City of University City

COMMISSION ON STORM WATER ISSUES
VIA VIDEOCONFERENCE
Tuesday, January 5, 2021
6:30 p.m.

IMPORTANT NOTICE REGARDING PUBLIC ACCESS & PARTICIPATION

On March 20, 2020, City Manager Gregory Rose declared a State of Emergency for the City of University City due to the COVID-19 Pandemic. Due to the ongoing efforts to limit the spread of the COVID-19 virus, the January 5, 2021 meeting will be conducted via videoconference.

Observe and/or Listen to the Meeting (your options to join the meeting are below):

Webinar via the link below:

https://us02web.zoom.us/j/87941258159?pwd=MGVrdkptRE9Ua0d6dW5JekFMUFF4UT09

Password: 989598

Audio Only Call

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Webinar ID: 879 4125 8159

Citizen Participation and Public Hearing Comments:
Those who wish to provide a comment during the "Citizen Participation" portion as indicated on the agenda; may provide written comments to Sinan Alpaslan ahead of the meeting.

ALL written comments must be received **no later than 12:00 p.m. the day of the meeting.** Comments may be sent via email to: salpaslan@ucitymo.org, or mailed to the City Hall – 6801 Delmar Blvd. – Attention: Sinan Alpaslan. Such comments will be provided to Board/Commission member prior to the meeting. Comments will be made a part of the official record and made accessible to the public online following the meeting.

Please note, when submitting your comments, a **name and address must be provided.** Please also note if your comment is on an agenda or non-agenda item. If a name and address are not provided, the provided comment will not be recorded in the official record.

The City apologizes for any inconvenience the meeting format change may pose to individuals, but it is extremely important that extra measures be taken to protect employees, residents, and elected officials during these challenging times.

A G E N D A

COMMISSION ON STORM WATER ISSUES MEETING

January 5, 2021 at 6:30 p.m.
Via Zoom

1. **MEETING CALLED TO ORDER**

2. **ROLL CALL**

3. **APPROVAL OF AGENDA**

4. **APPROVAL OF MINUTES**

5. **CITIZEN PARTICIPATION**

Procedures for submitting comments for Citizen Participation and Public Hearings:
ALL written comments must be received **no later than 12:00 p.m. the day of the meeting.** Comments may be sent via email to: salpaslan@ucitymo.org, or mailed to the City Hall – 6801 Delmar Blvd. – Attention: Sinan Alpaslan. Such comments will be provided to the Commission on Storm Water Issues members prior to the meeting. Comments will be made a part of the official record and made accessible to the public online following the meeting *Please note, when submitting your comments, a* ***name and address must be provided.*** *Please also not if your comment is on an agenda or non-agenda item. If a name and address are not provided, the provided comment will not be recorded in the official record.*

6. **NEW BUSINESS**
   a. Communications Subcommittee Report – Discussion (See Attachment #1)
   b. Length of meeting goal - Discussion

7. **OLD BUSINESS**
   a. Bylaws – Update and discussion
   b. Flooding Early Warning System – Update
   c. Trash Trap project - Update
   d. Establishment of storm water-related database in University City (including complaints tracking from earlier discussions at meetings) – Update/Discussion
   e. Request for Proposals/Qualifications for Storm Water Master Plan – Discussion (See Attachment #2)

8. **MISCELLANEOUS BUSINESS**

9. **COUNCIL LIAISON COMMENTS**

10. **ADJOURNMENT**

Please call (314) 505-8572 or email salpaslan@ucitymo.org to confirm your attendance.

ATTACHMENT #1

Flood Frequency, Impacts and the Need for Educating University City Residents

draft 3b 10/4/20

Robert Criss, Eric Stein, and Eric Karch
Members, University City Commission on Storm Water Issues

Summary. Every year, flooding of the River des Peres, yard and street flooding, sewer backups, and associated problems affect numerous homes and businesses in University City, and cause millions of dollars in average annual property damage. Heavy rainfall delivered within 1 to 2 hours is the primary cause, given that 43% of the land in University City is impervious. These problems are magnified by combined sewer lines, inadequate storm water detention, and undersized or clogged drains, culverts, and bridge underpasses. Heavy rainfall due to the Hurricane Ike remnant of 9/14/08 caused the most devastating recent flood, but flood levels in 2013, 2014, 2019 and 2020 were only one foot lower, and the floods of 1915 and 1957 were probably significantly higher. Flooding of most land within the regulatory, "100 year flood zone" mapped by FEMA occurs far more frequently than generally understood, given that most of that acreage lies within the "10 year" flood zone. Flood plain residents need to be informed of these issues and of simple, inexpensive steps they can take to mitigate flood damage to their homes. Simple signage of historical flood water levels along city sidewalks would also be an inexpensive and effective way to communicate flood hazard to the general public. These and additional recommendations appear at the end of this report.

