

Flood Risk & Vulnerability Assessment of Barberton, Ohio

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Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed:_____

Abstract

Since it's founding, Barberton has been susceptible to annual flooding. With the confluence of several waterways within the City of Barberton, flooding has, and will remain, an issue. The problem is the City of Barberton has not conducted a flood risk and vulnerability assessment. Through action research, the purpose of this study was to conduct a flood risk and vulnerability assessment and to recommend strategies to minimize flooding for the City of Barberton by answering the following questions, 1. What areas in the City of Barberton are at a risk for flooding? 2. Who are the stakeholders and partners that should be involved in developing a flood risk assessment? 3. What engineering and enforcement strategies can be implemented to reduce the risk of flooding? 4. What economic incentives and education strategies can be developed to reduce the damage when flooding occurs? Interviews, data analysis of current City of Barberton ordinances, policies and programs pertaining to flooding, and an extensive literature review were conducted to obtain the necessary data for this research. This research revealed that although the City of Barberton does not have an official flood hazard and vulnerability assessment, they have been actively working to address the flooding problems in Barberton. Recommendations for the City of Barberton include, a) improved data collection pertaining to flood loss and quantify losses, b) develop an official Flood Risk and Vulnerability Assessment for the City of Barberton, c) continually review and update emergency response and flood mitigation SOP's, and d) continue efforts to establish alternative funding sources including private sector partnerships, federal, state, and local grants.

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Floods are natural processes that occur “when runoff exceeds the capacity of the river or stream channel” (Wright & Monday, 1996, p. 7). The Federal Emergency Management Agency (FEMA) performs Flood Insurance Studies to identify areas within a community susceptible to routine flooding.

The study includes statistical data for river flow, storm tides, hydrologic/hydraulic analyses, and rainfall and topographic surveys. FEMA uses this data to create the flood hazard maps that outline your community's different flood risk areas (National Flood Insurance Program, n.d.).

The problem is the City of Barberton has not conducted a flood risk and vulnerability assessment. Through action research, the purpose of this study is to conduct a flood risk and vulnerability assessment and to recommend strategies to minimize flooding for the City of Barberton by answering the following questions:

- What areas in the City of Barberton are at a risk for flooding?
- Who are the stakeholders and partners that should be involved in developing a flood risk assessment?
- What engineering and enforcement strategies can be implemented to reduce the risk of flooding?
- What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

Background & Significance

Located in Northeast Ohio, the City of Barberton currently has 26,444 residents living in nine square miles (U.S. Census Bureau, 2011). Founded in 1891 by industrialist Ohio Columbus Barber, Barberton was established as a planned industrial community and became known as the Magic City because of its rapid growth (Flickinger, 2008, 2009). The city was constructed on fertile rural farmland located in the Muskingum River basin, specifically the Tuscarawas River watershed; both are home to several water tributaries (US Army Corps of, 2011). Barberton itself has several waterways consisting of the Tuscarawas River, Wolf Creek, Pan Cake Creek, Mud Run, and Hudson Run. In addition, the Ohio Erie Canal was opened in 1827 and its route follows the Tuscarawas River through Barberton (City of Barberton, n.d.). A system of locks along the length of the canal, which were completed to the Ohio River in 1832, controlled the water levels through changes in topography. One of these locks was constructed at the mouth of Wolf Creek prior to 1827, with the waters of the creek used to feed the canal below the lock (City of Barberton, n.d.).

Barberton has several flood hazard areas that are prone to frequent flooding and have been ongoing problems since the founding of the city in 1891 (Barberton Public, n.d.). The Ohio Department of Natural Resources (ODNR) (n.d.) defines the 100-year floodplain “as the floodplain associated with a flood that has a 1-percent annual chance of being equaled or exceeded in any given year” (para. 3). Specifically, the ODNR defines and categorizes hazard areas as:

Zone A- corresponds to the 100-year, or 1% annual chance, floodplain determined by approximate methods. Detailed hydraulic analysis is not performed for such areas, and no Base Flood Elevation (BFE) or depth is shown for this zone.

Zone AE and A1-A30 corresponds to 100-year, or 1% annual chance, floodplain that is determined in the Flood Insurance Study by detailed methods. Usually, BFEs derived from detailed hydraulic analysis are shown at select intervals within this zone.

Zone AH corresponds to areas of the 100-year, or 1% annual chance, shallow flooding with a constant water-surface elevation (usually areas of ponding) where average depths are between 1 and 3 feet. BFEs derived from detailed hydraulic analysis are shown at select intervals within this zone.

Zone AO corresponds to areas of the 100-year, or 1% annual chance, shallow flooding (typically sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average flood depths derived from detailed hydraulic analysis are shown within this zone.

Zones B, C, and X correspond to areas outside the 100-year or 1% annual chance floodplains, areas of 100-year sheet flow flooding with average depths less than 1 foot, areas of 100-year stream flooding where contributing drainage areas are less than 1 square mile, or areas protected from the 100-year or 1% annual chance flood by levees. No BFEs or depths are shown within these zones (ODNR, n.d.).

Figure 1 illustrates the identified flood hazards areas in the City of Barberton.

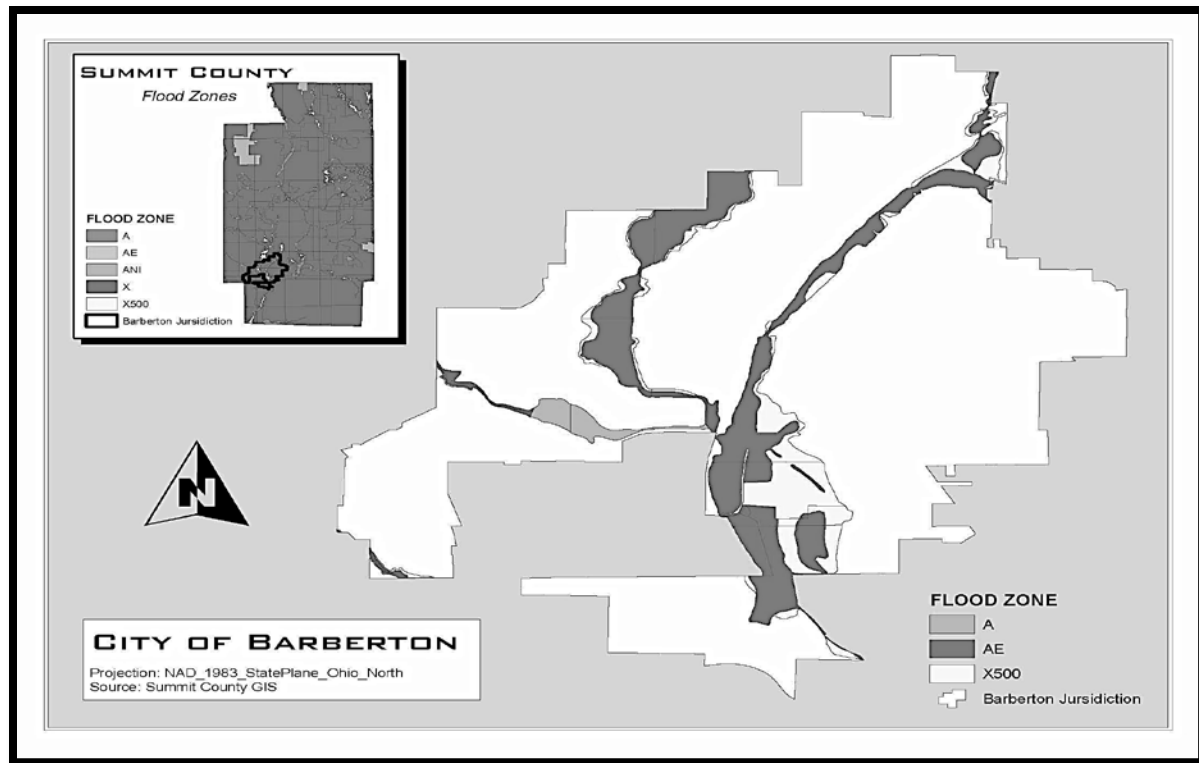


Figure 1. Flood hazard areas within the City of Barberton (Barberton Stormwater, 2012).

Areas of Barberton within a flood zone are illustrated in Appendices A- D. Specifically those areas are:

- 14th, 15th & 16th Streets N.W.- Flood Zone AE (Appendix A)
- 31st N.W. & Hudson Run- Flood Zone A (Appendix A)
- South Barberton- Flood Zone AE (Appendix B)
- Mud Run, Coventry Rd., & Eagon St.- Flood Zone AE (Appendix C)
- Robinson Ave. & E. Tuscarawas Ave.- Flood Zone AE (Appendix D)
- 2nd St. S.E. and Lamberton Ave.- Flood Zone AE (Appendix D)

14th, 15th & 16th Streets N.W.

Specifically, the area along Wolf Creek, located on Barberton's west side, has historically been subjected to the heaviest flooding in "lower living levels and streets" (Barberton

Stormwater, 2012, p. 1). The Barberton Stormwater & Floodplain Administration cites several reasons this area floods: (a) the rise of Wolf Creek due to precipitation and rain events, (b) the Betz Run Drainage that drains a significant area of the neighboring City of Norton into Wolf Creek, and (c) the storm sewers back up and are incapable of draining to Wolf Creek. This storm sewer back up is illustrated in *Figure 2*.

