Type	10	Slab-on-Grade
	0	Pier and Beam with Crawlspace
Structure Type	8	Masonry
	1	Wood Frame
	0	Tilt Wall
	0	Stucco
	1	Other
	0	Combination
Structure Condition	8	Good (optional minor repairs)
	2	Fair (needs minor repairs)
	0	Poor (needs significant repairs
Number of Stories	5	1
	5	2
Height Above Street	1	Below Street Grade
	1	At Street Grade
	0	0 - 1 Feet
	1	1 - 2 Feet
	3	2 - 3 Feet
	4	3 - 4 Feet
	0	> 4 Feet
Height Above Site Grade	7	At Grade
	2	0 - 1 Feet
	1	1 - 2 Feet
	0	2 - 3 Feet
	0	3 - 4 Feet
	0	> 4 Feet
Appurtenant Structures	8	None visible
	1	Carport
	0	Detached Garage
	0	Deck
	1	Shed
	0	Other
Likely Areas of Damage on Property	6	Water in Primary Structure
	0	Damage to Appurtenant Structure
	0	Yard Flooded
	0	Damage to HVAC Unit
	4	Cannot Tell
	0	Other
Presence of HVAC Units that Would be Vulnerable	2	Yes
	0	No
	8	Unknown
Drainage Complaints on File	2	

4 Conclusion and Recommendations

Based on the field survey and collection of all available data, the analysis of existing studies, reports, and projects, and the evaluation of various structural and non-structural mitigation measures that are appropriate for each area, the City of Arlington proposes that the following mitigation measures should be implemented. Two sections of Mitigation Actions are included. Mitigation Actions 1 – 6 are General Mitigation Actions which are applicable to all Repetitive Loss Areas. Mitigation Actions 7 - 16 are proposed for the specifically noted Repetitive Loss Areas.

General Mitigation Actions

Mitigation Action 1

Property owners should obtain and keep a flood insurance policy on their structures. This policy should include both building and contents coverage. Tenants should also obtain and keep a flood insurance policy for their contents. The City will continue on an annual basis to target all properties in the repetitive loss area and any tenants to remind them of the advantages to maintaining flood insurance through its annual outreach efforts.

Responsibility:

The City's Public Works and Transportation Department will provide the most relevant up-to-date flood insurance information to all property owners and tenants within this repetitive loss area on an annual basis.

Funding:

The cost will be paid for from the Public Works and Transportation Stormwater Utility Environmental Education General Services budget.

Mitigation Action 2

When appropriate, property owners should consider dry floodproofing measures such as flood gates.

Responsibility:

The City's Public Works and Transportation Department will promote effective flood protection measures and provide advice and assistance to property owners who may wish to implement such measures in an on-going program to provide technical assistance to property owners. Property owners are typically responsible for constructing or installing mitigation measures specific to protection of an individual home.

Funding:

Costs related to specific measures to protect an individual structure are the responsibility of the property owner. The advice and assistance will require city staff time. Promotion of existing

floodproofing measures may require some additional funds from the Stormwater Utility Fund's operating budget.

Mitigation Action 3

Prioritize CIP projects to focus drainage improvement projects in watersheds containing repetitive loss areas.

Responsibility:

The City's Public Works and Transportation Department is responsible for the planning and implementation of drainage improvement projects across the city. The Public Works and Transportation Department will study all watersheds within the City of Arlington by 2020 to identify flood risks throughout the city. These watershed studies will identify projects that will be scheduled into the City's CIP based upon severity of the flood risk.

Funding:

The cost will be paid for by the Stormwater Utility Fund.

Mitigation Action 4

Encourage property owners to elevate inside and outside mechanical equipment above the base flood elevation or known flood protection level.

Responsibility:

The Public Works and Transportation Department will promote effective flood protection measures and provide advice and assistance to property owners who may wish to implement such measures in an on-going program to provide technical assistance to property owners.

Funding:

Costs related to specific measures to protect an individual structure are the responsibility of the property owner. The advice and assistance will require city staff time. Promotion of elevation techniques measures may require some additional funds from the Stormwater Utility Fund's operating budget.

Mitigation Action 5

Continue acquisition/demolition mitigation of high-risk flood-prone properties. The highest priorities are properties at the greatest flood risk and where drainage improvements will not provide an adequate level of protection.

Responsibility:

The City's Public Works and Transportation Department will continue to target properties for acquisition/demolition on an annual basis.

Funding:

The acquisition and demolition will be paid for using FEMA mitigation grant funds when available. Stormwater Utility Funds will be utilized when FEMA mitigation grant funds are not available. Staff time will be used to develop the list of target properties.

Mitigation Action 6

Continue to implement the volume control and runoff reduction measures as specified in the City's Design Criteria Manual to reduce flooding impacts of development and continue to implement building code to reduce susceptibility to flooding.

Responsibility:

The City's Community Development and Planning Department will continue to ensure that all building code and design criteria are implemented on new construction and substantial improvements within each repetitive loss area in an on-going program to review all new construction.

Funding:

Implementation of the City's Design Criteria Manual and building code will involve city staff time.

Specific Mitigation Actions

Mitigation Action 7 – Hollow Creek/Doty Lane

Purchase of 6 homes identified for flood mitigation buyouts in the Sublett Creek Neighborhood Drainage Improvements Study.

Responsibility

The City's Stormwater Division of the Public Works and Transportation Department is managing the buyouts. This is a voluntary program and all homeowners within this area have agreed to be included in the FEMA Hazard Mitigation Grant application.

Funding:

If the grant is received, then the City's match is 25% of the total cost which is included in the 2016 Stormwater Capital Budget. If the grant is not received, then the full cost of the buyouts will be included in the Stormwater Capital Budget over the next two to three years. The City's funding source is the Stormwater Utility Fee.