University City Flood Records and Impacts. Many properties in University City have repeatedly experienced significant flooding. The mapped width of the regulatory floodplain is as much as 1000 feet wide in parts of University City (FEMA 2015a). This zone is inundated by a hypothetical "base flood", specifically by a flood having a 1% chance of occurrence in any given year, which is commonly but misleadingly called a "100-year" flood. Street flooding, yard flooding, sewer backups in basements, and other problems also affect many University City residents.

Table 1 provides the stages and equivalent elevations of the twelve highest water levels recorded at the Purdue Ave. footbridge over the River des Peres in Heman Park, which is where USGS stream gauge 07010022 is located (USGS, 2020). All other annual floods since 1997, when continuous recording began, were more than 0.8 feet lower than these top twelve floods. Most or all of these twelve floods damaged many University City homes and several apartments. The 2008 flood (#2) damaged 2234 properties in St. Louis County (Wilson, 2008), and caused two fatalities only 0.3 miles west of the Purdue Ave. gauge (StLPD, 2011).

Several items are of interest. First, taking the Table 1 entries at face value, the 1957 flood was more than 2.5 feet higher than the devastating 2008 flood. Part of this difference may be due to an inconsistent reporting datum, but available narratives and photos of the 1957 and 1915 floods provide ample cause for concern. Though not included in Table 1, the devastating flood of August 1915 may have been highest of all; this flood caused 11 fatalities and the loss of more than a thousand homes in St. Louis, and provided justification for a series of major channelization and tunneling projects along much of the River des Peres (ASCE, 1988).

Second, the frequency of serious floods of both local creeks and our major regional rivers appears to be increasing (e.g., Criss and Luo, 2016, 2017). For example, half of the entries in Table 1 postdate 2008, even though gauge 07010022 has operated continuously since 1997 (USGS, 2020).

Finally, the third to seventh highest floods in Table 1 all attained a nearly uniform level of 508.28-508.40 feet above sea level; this uniformity strongly suggests that at this level, the flow of water is impeded a short distance downstream, and begins to "pond up". Water backup might result if the

Kingsland Ave. entrance to the large River des Peres drainage tunnel is too small to convey the high flows associated with this level, as suggested by FEMA (1977). Alternatively, the clearance beneath the Pennsylvania Ave bridge only 1800 feet downstream of the gauge appears to be too small to efficiently pass high flows.

Table 1. Twelve Highest Recorded Floods at Purdue Ave., University City*

Rank	Date	Stage, ft	Elevation, ft. MSL	Reference
1	June 14-15,1957	19.96	511.93	Hauth & Spencer 1971 p.13
2	Sept. 14, 2008	17.40	509.37	USGS 2020
3	Sept. 9, 2014	16.43	508.40	#
4	June 17, 2013	16.42	508.39	#
5	Aug. 9, 2020	16.39	508.36	#
6	July 22, 2019	16.35	508.32	#
7	June 26, 2003	16.31	508.28	#
8	June 6, 2011	16.04	508.01	#
9	May 27, 2009	15.82	507.79	#
10	June 12, 1999	15.74	507.71	#
11	May 27, 2004	15.56	507.53	#
12	June 23-24 1970	15.56	507.53	Hauth & Spencer 1971 p.13

*Elevation and stage were interconverted using the USGS gauge zero datum of 491.97.
The 1915 flood had unknown stage and is not included.

Probabilistic Flood Levels, University City. In addition to its map of the area subject to inundation by the "base flood" (FEMA 2015a), FEMA tabulates probabilistic flows at many sites within University City, including the site on Purdue Ave. Separate plates 206P and 207P show the associated water levels that these hypothetical floods would attain. The computational protocol used by FEMA is very complicated and is fundamentally based on their calculated discharges. Nevertheless, FEMA's estimates of the water elevations for different recurrence intervals at the Purdue Ave. site (right column of Table 2) compare favorably with levels calculated by us using a normal distribution and also with the "simple method" of Criss (2016), which both analyzed the measured annual peak stages, not the estimated discharges, at gauge 07010022 (USGS, 2020).