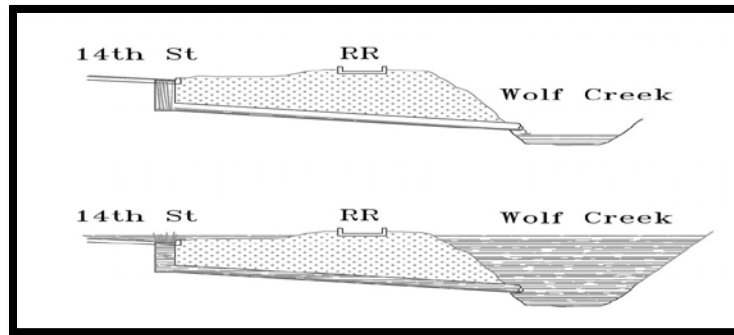


Figure 2. Storm sewer drainage into Wolf Creek at normal creek levels and the subsequent storm sewer back up during elevated creek levels (Barberton Stormwater, 2008).

31st N.W. & Hudson Run

This residential area has experienced flooding throughout the years due to the rising water levels of Hudson Run during heavy rainfall. The Lake Dorothy Dam, located in the City of Norton, and the Columbia Lake Dam, located in Barberton are both operated by P.P.G. Industries and “complicate flood conditions along Hudson Run (Barberton Stormwater, 2012, p. 4).

South Barberton

The filling in of former wetlands first developed the South Barberton neighborhoods, and have been an area of heavy flooding affecting lower living levels and streets (Barberton Stormwater, 2012). Flooding mechanisms identified by the Barberton Stormwater Administration are, a) rises of the Tuscarawas River due to precipitation and heavy rain events, b) the storm

sewers back up and are incapable of draining to Tuscarawas River, and c) surface water run off from the east side of Barberton that drains into South Barberton.

Mud Run, Coventry Rd., & Eagon St.

Mud Run is a small tributary on Barberton's north end that flows into the Tuscarawas River. Flooding in this commercial-industrial area occurs when the Tuscarawas River backs up into Mud Run. This condition is worsened when combined with the normal water run-off flow from the City of Akron down Mud Run (Barberton Stormwater, 2012).

Robinson Ave. & E. Tuscarawas and 2nd St. S.E. & Lamberton Ave.

Located on the east side of Barberton, the primary causes of flooding in these residential, commercial areas are attributed to heavy rainfall coupled with run off from neighboring Coventry Township overwhelming retention ponds and existing storm drainage systems (Barberton Stormwater, 2012).

Since it's founding, Barberton has been susceptible to flooding year after year. With the confluence of several waterways within the City of Barberton, flooding has, and will remain, a problem. Because of this, conducting a flood risk and vulnerability assessment for the City of Barberton will benefit the city and will address the United States Fire Administration goal of "reducing the risk at the local level through prevention and mitigation" (FEMA, 2011, p. SM 1-7). In addition, this applied research project addresses the primary goal of the Executive Analysis of Community Risk Reduction course by enabling this researcher to "lead community risk reduction in a strategic manner" (p. SM 1-7). Through analytical planning, the devastating effects of flooding can be managed and subsequently minimized for the City of Barberton.

Literature Review

FEMA (2011) asserts community risks must be identified and prioritized for a community to address its hazards. Risk assessment is a multistep process that requires an analytical approach to planning, implementation, and evaluation for a risk reduction initiative to be successful. After a risk assessment, a vulnerability assessment should be conducted to evaluate the community's ability to resist the impact/effect of the hazard. Finally, risk reduction objectives should be developed that address priorities and the level of risk the community will accept.

Summit County (2011) reports, the county is susceptible to three types of floods:

- Riverine results from the overflow of rivers and streams from rain or melt water.
- Flash floods resulting from fast rising streams after heavy rain or snowmelt.
- Urban floods resulting from the overflow of storm sewers and streets after heavy rainfall.

The Summit County Hazard Reduction and Prevention Plan also provided a template for hazard vulnerability assessment criteria (Appendix E).

The Hamburg University of Technology (n.d.) asserts it is critical for success to identify all relevant stakeholders at the start of the planning process. Wright and Monday (1996) suggest forming a group to identify common goals and objectives, and warn it may not be possible to obtain complete agreement from all stakeholders. However, consensus within the group may be reached if goals and objectives support more than one interest. Furthermore, the Hamburg University of Technology suggests organizing stakeholders into several different groups consisting of a) government ministries, departments, and agencies, b) non-governmental organizations, c) upstream and downstream neighboring communities, d) scientific institutions, e) voluntary organizations, and f) the private sector.

Brisbane City Council (2011) describes two types of engineering that can be utilized to prevent and mitigate flooding- structural and non-structural. “Structural measures are those that involve physical works to lessen the effects of flooding...” (p. 2). Structural methods can be further classified as passive or active measures. Passive measures being those that require no operation, versus active measures which require some form of movement or operation. Examples of structural methods include a) river barriers, b) flood gates, c) levees and flood walls, d) backflow prevention valves, e) dredging, and f) flood mitigation storages (pp. 4-10). Non-structural measures typically are considered policy, procedures, and building codes.

The Natural Hazards Research and Applications Information Center (NHRAIC) (1992) assert regulations have a greater impact on flood loss reduction than any other floodplain management tool. At the federal and state level, flood loss is accomplished through laws, executive orders and directives, administrative regulations, interagency actions, and agency policies and programs. However, the majority of regulations fall under the responsibility of local government, which are typically the minimum requirements of the National Flood Insurance Program.

The NHRAIC (1992) suggests several economic incentives for land development, flood mitigation, and recovery. Reductions, abatements, or deferral of taxes are examples of incentives designed to attract and retain businesses in flood prone areas. “These make locating businesses, homes, and other development in some flood-prone areas financially feasible and even attractive” (p. 42).

After a flood, federal, state, local and private sector disaster assistance may be provided in the form of financial relief to repair, replace, or restore damaged areas (The Natural Hazards, 1992). One example of federal and state financial relief is “casualty loss deductions on income

taxes to those suffering flood losses” (p. 42). Additional types of tax relief, the reduction or the temporary suspension of real estate taxes or business taxes are provided by state and local government to those affected by flooding. Another example of financial aid are the National Flood Insurance Program and “grants to the states from the President's Disaster Relief Fund after Presidentially declared disasters” (p. 43).

The NHRAIC (1992) opinions educating the public can be challenging but a very necessary endeavor. Several methods have been utilized to educate the community. Methods include distribution of educational literature, the use of radio, television, and newspapers, and the placement of warning signs (1992).

Procedures

Interviews, data analysis of current City of Barberton ordinances, policies and programs pertaining to flooding, and an extensive literature review were conducted to obtain the necessary data for this research.

Alan Keltyka, Stormwater & Floodplain Administrator for the City of Barberton was interviewed over the telephone February 19, 2013 at 10:00 am. Mr. Keltyka was asked the following questions:

- What areas of Barberton present the highest flooding?
- What is the primary cause of flooding in Barberton?
- What engineering and enforcement strategies can be implemented to reduce the risk of flooding?
- What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

Dan Stimmel, Summit County Emergency Management Agency Specialist was

interviewed February 20, 2013 at 10:00 am. Mr. Stimmel was asked the following questions:

- What county or state assistance is available for prevention and mitigation?
- What engineering and enforcement strategies can be implemented to reduce the risk of flooding?
- What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

Joseph Stefan, Assistant Planning Director City of Barberton was interviewed over the telephone February 20, 2013 at 1:15 pm. Mr. Stefan was asked the following questions:

- Who are the stakeholders involved in the flooding issue?
- What county or state assistance is available for prevention and mitigation?
- What engineering and enforcement strategies can be implemented to reduce the risk of flooding?
- What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

Bill Judge, Mayor City of Barberton was interviewed over the telephone February 22, 2013 at 2:15 pm. Mr. Judge was asked the following questions:

- Who are the stakeholders involved in the flooding issue?
- What county or state assistance is available for prevention and mitigation?
- What engineering and enforcement strategies can be implemented to reduce the risk of flooding?
- What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

Results

Alan Keltyka answered the first research question of what areas in the City of Barberton are at risk for flooding. Mr. Keltyka confirmed the areas mentioned in the Background & Significance of this research paper as being the most at risk areas and forwarded by email the document titled Flood & Flooding Mitigation Strategies in Barberton (Appendix F). In addition, Mr. Keltyka asserted although an over abundance of stormwater is generally the cause of flooding in Barberton it is not the only cause. Wolf Creek, Hudson Run, and the Tuscarawas River are all greatly influenced by rainfall outside of Barberton when the stormwater from communities' upstream flow into and over capacitate the three waterways. Furthermore, he provided the frequency of flooding events in Barberton between 2007 and 2012 as:

- 2007- July 28, August 9, and August 20
- 2008- February 5, March 4, March 18, and July 26
- 2009- February 12, March 9, May 27, June 19, July 31, and August 10
- 2010- March 22, June 23, October 26, November 25, and December 1
- 2011- February 28, March 10, May 25, June 7, July 19, September 26, October 19, November 19, and December 6

Finally, Mr. Keltyka described the detrimental way stormwater affects the City's sanitary sewers. As the stormwater enters the sanitary sewers it causes the design capacity of the pipes to be exceeded. This occurs because the sanitary sewer system has much smaller pipes than the storm sewer system. The largest sanitary sewer is 36 inches in diameter, while the storm sewers are over six feet in diameter.