Mitigation Action 8 – Hollow Creek/Doty Lane

Construction of drainage improvements currently under design in the Sublett Creek Neighborhood Drainage Improvements Study.

Responsibility

The City's Stormwater Division of the Public Works and Transportation Department is managing the construction project. A FEMA Hazard Mitigation Grant has been completed for this project.

Funding:

If the grant is received, then the City's match is 25% of the total cost which is preliminarily included in the Stormwater Capital Improvement Program for 2018. If the grant is not received, then the funding for the full cost will be included in the Stormwater Capital Improvement Program beyond 2018. The City's funding source is the Stormwater Utility Fee.

Mitigation Action 9 – Inwood/Meadow Lane

Purchase of 6 homes identified for flood mitigation buyouts. Two have already been purchased and are awaiting demolition. The remaining four have been included in a FEMA Hazard Mitigation Grant application.

Responsibility:

The City's Stormwater Division of the Public Works and Transportation Department is managing the buyouts. This is a voluntary program, but all homeowners within this area have agreed to be included in the FEMA Hazard Mitigation Grant application.

Funding:

If the grant is received, then the City's match is 25% of the total cost which is included in the 2016 Stormwater Capital Budget. If the grant is not received, then the full cost of the buyouts will be included in the Stormwater Capital Budget over the next two to three years. The City's funding source is the Stormwater Utility Fee.

Mitigation Action 10 – Peyco Industrial Park

Perform a detailed analysis of the options described in the Rush Creek Watershed Study to determine the most feasible and effective solution.

Responsibility:

The Stormwater Division of the Public Works and Transportation Department is responsible for managing the design and construction of this project.

Funding:

This analysis is preliminarily included in the Stormwater Capital Improvement Program for 2018. Construction funding has not been programmed at this time. The construction funding will be based on estimates provided with the analysis and will be programmed as funds are available after 2018. The funding source is the Stormwater Utility Fee.

Mitigation Action 11 – Abram Street/Overhill

Re-construct Abram Street with a new bridge and storm drain system to alleviate some of the repetitive flooding concerns. Construction of Abram Street began in January 2016 and will be completed within 18 months. Flooding concerns in the area will post-construction will be monitored and evaluated as needed.

Responsibility:

The Engineering Operations Division of the Public Works and Transportation Department is responsible for managing the construction of Abram Street.

Funding:

The major funding source for the Abram Street project is street bond funds.

Mitigation Action 12 – Willow Oak Lane

Design of drainage improvements to alleviate the flooding concerns. Conceptual evaluation is preliminarily included in the Stormwater Capital Improvement Program for 2017 and final design is preliminarily included in 2018. Construction has not been programmed at this time, but is likely to occur in 2019 or 2020.

Responsibility:

The Stormwater Division of the Public Works and Transportation Department is responsible for the management of this project.

Funding:

The funding source is the Stormwater Utility Fee.

Mitigation Action 13 – Mitchell Street

Purchase repetitive loss property. The repetitive loss property in this area has agreed to a voluntary buyout and was included in the FEMA Hazard Mitigation Grant application in 2015.

Responsibility:

The City's Stormwater Division of the Public Works and Transportation Department is managing the buyouts. This is a voluntary program, but all homeowners within this area have agreed to be included in the FEMA Hazard Mitigation Grant application.

Funding:

If the grant is received, then the City's match is 25% of the total cost which is included in the 2016 Stormwater Capital Budget. If the grant is not received, then the full cost of the buyouts will be included in the Stormwater Capital Budget over the next two to three years. The City's funding source is the Stormwater Utility Fee.

Mitigation Action 14 - Redstone

Drainage improvements are currently under design as described above. This project is included with the Sublett Creek Neighborhood Drainage Improvements associated with Area #2 - Hollow Creek/Doty Lane.

Responsibility:

The City's Stormwater Division of the Public Works and Transportation Department is managing the construction project. A FEMA Hazard Mitigation Grant application was completed for this project in 2015.

Funding:

If the grant is received, then the City's match is 25% of the total cost which is preliminarily included in the Stormwater Capital Improvement Program for 2018. If the grant is not received, then the funding for the full cost will be included in the Stormwater Capital Improvement Program beyond 2018. The City's funding source is the Stormwater Utility Fee.

Mitigation Action 15 – Royal Colonnade (Individual Repetitive Loss Areas)

Modifications to the grading and headwall adjacent to the repetitive loss property are proposed to be constructed with the Meadow Park Drainage Improvements Project in 2016.

Responsibility:

The City's Stormwater Division of the Public Works and Transportation Department is managing the construction project.

Funding:

The funding source is the Stormwater Utility Fee. Construction of the Meadow Park Drainage Improvements Project was included with the 2015 Capital Budget.

4 References

City of Arlington Capital Improvement Plan. FY15-17.

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Lake Arlington Emergency Action Plan, City of Arlington. 2012.

Sublett Creek Neighborhood Drainage Improvements Conceptual Study. 2015.

Conceptual Study of Parkchester-Wolff Drainage Improvements Project. 2015.

Cottonwood Creek and Fish Creek Watersheds Flood Protection Plan. 2012.

Rush Creek Watershed Study. 2016.

Johnson Creek Watershed Study. 2016.

Appendix A – Property Owner Notification Letters

Note: In accordance with the Privacy Act of 1974, Appendix A will not be shared with the general public.

Appendix B – Questionnaire Responses

Note: In accordance with the Privacy Act of 1974, Appendix B will not be shared with the general public.

Appendix C – Building Survey Data

Note: In accordance with the Privacy Act of 1974, Appendix C will not be shared with the general public.