Table 2. Estimated water levels for various floods at the Purdue Ave stream gauge #07010022

Return Period, years	K factor	Normal Distribution Stage & Elevation*, Mean=14.25; SD=2.232	Trend Corrected Stage & Elevation* (Criss 2016)	Water Levels and flows FEMA (1977, 2015)
2	0.00000	14.25 506.22	15.26 507.23	
5	0.84162	16.13 508.10	16.56 508.54	
10	1.28155	17.11 509.08	17.25 509.22	509.0 4600 cfs
25	1.75069	18.15 510.12	17.97 509.94	
50	2.05375	18.83 510.80	18.44 510.41	510.0 7200 cfs
100	2.32635	19.66 511.41	18.87 510.84	511.2 8500 cfs
200	2.57583	20.00 511.97	19.25 511.22	
500	2.87816	20.67 512.6	19.72 511.69	512.8 11600 cfs

*Stage in feet calculated for a normal distribution or by using method 1 of Criss (2016), based on processing annual peak stage data (USGS (2020).
The corresponding elevations in feet MSL were calculated by adding the USGS gauge zero datum of 491.97'.

When evaluating FEMA map products, it is important to remember that an area subject to inundation by the base flood can be inundated much more frequently than the popular, "100 year" designation would suggest. Figure 1 is a topographic profile we constructed perpendicular to Wilson Ave., a short distance west of gauge 07010022, near the site of the 2008 flood fatalities. This vertical “slice” through the area shows the steep, narrow channel of the River des Peres and its surrounding floodplain, all encased within its larger valley. The FEMA probabilistic flood levels for this section are shown by horizontal lines. Importantly, note that almost all of the land area within the mapped “100-year” zone is also in the “50 year” flood zone, and most of the latter area is within the “10 year” flood zone. Clearly, much of the land in the River des Peres floodplain is subject to flooding every few years.

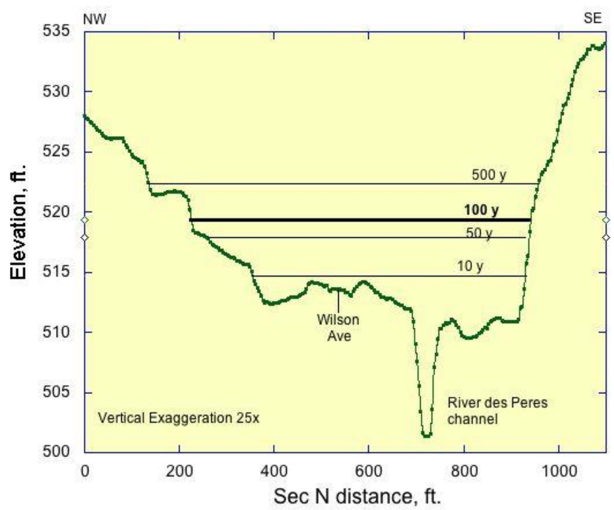

Figure 1. left. Topographic profile constructed from detailed, 1-meter resolution lidar data, available from MSDIS (2019) along line N of flood map 29189C0212K (FEMA 2015a). The line is directed N54W and shows the relation of the River Des Peres channel to surrounding land. The water levels that FEMA calculates for floods having 10, 50, 100 and 500 y recurrence intervals were taken from plate 206P of FEMA (2015b). The ~700’ width of the regulatory, 100 year flood plain is indicated by the length of the heavy horizontal line, whose area is shown on the flood map (FEMA 2015a). Most of the area within this “100 year” flood zone is in the “10 year” flood zone.

Figure 1. right. Photo schematically illustrating the “100 year” and “5 year” flood levels (blue horizontal lines) at a home on Wilson Ave., from USACE (2017). Note that these alleged levels are significantly higher than those indicated by FEMA (2015b, plate 206P) for this particular site.

Suggested Signage to Indicate Flood Levels, University City. Monuments, plaques, staff gauges and signs are used in cities throughout the world to indicate historical flood levels. The interest of the general public in these simple yet informative signs is indicated by the number of photos taken by a passerby of a companion who is pointing to these levels. Most such signage is found near large, continental rivers. Figure 2 shows several examples of flood level notations, ranging from simple signs to elaborate plaques.

Note that most of the levels indicated near large rivers are of events that occurred many decades or even a century ago. Yet, indications of the high water levels attained during the flash flooding of urban creeks are rare, but would be far more important to many St. Louis residents. Figure 3 shows notations of water levels that were scribed by workers on the wall of a local warehouse in the Deer Creek floodplain, which convey the frequency of Deer Creek flooding and the inventory damage they repeatedly witnessed. University City would do well to install signs showing historical water levels in its low-lying parks, sidewalks, and bridges near the River des Peres.

Figure 2. Examples of plaques and signage indicating historical flood levels along Major Rivers. Photos by Criss.