Mr. Judge and Mr. Stefan answered the second research question of what stakeholders and partners should be involved in developing a flood risk assessment? Mr. Stefan asserted the

stakeholders and partners are comprised primarily of those residents and businesses that are in the flood areas and a representative from every department in the City of Barberton. A private sector stakeholder, P.P.G. Industries located in Barberton, operates two dams that control water flow into South Barberton, the Lake Dorothy Dam and the Columbia Lake Dam. In addition, applicable county and state representatives for flooding and emergency management are considered stakeholders as well. Mr. Judge added the City of Barberton, the City of Norton, and Copley Township are currently in discussions of creating a sub-watershed district.

Mr. Keltyka, Mr. Stimmel, and Mr. Stephen collectively answered the third question of what engineering and enforcement strategies can be implemented to reduce the risk of flooding? Mr. Stimmel stated Summit County does not have enforcement over the City of Barberton, therefore engineering and enforcement strategies reside at the local level with the Stormwater & Floodplain Administrator for the City of Barberton. Mr. Stefan concurred with Mr. Keltyka's plan for flood mitigation and engineering strategies (Appendix F) that I have summarized below

- Remove flood prone structures from the area.
- Flood proof structures in the flood plain.
- Install a structural flood control.
- Reduce stormwater entering Barberton's waterways.
- Increase storage capacity of drainage areas.

Mr. Stefan stated one ordinance that is being enforced is the Stormwater Management Ordinance. This ordinance was not included in the appendix due to its large size. However, it is available on the City of Barberton's website at:

(http://www.cityofbarberton.com/govt/pdf/2008/Engineering/Stormwater_Mgmt_Ordinance.pdf).

In addition to the Stormwater Management Ordinance, Mr. Stefan stated the Barberton is

developing other policies and ordinances that will address the flooding problem. Specifically he stated a policy is being developed for dye testing of residential properties to check for improper connection of sanitary sewer lines into storm sewer lines. This is very common in the older sections of Barberton. Finally, Barberton is developing a program and ordinance that will require the use of basement check valves to avoid sewer back ups into homes. Mr. Stefan stated the installation cost is approximately \$1,500.00 per check valve. Because of the cost, Barberton is looking for alternative ways to fund the project. Finally, Mr. Stefan forwarded by email two programs initiated by the City of Barberton to assist flood victims, the 2011 Emergency Flood Program- Transportation (Appendix G) and the 2011 Emergency Flood Program- Clean-Up (Appendix H).

Mr. Stimmel and Mr. Stefan answered the fourth research question of what economic incentives and education strategies can be developed to reduce the damage when flooding occurs? Specifically, Mr. Stimmel suggested FEMA's Hazard Mitigation Program and the National Flood Insurance Program for economical relief and assistance. Mr. Stefan concurred with utilizing both programs and added the Community Development Block Grant Program (CDBG). Specifically, Mr. Stefan stated, the CDBG can be used for recovery efforts involving housing, economic development, infrastructure and prevention of further damage to affected areas. Finally, Mr. Stefan stated the City of Barberton is pursuing other sources of funding through private foundations to assist residence in flood prevention and recovery.

Mr. Stefan stated the City of Barberton organized a Flood Action Committee in February 2012 comprised of one representative from every city department, two representatives from the South Barberton area and one representative for the near west side of Barberton (between 14th- N.W. and 25th N.W.). Since its inception, the committee has worked to educate the areas prone to

flooding through community meetings, area newspaper, flyers, and informational letters.

Discussion

This research revealed that although the City of Barberton does not have an official flood hazard and vulnerability assessment, they have been actively working to address the flooding problems in Barberton. The following discussion compares and contrasts what the city is currently doing to what is contained in the literature.

What areas in the City of Barberton are at a risk for flooding?

FEMA (2011) asserts, “Through the analysis process the target of risk is narrowed to those that are most critical. The analysis also provides invaluable information on the people who are affected by, or part of the problem” (p. SM 2-3). FEMA further asserts risk assessment is a multistep process that requires an analytical approach to planning, implementation, and evaluation for a risk reduction initiative to be successful (p. SM 2-3). Based upon interviews with Mr. Keltyka and Mr. Stefan, and official City of Barberton documents, Barberton has identified its flood hazard areas and developed mitigation strategies (Appendix F).

FEMA (2011) opinioned, “There must be accurate and detailed information on risk and risk issues including loss history, demographics, information on high-risk groups and areas, natural hazards, etc.” (p. SM 2-3). Summit County (2011) asserted in Step 7 Fiscal Effects, the financial losses sustained need to be evaluated as part of the hazard and vulnerability criteria. The City of Barberton has been unable to quantify flood related losses or document flood loss history. Both Mr. Keltyka and Mr. Stefan in separate conversations with this researcher acknowledged this shortcoming and stated it is an area they are looking to improve on. Mr. Stefan stated the reason there is not specific data concerning monetary dollar loss is because not all flooding is reported to the City and most flood losses are covered through insurance or by the homeowner,

which are also not reported to the City (J. Stefan, personal communication, February 21, 2013).

Who are the stakeholders and partners that should be involved in developing a flood risk assessment?

The Hamburg University of Technology (n.d.) asserted:

Greater participation of all stakeholders in flood policy development is considered vital since it enables inhabitants of flood-prone regions to become aware of the level of risks they are ready to accept and play a conducive or complementary role in the flood management efforts the government is undertaking (p. 1).

In addition, the Hamburg University of Technology asserted stakeholders could be divided into government departments, non-governmental organizations, voluntary organizations, flood prone neighboring communities, the private sector, and scientific institutions. “The most successful risk-reduction efforts are those that involve the community” (FEMA, 2011, p. SM 2-23). Furthermore FEMA states,

Partnerships are established so the community as a whole is involved. This enables more minds, bodies, and resources to tackle the problem. This includes sharing tasks of targeting the problem, developing a plan, and implementing the solutions (p. SM 2-23).

Through the creation of the Barberton Flood Action Committee, Barberton has achieved several of these recommendations.

In regards to government departments, “It is, therefore, important that all relevant departments at the national, state, district, and municipal levels be part of the stakeholder group devising flood management strategies at the respective administrative level and take part in flood management planning” (Hamburg University of Technology, n.d., p. 1). According to Mr. Stefan

each department of the city has a representative on the committee.

Non-government community members “can influence the behavior of stakeholders by building awareness and disseminating information and can help flood-prone communities organize themselves” (Hamburg University of Technology, n.d.). Voluntary organizations are important components of raising flood risk awareness. Community members in Barberton’s flood hazard areas are represented on the Flood Action Committee on a voluntary basis. As volunteer-non-governmental committee members, they have taken part in educating the public through community meetings, area newspapers, flyers, and informational letters (J. Stefan, personal communication, February 20, 2013).

“Flood prone neighboring communities are at the core of all flood management activities and are major stakeholders” (Hamburg University of Technology, n.d.). Currently the City Of Barberton is in discussions with the City of Norton, and Copley Township (both communities are upstream of Barberton) to create a sub-watershed district within the Muskingum River basin, and the Tuscarawas River watershed to work towards solving and preventing water-related problems. These talks are in their infancy but appear to be very promising (B. Judge, personal communication, February 22, 2013).

“The private sector is directly or indirectly affected by flooding and commands over extra-governmental resources which can play a crucial role in flood loss reduction, business continuity planning, emergency response, and the recovery process” (Hamburg University of Technology, n.d.). A representative of P.P.G. Industries is also a member of the Flood Action Committee and P.P.G Industries’ role in operating the two dams to control water levels into South Barberton is being addressed (J. Stefan, personal communication, February 20, 2013).

“Scientific expertise forms the basis for well informed decision-making and can provide

important input by presenting unbiased scientific studies” (Hamburg University of Technology, n.d.). Mr. Keltyka, also a member of the Flood Action Committee, has utilized FEMA flood maps and scientific studies to develop mitigation strategies to address Barberton’s flooding issues.

What engineering, and enforcement strategies can be implemented to reduce the risk of flooding?

Brisbane City Council (2011) stated river barriers, floodgates, levees, floodwalls, backflow prevention valves, dredging, and flood mitigation storages as structural measures that can be utilized to lesson the effects of flooding (pp. 4-10). Although Mr. Keltyka’s plans for flood mitigation and engineering strategies (Appendix F) mirror Brisbane City Council’s recommendations, their implementation becomes a financial challenge for Barberton (A. Keltyka & J. Stefan, personal communications, February 19 & 20, 2013, respectively). Because Barberton does not have a Natural Hazard Mitigation Plan, the other flooding that has occurred nationally in the last few years, and a reduction of the Federal Budget, obtaining assistance from FEMA for flooding issues is difficult if not impossible (Barberton Stormwater, 2012). Given the challenges of utilizing financial assistance from FEMA, Barberton is using CBDG funding to lesson the impact of flooding for the community. Mr. Stefan stated the CBDG is being used to remove flood damage structures and for the prevention of further damage to the area (J. Stefan, personal communication, February 20, 2013). In addition, private funding sources are being sought for the purchasing and installation of basement check valves in the flood target areas of Barberton (J. Stefan, personal communication, February 20, 2013).

“Local governments are almost exclusively responsible for local drainage and stormwater management” (The Natural Hazards, 1992, p.29). Local regulations vary based on risk studies and mapping of the community but include a) requiring permits for all proposed

new development, b) reviewing subdivision proposals to assure that they will minimize flood damage, c) anchoring and flood-proofing structures to be built in known flood hazard areas, d) safeguarding new water and sewage systems and utility lines from flooding, and e) enforcing risk zone, base flood elevation, and floodway.

Barberton has addressed all of the NHRAIC (1992) recommendations in their 2008 Stormwater Management Ordinance whose purpose and scope are:

A. The purpose of this regulation is to establish technically feasible and economically reasonable storm water management standards to achieve a level of storm water quality and quantity control that will minimize damage to property and degradation of water resources and will promote and maintain the health, safety, and welfare of the citizens of the City of Barberton:

B. This regulation requires owners who develop or re-develop their property within the City of Barberton to:

1. Control storm water runoff from their property and ensure that all storm water management practices are properly designed, constructed, and maintained.
2. Reduce water quality impacts to receiving water resources that may be caused by new development or redevelopment activities.
3. Control the volume, rate, and quality of storm water runoff originating from their property so that surface water and ground water are protected and flooding and erosion potential are not increased.
4. Minimize the need to construct, repair, and replace subsurface storm drain systems.
5. Preserve natural infiltration and ground water recharge, and maintain

subsurface flow that replenishes water resources, except in slippage prone soils and areas where contaminated groundwater has been recognized.

6. Incorporate storm water quality and quantity controls into site planning and design at the earliest possible stage in the development process.

7. Reduce the expense of remedial projects needed to address problems caused by inadequate storm water management.

8. Maximize use of storm water management practices that serve multiple purposes including, but not limited to, flood control, erosion control, fire protection, water quality protection, recreation, and habitat preservation.

9. Design sites to minimize the number of stream crossings and the width of associated disturbance in order to minimize the City of Barberton future expenses related to the maintenance and repair of stream crossings.

C. This regulation shall apply to all parcels used or being developed, either wholly or partially, for new or relocated projects involving highways and roads; subdivisions or larger common plans of development; industrial, commercial, institutional, or residential projects; building activities on farms; redevelopment activities; grading; and all other uses that are not specifically exempted in Section XXXX.01 (pp. 1-2).

In addition to the 2008 Stormwater Ordinance, Barberton is developing other policies and ordinances that will address the flooding problem. Specifically, a draft of an ordinance for the dye testing of residential properties is in its final revision state (J. Stefan, personal communication, February 20, 2013). The ordinance will address the improper connection of sanitary sewer lines into storm sewer lines. Finally, an ordinance requiring the use of basement check valves to avoid sewer back ups into homes is being developed (J. Stefan, personal communication, February 20,

2013).

What economic incentives and education strategies can be developed to reduce the damage when flooding occurs?

The NHRAIC (1992) suggests several economic incentives for land development, flood mitigation, and recovery. Specifically they asserted,

Some tax-based incentives for development are reductions in property taxes, abatement or deferral of taxes to entice or retain businesses in an area, and the establishment of enterprise zones or other special business zones to promote development and employment in economically depressed areas. These make locating businesses, homes, and other development in some flood prone areas financially feasible and even attractive. On top of this, the federal Internal Revenue Code and many state codes also provide casualty loss deductions on income taxes to those suffering flood losses. After disastrous floods, many states and localities provide additional types of tax relief, reducing or temporarily suspending real estate taxes or business taxes for those affected by flooding, for example (p. 42).

The National Flood Insurance Program (2013) asserts the Federal Emergency Management Agency (FEMA) is responsible for administering the National Flood Insurance Program (NFIP). The NFIP is a Federal program enabling property owners to purchase subsidized flood insurance. NFIP is based on a formal partnership between local jurisdictions (counties/communities) and the Federal government. Under this program, counties and communities adopt floodplain management regulations in order to reduce flood risks associated with future floodplain growth and rehabilitated floodplain structures and the Federal government in turn subsidizes flood insurance for property owners within the community.

Currently, the City of Barberton does not offer any flood specific tax incentives. However, they have initiated an Emergency Flood Program- Transportation (Appendix G) and an Emergency Flood Program- Clean-Up (Appendix H). In addition, its limitations to utilize FEMA funding because it does not have a Natural Hazard Mitigation Plan has already been discussed.

According to the NHRAIC (1992) educating the public can be challenging but a very necessary endeavor. Specifically they state,

Private citizen perception of risk may be quite different from that of local officials.

Even if the risk is acknowledged, the advantages of a floodplain location to the individual property owner may seem to outweigh the disadvantages. Homeowners also may be more concerned with the effect of floodplain regulations on resale value than with the effect of a potential flood on the house or property itself (p. 52).

Through the Barberton Flood Action Committee, the committee has worked to educate the areas prone to flooding through community meetings, area newspaper, flyers, and informational letters. Although the actual number of attendees is not known, Mr. Stefan stated all four political wards where flooding occurs have held informational meetings (J. Stefan, personal communication, February 20, 2013).

Barberton has acknowledged it has a flooding problem, has identified flood target areas, and has developed several strategies for prevention and mitigation. In addition the elected officials have done well at identifying and selecting the appropriate stakeholders for the make up of the Barberton Flood Action Committee, and determining and implementing engineering, enforcement, economic and education strategies. However, they have been unable to accurately collect flood loss data or to develop its own Flood Risk & Vulnerability Assessment. Both of which have made obtaining federal assistance difficult if not impossible. In addition, there is not

an evaluation system to determine whether any of their efforts are being effective at alleviating the flooding issues in Barberton.

This researcher also attempted to compile a monetary figure for flood loss and was unsuccessful. Neither the State of Ohio Emergency Management Agency nor the Summit County Emergency Management Agency compiles this data. As mentioned previously, the difficulty in compiling this data is not all flooding is reported and most flood losses are covered through insurance or by the homeowner, which are also not generally reported. Requesting insurance claim information, even if it was only just a dollar amount, was not information agencies would release due to privacy issues. Another attempt to compile data was made by contacting the City of Barberton's Service Director, Elwood Palmer, and requesting the employee and equipment budget amounts spent during flood events. Mr. Palmer stated this information is not readily available and would be difficult and very timely to extrapolate out (E. Palmer, personal communication July 18, 2012). Finally, an attempt was made by contacting the local cleanup companies in the area for the costs associated with flood damage restoration. Paul Davis Restoration of Akron, Restorx, Design Restoration, and Walsh Construction all responded to my inquiry. However, each admitted their data were very rough estimates; therefore I did not include the data in this ARP.

Recommendations

The following are recommendations for the City of Barberton to improve its flood preparedness and recovery efforts:

Recommendation 1

Improve data collection pertaining to flood loss and quantify losses. Through the Flood Action Committee's community education, residents should be encourage to report flooding and the subsequent costs of repair to the City. In addition to residential reporting, city departments should track their individual department's flood related costs. The City of Barberton could then compile and create a database of fiscal losses associated with flooding.

Recommendation 2

Develop an official Flood Risk and Vulnerability Assessment for the City of Barberton. Based upon Barberton's data and Summit County's Hazard Vulnerability Assessment Criteria, this researcher has created a flood risk and vulnerability assessment for the high flood hazard areas of Barberton (Appendix I). However, it is incomplete because of the lack of data in regards to the fiscal effects.

Recommendation 3

Continually review and update emergency response and flood mitigation SOP's.

Recommendation 4

Continue efforts to establish alternative funding sources including private sector partnerships and federal, state and local grants

There are also three recommendations I will make for future researchers who are looking into developing an all encompassing approach to hazard mitigation. Future researchers are encouraged to look at other creative resolutions through laws, policies, procedures and local

ordinances. As the NHRAIC (1992) asserted, regulations have a greater impact on flood loss reduction than any other floodplain management tool. Secondly, I would encourage the researcher to attend stakeholder meetings to obtain a clearer picture of what the community perceives as their problems and solutions. Finally, I would recommend the researcher look at alternative methods for funding the community's flood preparedness, mitigation and recovery.

Even though the City of Barberton has made, and continues to make, substantial improvements to prepare, mitigate, and recover from flooding there still exists a need for improvements. Barberton will never be able to eliminate all flooding, however it can lesson its impact through,

- The strict enforcement of federal, state, and local laws, ordinances, policies and procedures.
- The continued education of the public on flood preparedness and recovery.
- Seeking funding alternatives for improvements to recommended engineering practices.