Top left: Paducah Kentucky near the confluence of the Ohio and Tennessee Rivers, showing the level attained by the record flood of 1937.

Top right. Plaque showing the 3 highest Yangtze River floods, 1954 (all-time record), 1998 and 1931; the latter had 300,000 fatalities. These events provided much of the justification for construction of the giant, Three Gorges Dam.

Bottom Left. Staff gauge along Katy Trail, St. Charles, MO, showing the level attained by the 1993 flood and others.

Bottom right. Simple sign on power pole, Labadie MO, showing the record 1993 level of the Missouri River.

Figure 3. Left. Examples of Flood Marks scribed on the wall of a warehouse in the Deer Creek floodplain, Rock Hill, St. Louis County, MO. White lettering was added to highlight the levels and dates written on the wall. This photograph was taken in 2008, and numerous floods have occurred along Deer Creek since then. Floods prior to this record may have overtopped the Sept. 14, 2008 level. Damaging floods frequently occur on small creeks in St. Louis County. Right: Detail showing two marks located on the horizontal board to the left of the fire extinguisher. Photos by Criss.

USGS Rating Table. Criss and Nelson (2020) provide a detailed analysis of USGS gauges in St. Louis County, and used the Purdue Ave. gauge as a specific example. They also developed a mathematical inverse method and associated algorithm to construct simple analytical equations that closely approximate most USGS rating tables.

Figure 4 shows the dependence of discharge and measured stage at gauge 07010022, as alleged by the USGS rating table (blue dots), and by FEMA (1977, 2015b Table 2) for large probabilistic floods. The red curve is the fit to the USGS rating table. Criss and Nelson (2020) explain why the indicated power of 1.58 in this fit is too small to be physically realistic, which suggests that the underlying problem lies with a poorly calibrated rating table. The four FEMA points likewise agree poorly with the USGS rating table, and the flows computed by FEMA are much too large to be conveyed through the tunnel a short distance downstream. Moreover, Southard (2010) estimates that the "100 year" discharge at gauge 07010022 would be 7470 cfs, a value much lower than the 8500 cfs flow estimated by FEMA (1977; 2015b), yet even this flow is far off-scale the USGS rating table. Thus, there is little basis for statistical analysis of discharge to estimate flood frequency (e.g., Criss, 2016; Criss and Luo, 2017). It is fortuitous but fortunate that there is good agreement between the statistical flood analysis based on the methodology of Criss (2016), which is based on simple processing of observed, accurately measured water levels, and the FEMA and USGS analyses, which are based on the statistical analysis of hypothetical or estimated flows (Table 2).

Criss and Nelson (2020) also demonstrated that the elevation datums reported by USGS for several gauges on local creeks disagree greatly with modern lidar-based elevation data. Fortunately, agreement between available data at gauge 07010022 is reasonably good (Table 3). Nevertheless, for several reasons discussed by Criss and Nelson (2020), the lowest lidar point on any channel transect is typically several inches higher than the actual channel bottom. Thus, the lidar and MSD data in Table 3 both suggest that the USGS gauge zero might be several inches too high.