From the interviews, it is obvious to this researcher the elected officials not only care greatly about their community, but they are willing to aggressively pursue multifaceted solutions to the flooding problems in Barberton.

References

- Barberton Stormwater & Floodplain Administration. (2008). *March 2008 flood presentation* (PowerPoint Presentation). Barberton, Ohio: Author.
- Barberton Stormwater & Floodplain Administration. (2012). *Flooding & flood mitigation strategies in Barberton* (February 25, 2012, pp. 1-7). Barberton, Ohio: Author.
- Brisbane City Council. (2011). *Engineering solutions for flood mitigation in Brisbane* (Discussion Paper). Brisbane, Australia: Author.
- City of Barberton. (2013). *2008 stormwater management ordinance*. Retrieved from http://www.cityofbarberton.com/govt/pdf/2008/Engineering/Stormwater_Mgmt_Ordinance.pdf
- City of Barberton. (n.d.). *Part I: Before Barberton (1810-1890)* [Online Article]. Retrieved August 26, 2012, from <http://www.cityofbarberton.com/live/history/1810-1890.shtml>
- FEMA. (2011). *Executive analysis of community risk reduction* (2nd ed.). Emmitsburg, MD: Author.
- FEMA. (2013). *Definitions of FEMA flood zone designations*. Retrieved from <https://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%2520Flood%2520Zone%2520Designations>
- Flickinger, R., Jr. (2008). *The City of Barberton, Ohio comprehensive annual financial report for the year ended December 31, 2008*. Barberton, OH: Author.
- Flickinger, R., Jr. (2009). *The City of Barberton, Ohio comprehensive annual financial report for the year ended December 31, 2009*. Barberton, OH: Author.
- Hamburg University of Technology. (n.d.). *Identifying stakeholders*. Retrieved from <http://daad.wb.tu-harburg.de/tutorial/integrated-flood-management-ifm-policy-and-planning->

aspects/social-aspects-and-stakeholder-involvement/stakeholder-involvement/identifying-stakeholders/

Larson-Troyer, R. (2009). *Barberton industry*. Unpublished manuscript, Barberton Public Library History Program, Barberton, Ohio.

National Flood Insurance Program. (n.d.). *Flooding & flood risks: Understanding flood risks*.

Retrieved from http://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/understanding_flood_maps.jsp

The Natural Hazards Research, & Applications Information Center. (1992). *Floodplain management in the United States: An assessment Report* (Volume 1, Summary Report). Boulder: University of Colorado.

Ohio Department of Natural Resources. (n.d.). *Flood maps & flood insurance studies*. Retrieved from <http://www.dnr.state.oh.us/tabid/4260/water/floodpln/mapinsur/tabid/3516/Default.aspx>

Pappas, G. (1989). *The magic city, unemployment in a working-class community*. Ithaca, New York/United States: Cornell University.

Summit County Emergency Management Agency. (2011). *Summit County hazard reduction & prevention plan* (Summit County Hazard Reduction and Prevention Plan). Akron, Ohio: Author.

U.S. Census Bureau. (2011). *Barberton city, Ohio* [Data file]. Available May 16, 2012, from American Fact Finder Web site: http://factfinder.census.gov/servlet/ACSSAFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=Barberton&_cityTown=Barberton&_state=04000US39&_zip=&_lang=en&_sse=on&pctxt=fph&p_gsl=010

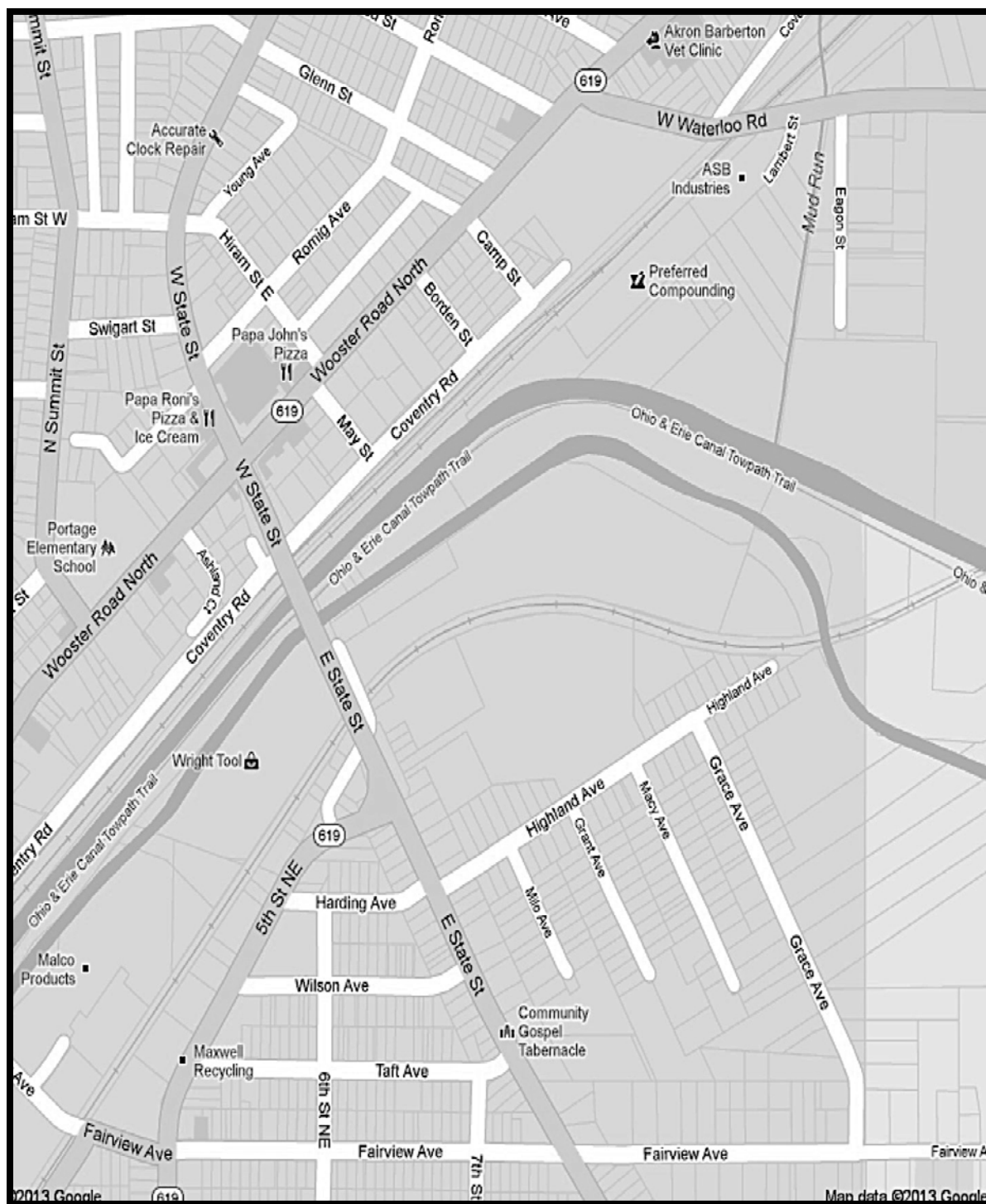
United States Fire Administration. (2012). *Strategic plan-Goals*. Retrieved from <http://www.usfa.dhs.gov/about/strategic/>