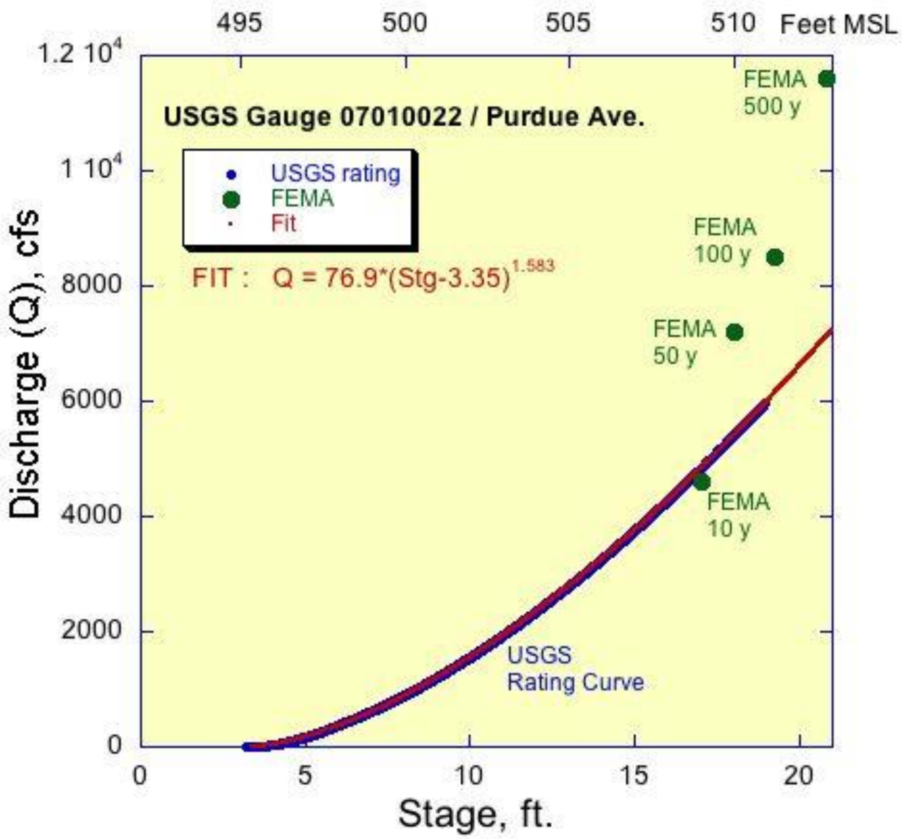

Figure 4. Discharge vs. stage relationship for the River des Peres gauge 07010022at University City, located at Purdue Ave. Lower horizontal scale indicates local stage; upper horizontal scale converts that stage to elevation relative to sea level. Blue, overlapping dots depict the entries in the USGS (2020) rating table for this site, tabulated every 0.01 ft. The thin red curve and indicated equation is the power-law fit to that USGS table computed by Criss and Nelson (2020). The four large, green dots are the estimated flows, and associated stages, for the 10, 50, 100 and 500 year floods computed by FEMA (1977; 2015b) for this site (Table 2).

Table 3. Elevation of the Channel Bottom at Gauge 07010022

Agency	Gauge Zero, ft. MSL	Channel Bottom, ft. MSL
USGS (2020)	491.97	495.32*
MSD map 17J; 60" RCP invert		494.48
MSDIS Lidar (Criss & Nelson)		495.13

*Assuming a correction of 3.35' for stage at zero discharge, after Criss & Nelson (2020)

Photo documentation of Flooding. Information of past floods could be improved by citizen information including flood marks such as those in Figure 3, as well as by photographs and videos of recent and prior events (e.g., You Tube, 2008). Security camera footage might be available for businesses along the River des Peres, which typically include an accurate time stamp, and could reveal valuable information about flood levels and timing. Video cameras are being used in Ellicott City, MD as part of an early warning system; these short films reveal details about problems such as clogging of culverts and bridge underpasses, and also provide residents with dramatic visualizations of the realities of flooding in their neighborhoods (Ellicott City, 2020).

Home Floodproofing and the Need to Educate Flood Plain Residents. The floods described above (Table 1) have caused significant damage to many homes in University City. In some cases, water levels were high enough to enter the first floor of homes but more commonly stopped short of that, instead entering basements via windows, walkout stairways, or basement garage doors. While not as catastrophic as main floor flooding, the damage to HVAC systems, water heaters, washers/dryers, electrical panels and items stored in the basement can be very high. Because NFIP flood insurance pays on actual cash value instead of replacement value, the cost can be significant even for those with flood insurance. In many of these cases, some relatively inexpensive mitigation techniques could have prevented or at least minimized damage. Despite this, members of the city's Storm Water Task Force, the predecessor to the Storm Water Commission, found that few were aware of these strategies (SWTF, 2019).

Some strategies can be very simple: In the August 9, 2020 flood, water rose to a depth of about 1 ft. on the foundation of a house near the Groby bridge that had below-grade basement windows. The depth of water in the window wells exerted sufficient pressure on the windows to break glass, allowing flood waters to enter, which ruined a number of expensive items stored in the basement. The resident had just purchased the home and had no idea this could happen. She subsequently had barriers installed to keep flood water from entering the window wells in future floods (Stein, 2020). This is an example of a scenario where a little foreknowledge and a few hundred dollars could have prevented a significant loss from a flood that was only 1 ft. deep on a foundation for perhaps 45 minutes before receding. We need to do a better job in educating floodplain residents in this regard. Not all homes can be this simple to mitigate. In the September 14, 2008 flood, water rose to a depth of 24" for about 2 hours on a home near the Shaftsbury bridge, and entered the basement to a depth of 7 ft. by breaking basement window glass as well as pouring down the walkout stairwell, caving in the basement door. Sanitary sewer overcharge also contributed via the basement floor drain. The homeowner subsequently replaced all basement windows with glass block windows, built a floodwall with a lift-out floodgate around the stairwell, and devised a method to keep sewer overcharge from entering the basement (Stein, 2014; Stein and Fuhler, 2005). This homeowner possessed the technical knowledge and skills to accomplish these but there are others with homes subject to similar flooding problems are not aware of these strategies.

Mitigation methods vary depending on the situation. The examples above, where water is denied entry to the home, is referred to as "dry floodproofing". In flood-prone houses that have basement garages, it is almost impossible to prevent water from entering the basement so a different mitigation strategy, called "wet floodproofing" is used. In this case, water is allowed to enter but steps are taken to minimize damage to the interior, such as elevating the HVAC system and water heater. Still other mitigation strategies are needed to address stormwater problems other that flooding from streams, such as runoff, yard ponding, and sanitary sewer overcharge.

To compound the problem, an inappropriate mitigation strategy can do more harm than good. For instance, if a lot slopes off to the rear so that ground level on the rear of the house is at basement floor level, floodwater that is 1 ft. deep at the front of the house might be several feet deep on the foundation wall at the rear. If a "dry floodproofing" strategy to keep water out of the basement is attempted, the enormous pressure of several feet of water pressing against the rear exterior foundation may cause structural damage to the foundation at that point. Thus, mitigation is not a one-size-fits-all proposition…..some expertise is required to choose the appropriate strategy for a given situation.

At the very least, the city should help floodplain residents by providing education on mitigation strategies and tradeoffs. But because these can be complicated and are case specific, it is asking a lot of homeowners to master enough technical detail to make good decisions without some individual assistance. It would be even better if the city could provide some individualized consultation, either by city staff or possibly by an out-sourced consultant. It is generally accepted, and gospel with FEMA, that relocation, demolition, or elevation of structures are preferable mitigation strategies to wet or dry floodproofing, particularly in residential areas (FEMA, 2013, 2014). But these are unaffordable to most homeowners unless accompanied by buyouts, which are very difficult to achieve. It is laudable that the city is actively pursuing additional buyouts and assistance from the Army Corps of Engineers; it will be wonderful if these expensive programs become reality. But meanwhile, home owners in flood-prone neighborhoods are needlessly suffering from flood damage that could be prevented by smaller-scale, relatively inexpensive mitigation steps.

Flood risk for home-buyers. A recent press release reminded us that, "at present federal policy requires lenders — and not sellers — to notify borrowers only if they are required to have flood insurance" (Missouri Times, 2020). There is some federal support to change this. Though it has yet to pass, bipartisan senate bill S.2187 (section 417) would require all prospective homebuyers as well as tenants to be told the flood history of a property they are considering buying or leasing. At the state level, "Missouri has no statutory or regulatory requirements for a seller to disclose a property's flood risk or past flood damages to a potential buyer" (NRDC, 2020). We have only a voluntary disclosure form that asks whether the seller is aware of flood problems (Kusistso, 2017). The Missouri State Emergency Management Agency (SEMA, 2017-8) supports full public disclosure to potential buyers of properties in the special flood hazard area (i.e. SFHA 100-year floodplain), which should expand to include risk of more frequent risk where warranted (see "Probabilistic Flood Levels, University City"). We are fortunate in University City to have a document that lists and maps probabilistic flood risk by address (USACE, 2013a,b; Fig. 5). One recommendation would be to add this list and map to the resources included in the library and website. This does not address those property owners who experience flooding, but who do not live within a SFHA. One way to do this might be to publicize stormwater complaints made by residents to the City, but this may be counterproductive to the goals of the City and the Stormwater Commission to help residents. However, a recent national effort by the First Street Foundation attempts to address this in a more general fashion through their Flood Factor website (https://floodfactor.com/). One can look up a property by address to find out a flood risk rating that in addition to river/creek flooding addressed by FEMA, also includes localized neighborhood flooding from low points in topography that impacts many residents in our City.

USACE General Reevaluation Report. The US Army Corps of Engineers kicked off a renewed flood risk management study of University City in June 2020, and is due to be completed in April 2023. The project website states that "the purpose of a General Reevaluation Report is to reevaluate the flooding problems and potential plans to reduce flood risk and confirm the authorized project or identify a revised recommendation." This is an important effort that requires the input of stakeholders including residents and the Stormwater Commission (USACE, 2020).