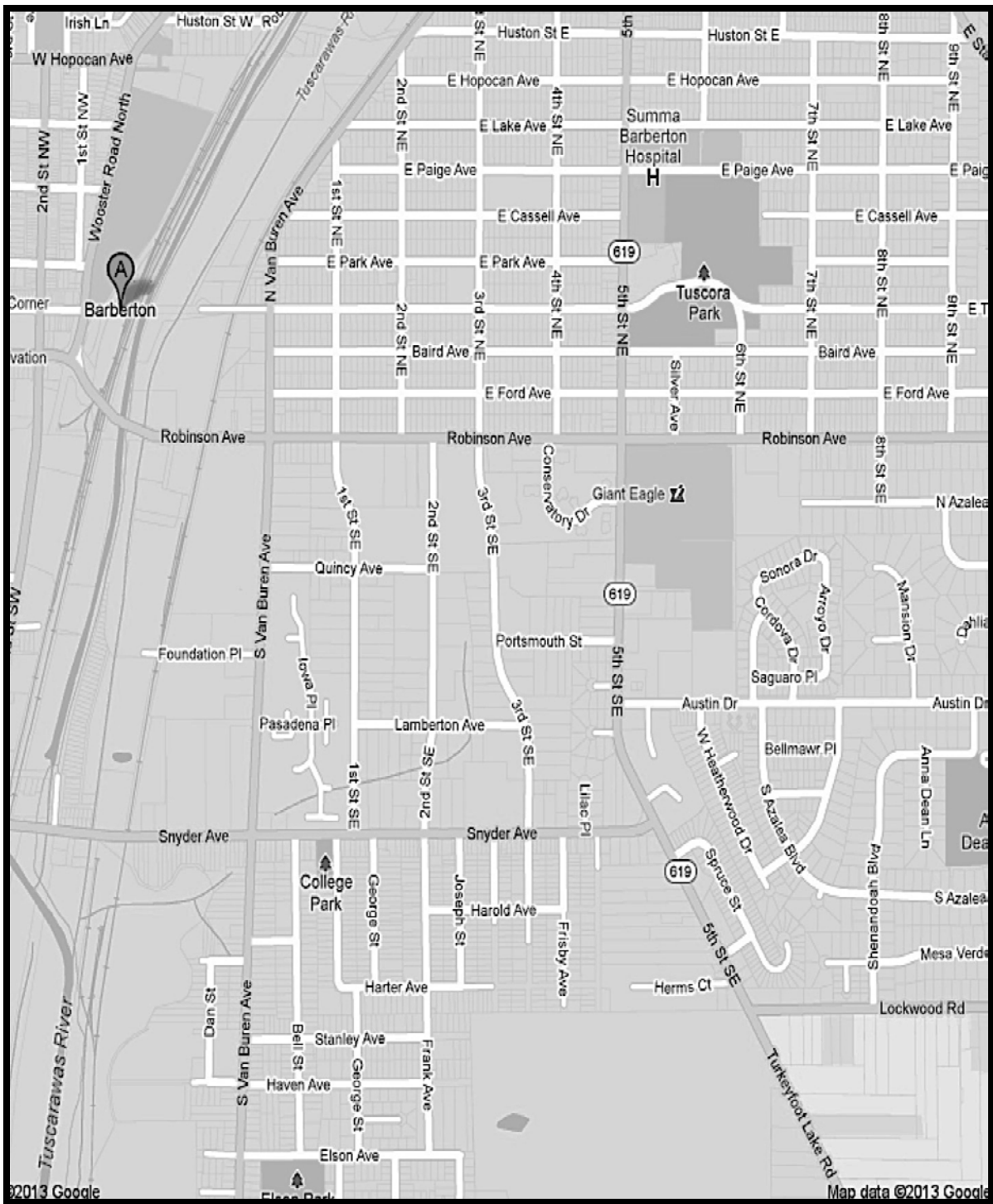
US Army Corps of Engineers. (2011). *Muskingum River Basin initial watershed assessment* (Huntington District). Huntington, West Virginia: Author.

Wright, J. M., & Monday, J. L. (1996). *Addressing your community's flood problems: A guide for elected officials* (FEMA 309). Madison, Wisconsin: ASFPM Executive Office.

This is a detailed street map of a portion of Minneapolis, Minnesota. The map shows a grid of streets, including W Hopocan Ave, W Wooster Rd, W Hudson Run Rd, and W Valley Ave. Parks shown include Edgewood Park, Conrad Park, and McCaffery Park. Landmarks like Milich's Village Inn and Hopocan Gardens are also marked. The map is oriented with North at the top.

Appendix B: Map South Barberton

Appendix C: Map- Mud Run, Coventry Rd. & Eagon St.

Appendix D: Map- 2nd SE, Lamberton Ave., Robinson Ave, & E. Tuscarawas Ave.

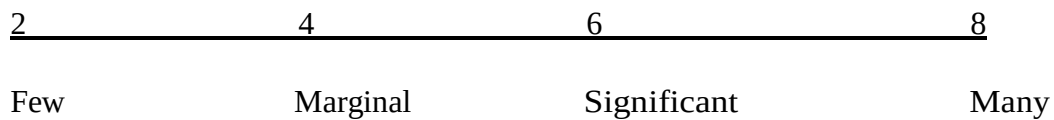
Appendix E: Summit County Hazard Prevention Plan

Summit County Hazard Vulnerability

Assessment Criteria

1.) Historical Occurrence

This estimate is based on the historical evidence contained in the Historic Hazard Profile.

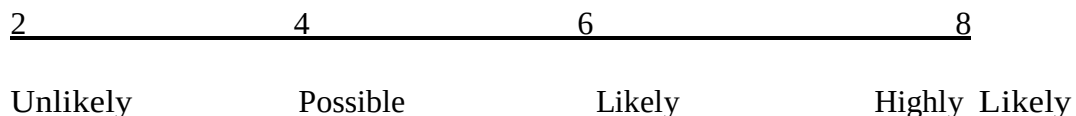


Few: Between 0 and 10 occurrences in the last 50 years. Marginal: Between 11 and 20 occurrences in the last 50 years. Significant: Between 21 and 30 occurrences in the last 50 years. Many: 31 or more occurrences in the last 50 years.

2.) Likelihood of Occurrence

Estimate the likelihood of each type of hazard occurring in Summit County. This estimate is based on the expertise of the subcommittee and their knowledge of the county and is not tied to historic data.

Assessing the potential threat from a hazard to a specific location could pose planning challenges. Although helpful in an objective analysis, historic data may have limitations. The potential for a threat may exist, but the lack of occurrences yields little or no data, making an analysis difficult. Historic data may not account for changes in land use, which may increase or decrease the vulnerability of a geographic area.



Unlikely: It is unlikely to have an incident within the next ten years.

Possible: It is possible to have an incident within the next ten years.

Likely: It is likely to have an incident within the next ten years.

Highly Likely: It is highly likely to have an incident in the next ten years.

3.) Size of Incident

Community Disaster- A large-scale emergency where a single community will operate under existing mutual aid or automatic response system.

County Disaster- When the threat to lives, property, and the environment depletes the resources of a community beyond ordinary practice. May also include mass casualty incidents or those involving two or more political sub- divisions. Summit County has declared a disaster.

State Declared Disaster- A disaster where resources from outside Summit County are necessary. State declares a disaster in Summit County.

Federal Declared Disaster- A disaster where resources from the federal government are needed. Federal government declares a disaster in Summit County.

<u>2</u>	<u>4</u>	<u>6</u>	<u>8</u>
Community	County	State	Federal

4.) Indirect Damage

This effect has also been called a secondary event. For example, an earthquake could cause a dam to fail, which in turn could cause flooding to homes and businesses. In this example, the earthquake (the original hazard) caused another hazard to occur (Flooding from the dam failure).

2 4 6 8 No

Possibility	Some Possibility	Much Possibility	High
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

Possibility

No Possibility: It is determined that this hazard could not initiate another hazard throughout the course of the event.

Some Possibility: There is at least a chance that one or two hazards may be caused as the result of the original event.

Much Possibility: There is a likely chance that 3 or 4 hazards may be caused as the result of the original event

High Possibility: There is a strong chance that more than 4 hazards can be potentially caused as a result of the original event.

5.) Warning Time

Warning Time has an effect on both the Population and Fiscal Impacts of a hazard.

The lead-time required to protect lives and property from a hazard varies greatly with each particular event. For example, drought may develop so slowly that there is time to dig a well, but flash floods can occur with no warning at all.

<u>2</u>	<u>4</u>	<u>6</u>	<u>8</u>
Long (over 60 minutes)	Medium (31-60 minutes)	Short (15-30 minutes)	Short-None (Under 15)

6.) Population Impact

Population Impact refers to the number of people affected via deaths and injuries that can be expected if a particular event occurs.

<u>2</u>	<u>4</u>	<u>6</u>	<u>8</u> No
Casualties	Low (1-11)	Medium (12-24)	High (25+)

7.) Fiscal Effects

Refers to the monetary losses suffered in an event. This type of vulnerability can vary greatly between communities based on economic, geographic, demographic, and legal considerations. For example: subdivisions that rigorously enforce floodplain regulations are likely to suffer far fewer fiscal effects than those permitting home and business construction in floodplains.

<u>2</u>	<u>4</u>	<u>6</u>	<u>8</u>
Minimum (\$0-10,000) \$100,000)	Low (\$10,000-50,000)	Medium (\$50,001-100,000)	High (Over

8.) Response Time

Response Time for a given hazardous event may vary greatly depending upon resources and capabilities. Response includes actions taken immediately before, during or just after an emergency occurs. Response activities are meant to save lives and minimize property damage. They also seek to reduce secondary damage and make recovery efforts faster and easier.

<u>2</u>	<u>4</u>	<u>6</u>	<u>8</u>
Low (Less than 24 hrs.) days)	Medium (1-5 days)	High (6-10 days)	Extreme (Over 10

Appendix F: Flooding & Mitigation Strategies in Barberton**February 25, 2012****FLOODING & FLOOD MITIGATION STRATEGIES IN BARBERTON****GENERAL INFORMATION**

FEMA offers a number of flood mitigation programs to minimize flood losses.

- Repetitive Flood Losses for Structures with Flood Insurance.
 - o Structures must presently carry Flood Insurance and have had two or more claims in a ten-year period.
- Repetitive Flood Losses for Structures in the Flood Plain
 - o A community Natural Hazard Mitigation Plan must be in effect to qualify for this program.
- Flood Control Programs
 - o Once again, a community Natural Hazard Mitigation Plan must be in effect to qualify for this program.
 - o These structural flood control programs are difficult to obtain.

All FEMA and US Army Corps of Engineer programs are competitive on a nationwide basis.

Given the degree of serious flooding that has occurred nationally in the last few years and a tightening of the Federal Budget, obtaining assistance is difficult.