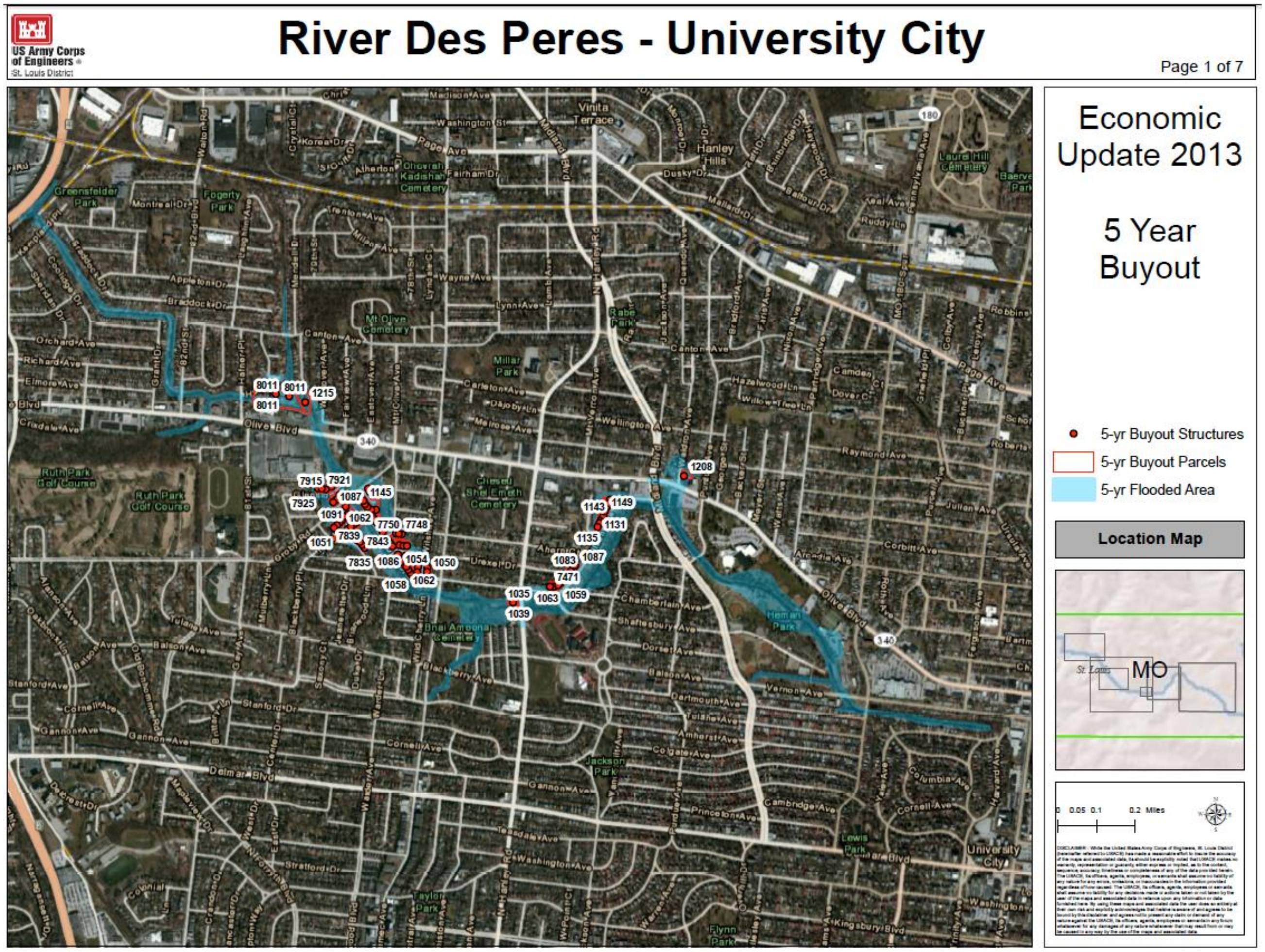

Figure 5. First of 7 pages in the River des Peres map book, showing the extent of the 5 year flood plain in central University City, and potential buyout structures identified by USACE (2013a,b).

RECOMMENDATIONS FOR EFFECTIVE COMMUNICATION OF FOOD ISSSUES

1) Consolidate flood related information on the University City website. Items should include links and/or PDFs of FEMA documents, flood insurance maps, home floodproofing information, historical flood photographs, and other important references.

2) Recommend that the University City Public Library establish a reference shelf with copies of important flood related documents.

3) Install simple signage depicting historical flood water levels along city sidewalks and bridges, including on the Groby Road and Hafner Place bridges, and also at Heman Park and the Wilson Ave. buyout area.

4) Issue a call for flood marks, photos and video information on prior and future floods in *Roars* and on the City web site.

5) Encourage the Public Works Department to compile photographs and flood level information on future floods, and of relevant engineering diagrams of bridges, sewers, and other relevant infrastructure.

6) Consider installing a staff gauge at the corner of Wilson and Drexel, and another on the vertical concrete channel wall near the Hafner Place bridge, possibly with a telemetered video camera.

7) The Storm Water Commission should author a series of brief, focused pieces on different, flood-related topics for *Roars*.