AREAS OF BARBERTON FLOODING**14TH, 15TH & 16TH STREETS NW**

This area of Barberton has been subjected to flooding from Wolf Creek since the City was founded. The first FEMA floodplain maps of the area were published in 1981. The updated flood plain maps of 2009 did not show significant changes to this flood prone area. The majority of the

flooding is lower living levels and streets. This area appears to have a greater potential for assistance than other areas of the city.

FLOOD MECHANISMS

- Wolf Creek rises due to precipitation in Barberton and to the northwest.
- Rain events in the immediate area from 14th St. NW to 25th St. NW drain into Wolf Creek.
- The Betz Run Drainage that enters Wolf Creek at the BCF Ball fields extends well into Norton and drains a significant area.
- The primary instrument of flooding for the 14th through 16th St. NW area is that the storm sewers back up and are incapable of draining to Wolf Creek. When additional rainfall in this area and surface runoff from the areas to the west, it accumulates in the streets with nowhere to drain.

FLOOD MITIGATION STRATEGIES

- **Remove flood prone structures from the area.**
 - o This is preferred by the Ohio Emergency Management Agency (OEMA)
 - Once OEMA /FEMA purchase the property and the structure is removed, the property must remain undeveloped.
 - Undeveloped means open space only.
 - Using the property for other flood control purposes such as levees, pump stations, retention ponds and rain garden are not allowed.
 - The City of Cuyahoga Falls received a special exemption to construct a stormwater feature on FEMA purchased lots.

- o Property purchased by the city of other entities may be used for any purpose that conforms to Barberton's Floodplain and Stormwater Ordinances.
- **Flood Proof Structures in the Flood Plain**
 - o Residential Structures
 - Elevate the structure above the designated flood level including mechanical and electrical components.
 - Can only be done if the cost / benefit ratio justifies this.
 - Residential structures cannot be flood-proofed in-place.
 - o Commercial Structures in Flood Plain
 - Can be purchased and demolished.
 - Can be elevated to above the designated flood level.
 - Can be flood-proofed with levees, flood doors, and pump systems.
- **Install A Structural Flood Control**
 - o Levees, Pump stations, Flood Gates
 - Highly unlikely that funding can be obtained for this type of mitigation.
 - Very high initial cost and high maintenance costs.
- **Reduce Stormwater Entering Wolf Creek In Barberton**
 - o Diversion of 24th & 25th St. NW runoff into Hudson Run rather than Wolf Creek.
 - o Storage of stormwater from Norton on Hillsdale Ave.
 - o Rain Barrels & Rain Gardens.
- **Increase Storage Capacity of Wolf Creek.**

- o Enlarge Wolf Creek Floodplain from existing channel configuration.
 - Seiberling, BCDC, Wintrow, Alcoa, Midwest Rubber.
 - Joint purchase of floodplain in Norton.
- o Increase Wolf Creek Storage at the BCF Ball fields.

SOUTH BARBERTON FLOOD ZONE

This area of Barberton has been subjected to flooding since the area was first developed. This low-lying section of Barberton has been built up by filling in numerous former wetland areas for development. The first FEMA floodplain maps of the area were published in 1981 and the updated flood plain maps of 2009 have significantly increased the floodplain zone. The majority of the flooding is lower living levels and streets. Sewage backups are also a source of resident complaints.

FLOOD MECHANISMS

- The Tuscarawas River rises due to precipitation in Barberton and surrounding areas.
The drainage area of the Upper Tuscarawas Watershed encompasses southern Summit County and portions of Medina and Stark Counties.
- Flow from three major tributaries in Barberton into the Tuscarawas River is Wolf Creek, Hudson Run and Mud Run.
- Rain events in any part of the city will affect the South Barberton area.
- The primary instrument of flooding is storm sewers that back up, as they are unable to drain into the Tuscarawas River. Additionally, rainfall in the area along with surface water running off from the high ground to the east drains into the South Barberton area.

FLOOD MITIGATION STRATEGIES

- **Remove Flood Prone Structures From The Area.**
 - o This is preferred by the Ohio Emergency Management Agency (OEMA).
However, at this time, given the flood damages as defined by FEMA only a few structures appear eligible for this program.
 - o Property purchased by the city or other entities may be used for any purpose that conforms to Barberton's Floodplain and Stormwater Ordinances.
- **Flood Proof Structures in the Flood Plain**
 - o Residential Structures
 - Elevate the structure above the designated flood level including mechanical and electrical components.
 - Can only be done if the cost / benefit ratio justifies this.
 - Residential structures cannot be flood-proofed in-place.
 - City must have a Natural Hazards Mitigation Plan in place to be eligible for funding.
- **Install A Structural Flood Control**
 - o Examine a flood control gate and pump system for this area.
 - Topography of this area appears to favor this type of system.
 - A single gate and a small pump station may keep costs low.
 - A nearby area appears suitable for a safe diversion of the floodwater.
 - Outside funding for this type of project is unknown.
- **Reduce Stormwater Entering The Tuscarawas River in Barberton**
 - o Any storage of runoff in the city will benefit the South Barberton Area.

- o Rain Barrels & Rain Gardens.
- **Increase Storage Capacity of The Tuscarawas River**
 - o A large undeveloped parcel of land within the floodplain and riparian area could be available for purchase.
 - o This area, south of Snyder Ave. and west of Van Buren is presently owned by the Wheeling & Lake Erie Railroad.

31st STREET – HUDSON RUN FLOOD ZONE

A number of single-family and apartment structures have been subjected to flooding over the years. The FEMA floodplain maps of 1981 did not show these areas within the 100-year flood zone. However, the 2009 updated FEMA flood plain maps have extended the flood zone into these areas.

FLOOD MECHANISMS

- Hudson Run experiences a rapid rise in floodwaters during heavy rainfall events in the northwest Barberton and Norton areas. Flood conditions along Hudson Run are also complicated by two dams operated by PPG. The Lake Dorothy Dam lies approximately one-half mile upstream of the Barberton Corporate Line and the Columbia Lake Dam is about three-quarters of a mile downstream from Wooster Road.

FLOOD MITIGATION STRATEGIES

- **Remove Flood Prone Structures From The Area.**
 - o This is preferred by the Ohio Emergency Management Agency (OEMA). At the present time, no structure is eligible for a FEMA sponsored purchase.

- o Property purchased by the city of other entities may be used for any purpose that conforms to our Floodplain and Stormwater Ordinances.
- **Flood Proof Structures in the Flood Plain**
 - o Residential Structures
 - Elevate the structure above the designated flood level including mechanical and electrical components.
 - Can only be done if the cost / benefit ratio justifies this.
 - Residential structures cannot be flood-proofed in-place.
 - City must have a Natural Hazards Mitigation Plan in place to be eligible for funding.

Reduce Stormwater Entering Hudson Run

- o The city has been studying a plan for a constructed wetland in Edgewood Park. This would reduce inflow to Hudson Run from 25th to 27th St. NW.
- o Rain Barrels & Rain Gardens.
- **Increase Storage Capacity of Hudson Run**
 - o A large undeveloped parcel of land within the floodplain west of 31st St. NW could be available for purchase.

MUD RUN – COVENTRY ROAD - EAGON STREET FLOOD ZONE

This is primarily a commercial-industrial area with a few older residential structures. Most of the property in the area lies within the FEMA 100 year Flood Zone.

FLOOD MECHANISMS

- Flooding occurs when high water levels on the Tuscarawas River backup Mud Run. This combined with flow in Mud Run coming down from Akron cause flooding to occur.

FLOOD MITIGATION STRATEGIES

- **Remove Flood Prone Structures From The Area.**
 - o This is preferred by the Ohio Emergency Management Agency (OEMA). At the present time, no structure is eligible for a FEMA sponsored purchase.
 - o Property purchased by the city or other entities may be used for any purpose that conforms to our Floodplain and Stormwater Ordinances.
 - o Some of the industrial buildings lie within a portion of the floodway where debris and erosion can inflict additional damage to structures.
 - o City must have a Natural Hazards Mitigation Plan in place to be eligible for funding
- **Flood Proof Structures in the Flood Plain**
 - o Residential Structures
 - Elevate the structure above the designated flood level including mechanical and electrical components.
 - Can only be done if the cost / benefit ratio justifies this.
 - Residential structures cannot be flood-proofed in-place.
 - Commercial and industrial building can be flood-proofed to minimize the effects of high water.
 - City must have a Natural Hazards Mitigation Plan in place to be eligible for funding
- **Increase Storage Capacity of Mud Run**

- o A low-lying area of Harter Park incurs shallow flooding from surface runoff during heavy rain events. Reconfiguring the park topography could allow Mud Run to overflow into the park.
- o Any improvements in the Mud Run drainage affect the entire Tuscarawas River in Barberton.

ROBINSON AVE. – EAST TUSCARAWAS AVE. FLOOD ZONE

This residential area suffered some of the most damage in the 2007 and 2011 flood events. In both of these instances the stormwater retention pond was unable to contain the stormwater runoff and overflowed the levee. The rushing waters filled some residences with over six of water and required a boat evacuation of an elderly resident by city safety forces. This pond was constructed in the mid-1970s, primarily for the new east side residential neighborhoods.