8) University City should implement a system for residents to report stormwater problems.

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ATTACHMENT #2

GENERAL ORGANIZATION

This Request for Qualifications (RFQ) is issued for engineering services to provide the City of University City, Missouri, a three-phased Citywide Stormwater program. This RFQ is intended to gather pertinent information concerning the ability of consultants to meet the needs of the City for the first two phases. The City will determine whether and how to conduct Phase III after the completion of Phases I and II.

PHASE I: STORMWATER NEEDS ASSESSMENT

Identify, classify, and map stormwater problem areas using MSD and the City's complaint records, UC Stormwater Task Force Survey Data, and by soliciting new information from residents and property owners of the community.

PHASE II: STORM WATER MASTER PLAN WITH CONCEPTUAL DESIGN & COST ESTIMATES

From the problem areas, identify projects. Develop basic conceptual solutions for the identified projects, including order-of-magnitude cost estimates for key projects, and develop and apply a prioritization scheme to generate a ranked list of capital improvement projects.

PHASE III: STORM WATER PROJECTS: PROJECT DESIGN DEVELOPMENT, AND FINAL PLANS/SPECIFICATIONS/BID DOCUMENTS

Develop construction plans and specifications as well as easement exhibits, legal descriptions, or maintenance agreements required for the implementation of the highest priority projects.

ANTICIPATED SCOPE OF WORK – PHASES I and II

1) As stated in the background information section, Phase I will consist of assessing the stormwater needs and concerns of the community. The Phase I scope will include the following:
    a. Attend kick-off meeting with City Project Manager and other City team members.
    b. Develop Stormwater Concern Form for distribution to residents (by City) for the purpose of collecting and documenting stormwater problems.
    c. Review existing stormwater studies, reports, complaint logs obtained by the City and obtained by the City from MSD, reports from the Corps of Engineers, and the Storm Water Task Force Citizen Survey.
    d. Coordination shall include:
        i. Attending up to two public meetings designed to inform citizens of the needs assessment and to collect information on stormwater problem areas.
        ii. Attending one mid-study update to City Council and obtain feedback from the Council.
        iii. Periodically updating Staff and Commissions on stormwater *volume and quality* Issues.

    iv. *Coordinate* with other departments and commissions of the City regarding stormwater *volume and quality*.
    v. *Coordinate* with the US Army Corps of Engineers project team working on the Upper River Des Peres Flood Risk Management Study.
  e. Complete necessary field visits to analyze identified stormwater problem areas.
  f. Delineate and map sewer sheds to create a storm water map of University City including important infrastructure location and sizes.
  g. Develop definition to distinguishing between public and private stormwater problems.
  h. Present to the City Staff and City Commissions for review and comment a draft of a preliminary stormwater needs assessment including mapping of problem areas.
  i. After incorporating review comments, present to the City Staff and City Council a preliminary stormwater needs assessment.
2) Phase II will continue the stormwater needs assessment that was started in Phase I. The scope of Phase II will include the following tasks:
  a. From the problem areas cataloged in Phase I, identify specific stormwater projects and conceptual cost estimate for those projects.
  b. In cooperation with City Staff and Commissions, develop a prioritization scheme for ranking the stormwater projects.
  c. Rank the projects and organize the data to aid in City budgeting and grant applications.
  d. Present draft stormwater needs assessment, costs, and prioritization scheme to City staff and City Commissions for review and comments.
  e. Incorporate City review comments into Final Stormwater Needs Assessment for submission to the City Staff and City Council.

STATEMENT OF QUALIFICATIONS (SOQ) REQUIREMENTS

The SOQ shall be limited to **15 pages** including the cover letter and shall include the following information:

1. Cover Letter including contact information of consultant point of contact.
2. Qualifications & Experience
   a. Overall company qualifications, including capacity of firm.
   b. Description of the project team and sub-consultants, including roles and responsibilities, specific qualifications of key team members, including resume for project manager.
   c. Experience of consultant and project team related to storm water projects; include the names of clients, brief project description, and the project team's involvement.
3. Approach
   a. Project Understanding
   b. Unique and creative technical approaches that will enhance the project outcomes, deliverables, and schedule.
   c. List and describe major phases or tasks to be completed.

SELECTION PROCESS

The statements of qualifications (SOQ) will be evaluated by the City's review committee consisting of various City personnel, and up to two public members. The criteria that will be utilized to score the SOQs are listed below:

- Qualifications of firm (25 points).
- Qualifications for Project Manager and Project Team (25 points).
- Relevant Storm Water Experience (25 points).
- Approach (25 points).