FLOOD MECHANISMS

- During heavy rainfall events in the East Barberton and Coventry Township areas, the stormwater runoff can exceed the present capacity of the retention pond. Development of new residential areas are adding to the system's capacity. Drainage from this area flows directly into the Tuscarawas River and affect all downstream flood zones in Barberton.

FLOOD MITIGATION STRATEGIES

- **Remove Flood Prone Structures From The Area.**
 - o The City is in the process of purchasing an adjacent one-acre residential property. The structure that has previously flooded a number of times will be demolished.
- **Flood Proof Structures in the Flood Plain**
 - o Residential Structures

- Elevate the structure above the designated flood level including mechanical and electrical components.
- Residential structures cannot be flood-proofed in-place.
- **Increase Storage Capacity of the Drainage Area**
 - o A study commissioned by the City in 2007 analyzed the retention pond and the surrounding drainage area. The report stated that the pond was capable of containing the design 100-year storm. However, the two storms that resulted in overtopping the pond significantly exceeded the design storm.
 - o With the purchase of the adjacent property, the City plans to increase the storage capacity and configure the site to meet current EPA Standards for Water Quality.
 - o In the 1980s, the downstream outlet from the retention pond was converted from an open waterway to an enclosed culvert. This change has resulted in a reduction in floodwater capacity.
 - o The City has a utility corridor at E. Tuscarawas Ave. and State St. This also serves as a shallow overflow basin. However, the capacity is very limited and it can detrimentally affect nearby residences. A comprehensive plan covering all three of these features should be initiated. In 2011, the City prepared a grant application for the retention pond alone and this was rejected. We will be submitting a future grant application for design studies.
- **Reduce Stormwater Entering The Tuscarawas River**
 - o The present storm sewers along Robinson Ave. discharge directly into the culvert downstream of the retention pond. Relocating these to the proposed

increased storage area of the retention pond would reduce some stormwater from going directly to the Tuscarawas River during storm events.

- o Rain Barrels & Rain Gardens
 - The large lots and abundance of gardens in the immediate area, make this a prime candidate for inclusions of the stormwater reduction features.

2nd STREET SE – LAMBERTON AVE. FLOOD ZONE

This residential area of single-family homes and three apartment complexes has suffered serious flooding, especially in the 2007 flood events.

FLOOD MECHANISMS

During heavy rainfall events on the east side of Barberton, runoff exceeds the capacity of existing drainage systems. Water overflows the local waterway, floods 2nd St. SE and the local structures. While new development in the area is required to construct stormwater storage, the intensity of recent storms exceeds their design capacity. Drainage from this area flows directly into the Tuscarawas River and adversely affects the South Barberton flood situation.

FLOOD MITIGATION STRATEGIES

- **Flood Proof Structures in the Flood Plain**
 - o Apartment Complexes
 - Construct barrier systems to minimize flooding.
 - Outside funding is questionable.
 - Flood-proof where feasible.
- **Increase Storage Capacity of the Drainage Area**
 - o The area requires a study to evaluate potential stormwater storage for this area.

- o Older commercial complexes were constructed prior to stormwater storage requirements and contribute greatly to the problem water runoff.

ADDITIONAL AREAS, NOT IN THE FLOODPLAIN, EXPERIENCING PROBLEMS

17TH ST. NW - Runoff from Norton flows south on 17th St. NW flooding yards and approaches foundation walls on structures. An existing storm sewer system is inadequate for the water. While moving the water off 17th St. and the yards is feasible, transmitting this amount of water down a steep slope will create additional problems downstream. As this runoff goes to Wolf Creek, storage is essential to any improvement plan.

AREA EAST OF 5TH ST. NE – A number of neighborhoods are experiencing significant amount of stormwater accumulations in their yards. The depths can exceed two feet and outlying structures are affected. Rapid draining of these areas will increase flow to the major waterways and the construction of additional detention ponds, underground storage chambers and infiltration basins will be needed.

19TH AND 21ST STS. NW – Sections of the streets have low-lying areas that collect runoff in moderate to heavy rain events. The existing storm sere system has difficulty in handling large amounts of runoff. The runoff water overtops the curbs and flows into residences. The July 19, 2011 flooding resulted in three basement wall failures.

VAN- HYNING NEIGHBORHOOD – Moderate to heavy rain events result in storm water overtopping the curbs and flowing into residences.

ORCHARD STREET AND EVERGREEN AVE. – A natural basin at this intersection overwhelms the existing drainage system and causes flooding.

Appendix G: 2011 Emergency Flood Program- Transportation**2011 Emergency Flood Program- Transportation**

Program application date is 7/21/2011 until 7/31/2011

SCOPE: Due to the damages that were a result of the extreme storm activity on July 19, 2011, the City of Barberton has recognized a need for assistance. Due to this extreme weather event The City of Barberton is establishing a program to assist residents of Barberton. This program will allow for assistance by offering up to a two-week voucher from METRO for transportation. Any application for assistance should be filed concurrently with your own insurance claim.

DEFINITION: Up to a two week voucher will be issued through METRO to assist with transportation needs.

ELIGIBILITY: Resident of Barberton

Flood damage that has rendered vehicle inoperable

Damage must be documented and verified by Flood Damage Spreadsheet in Engineering Dept.

LIMITS: One voucher per damaged vehicle

No more than 2 vouchers per household

PROCESS: Application – Pick up from Planning Dept.

Verification of Damage from Engineering Dept. Spreadsheet

Verification of Vehicle ownership

Verification of Proof of Insurance

Verification of Residency

Approval of Application

Applicant will pick up Voucher at City Hall

Applications can be obtained from the Barberton Planning Department, which is located on the 3rd floor of the Barberton Municipal Building, 576 West Park Ave. Office hours are from 8:00am until 4:00 pm Monday through Friday. For questions please contact Assistant Planning Director Joe Stefan at 330-848-6729.

Appendix H: 2011 Emergency Flood Program- Clean Up**2011 Emergency Flood Program-Clean Up**

Program application date is 7/21/2011 until 7/31/2011

SCOPE: Due to the damages that were a result of the extreme storm activity on July 19, 2011, the City of Barberton has recognized a need for assistance. Due to this extreme weather event, The City of Barberton is establishing a program, while funds last, to assist residents of owner occupied homes. This program will allow for assistance up to \$500 per household to help with payment of an approved contractor for **Emergency Clean Up** as a result of this event. Any application for assistance should be filed concurrently with your own insurance.

DEFINITION: Emergency Clean Up may include the removal of water-damaged items from the flooded area. All rubbish should be placed in the area normally used for rubbish removal. Clean up could also include cleaning and disinfection of flooded area.

ELIGIBILITY: Owner Occupied House

Income Qualified (verification of location in qualified census tract)

Non-Income Qualified (Storm water funds)

Must be documented and verified by Flood Damage Spreadsheet

LIMITS: Limit of \$500. Per household.

Emergency clean up of damage caused by flooding in an occupied dwelling

PROCESS: Application – Pick up from Planning Dept.

Verification of Damage from Engineering Dept. Spreadsheet

Approval of Application

Resident will contact contractor to schedule work upon approval:

Call Marlene @ Cardinal Environmental (330) 252-1123

Resident will identify self as part of the Barberton Program

Cardinal will schedule arrival time

After work is complete Cardinal will issue an invoice to the applicant

Proof /Verification of work completion by City Officials and Resident

Upon presentation of invoice and work verification the City will assist with

payment to the contractor of up to \$500.00

Applications can be obtained from the Barberton Planning Department, which is located on the 3rd floor of the Barberton Municipal Building, 576 West Park Ave. Office hours are from 8:00am until 4:00 pm Monday through Friday. For questions please contact Assistant Planning Director Joe Stefan at 330-848-6729.

Appendix I: Barberton Flood Risk and Vulnerability Assessment

City of Barberton Flood Risk & Vulnerability Assessment										
1- Little to no probability/vulnerability of hazard.										
2- Some probability/vulnerability of hazard.										
3- Average probability/vulnerability of hazard.										
4- Increased probability/vulnerability of hazard.										
5-Greatest probability/vulnerability										
U- Unknown										
Hazard Criteria	14 th , 15 th & 16 th Streets N.W.		31 st N.W. & Hudson Run		South Barberton		Mud Run, Coventry Rd., & Eagon St.		Robinson Ave. & E. Tuscarawas and 2 nd St. S.E. & Lamberton Ave.	
Historical Occurrence	P5	V5	P2	V3	P5	V5	P2	V3	P2	V3
Likelihood of Occurrence	P5	V5	P2	V2	P5	P5	P2	V3	P1	V1
Size of Incident	P5	V5	P2	V2	P5	P5	P1	V1	P1	V1
Indirect Damage	P5	V5	P3	V3	P5	V5	P2	V2	P2	V2
Warning Time	P4	V2	P2	V2	P4	V5	P2	V2	P2	V2
Population Impact	P5	V5	P2	V2	P5	V5	P2	V2	P3	V3
Fiscal Effects	U	U	U	U	U	U	U	U	U	U
Response Time	P2	V2	P2	V2	P2	V2	P2	V2	P2	V2

Completed February 23, 2013 by Robert L. Pursley, Jr.