



Department of Public Works and Parks

6801 Delmar Boulevard, University City, Missouri 63130, Phone: (314) 505-8560, Fax: (314) 862-0694

AGENDA
COMMISSION ON STORM WATER ISSUES
SPECIAL MEETING
HEMAN PARK COMMUNITY CENTER
975 PENNSYLVANIA
Tuesday, March 21, 2023,
3:00 PM

- 1. MEETING CALLED TO ORDER**
- 2. ATTENDANCE-ROLL CALL**
- 3. APPROVAL OF AGENDA**
- 4. NEW BUSINESS**
- 5. ADJOURNMENT**



MEMORANDUM

TO: Darren Gilder, Director of Public Works
Mirela Celaj, CFM, Assistant Director of Public Works

FROM: Stormwater Master Plan Team (HR Green and Reitz & Jens)

SUBJECT: University City Stormwater Master Plan
City Code – Review and Suggest Improvements Scope of work Task 2.5

DATE: February 8, 2023

Suggesting changes in the City code that would minimize stormwater quantity and quality problems is a requirement of our work for the Stormwater Master Plan for University City. Further, we recognize that the Department of Public Works is interested in working with the Department of Planning and Development to change the City code to minimize stormwater problems. The engineering community has established that increases in impervious area are tied to increases in non-point source pollution and erosion, so ordinances that limit impervious area or require additional stormwater management for these increases will benefit stormwater quantity and quality.

Therefore, we submit for your consideration the following recommendations regarding the City code. These suggestions are part of our Stormwater Master Plan Scope of Work Task 2.5. These recommendations build on work by the University City Stormwater Task Force¹, authored in part by members of the Stormwater Master Plan Team, and adds new information and example ordinances. A review of the codes of neighboring communities and local regulators helps identify potential ordinances that could be adapted to University City. These codes are available online, but the MSD Legal Impediments Workgroup document is provided as an appendix since it is not available online.

City officials and the Stormwater Commission have expressed a primary interest to protect property from excess stormwater volume. Current City ordinances appear to be more useful at preventing new stormwater problems associated with future large developments. But Code changes discussed below would minimize some existing stormwater problems. We recommend the following Code improvements:

1. Add an ordinance that no project, modification, or grade change of any size may increase stormwater runoff on adjacent properties or cause sedimentation or erosion. This could address stormwater quantity.
 - a. Ladue² states that “no improvements shall increase storm water runoff onto adjacent properties.”
2. Reduce the threshold development size that triggers stormwater management requirements.
 - a. City code currently defers to the MSD plan review process which is triggered by development projects having a land disturbance of 1 acre or greater³.
 - b. MSD requirements are effective at addressing water quantity (e.g. flood control) and water quality (non-point source pollution control) for 1+ acre projects, but not smaller projects such as infill tear-down-rebuild projects and simple flatwork projects that expand driveways. These small foot-print projects will cumulatively increase regional flooding and cause serious local stormwater damage to neighboring property. So, the City Code needs to set a low trigger point for requiring stormwater mitigation features.

¹ University City Stormwater Task Force Report. November 2019. p 22.

² Ladue Section 110-142

³ University City Section 405.490 C.6

- c. MSD allows for more stringent design criteria, and states that “Stormwater management facilities shall be provided and designed in accordance with the requirements of this section. If another local jurisdiction requires more stringent design standards, then they shall govern in that locale.”⁴
 - d. Several local municipalities have adopted stormwater codes more stringent than MSD. For example, Town & Country reduces the permitting threshold to 2,500 square feet⁵. Ladue and Olivette’s threshold are both 400 square feet⁶ which may be more appropriate given that University City lots are generally smaller than Town & Country, and that Olivette is located immediately upstream of University City. Crestwood⁷ and Ladue⁸ require that any increased water discharge must be retained on that property and controlled by facilities like rain gardens, rain barrels, French drains, dry wells.
3. Add protection for discharge of stormwater at property lines.
 - a. Town & Country⁹ requires that “water shall not be directed through a pipe, culvert, hose, spout or drain which discharges within ten (10) feet of an abutting property line.” This statement is a good bare minimum that is not currently in the U City ordinances. Roof drains can carry a lot of water and discharges even as far as 10 feet from a property line can cause problems to neighbors. However, this statement would be useful when taken together with U City section 405.49 C.6, and a lower threshold on projects that require a land disturbance permit.
 - b. Webster Groves¹⁰ requires that “no stormwater shall be discharged to an adjoining public or private property in a manner that negatively impacts the adjoining property. Existing conditions shall be the basis for determining negative impact.”
 4. Reduce Erosion.
 - a. Town & Country¹¹ requires that “every land development or subdivision shall make adequate provisions to accommodate or dispose of stormwater and prevent damage to off-site streets and downslope of adjacent properties due to soil erosion or siltation by means of sodding, erecting silt barriers, detention storage areas, sewers, catch basins, culverts, terracing, walls and other facilities or combination of similar methods per the requirements of this Article....” This language also provides City staff with the flexibility to require detention and/or rain gardens for infill development.
 5. Increased use of detention and decreased use of impervious surfaces should be encouraged.
 - a. Webster Groves¹² requires that “if any existing impervious surface is removed during construction or development, that area shall be considered as pervious for the purpose of calculating the differential runoff from the new construction.” For example, when constructing a new house on a lot where a house was torn down, the lot will be treated as if it had been entirely undeveloped, thereby requiring 100% of the stormwater to be addressed. The same could apply to a homeowner replacing 100 square feet of patio with 200 square feet of home addition, the differential would be based on the full 200 square feet. This is one way that an ordinance can address existing stormwater problems in addition to minimizing future problems.
 - b. Town & Country¹³ requires that “facilities for storm drainage shall be designed and constructed so as to prevent any increase in the rate of storm runoff into the water shed over that which existed prior to development...”

⁴ MSD Rules and Regulations and Engineering Design Requirements 4.060.01

⁵ Town & Country Code Section 415.080 A.2.b

⁶ Olivette Code Section 422.080 A.2.b

⁷ Crestwood Section 26-44 N

⁸ Ladue Code Section 110-143 (3)

⁹ Town & Country Code Section 415.100 J

¹⁰ Webster Groves Code Section 82.100 d

¹¹ Town & Country Code Section 415.100 C

¹² Webster Groves Code Chapter 82.100

¹³ Town & Country Code Section 415.100 A

6. Expand stormwater detention requirements to make up for previously unmanaged impervious area, thereby attempting to address existing stormwater problems in addition to minimizing future problems.
 - a. Webster Groves¹⁴ requires that “the calculation of differential stormwater resulting from the new construction shall assume that the area covered by new impervious materials is replacing pervious areas, regardless of the preconstruction status of the site.”
 - b. Town & Country¹⁵ requires “provision of a system which mitigates one hundred fifty percent (150%) of the flow rate increase identified in Section 415.105(A)(2) above by storing a volume equal to one hundred fifty percent (150%) of the calculated volume for the fifteen-year, twenty-minute design storm. This shall then be designed with a release mechanism which allows for dissipation over a twelve-hour-to-thirty-six-hour period using small orifice structures or Metropolitan St. Louis Sewer District-approved volume reduction best management practices.”
7. Adjust minimum requirements for off-street parking.
 - a. The 2009 MSD Legal Impediments to Stormwater Best Management Practices Workgroup provided recommendations to reduce impervious area associated with off-street parking required by City code. Code could encourage reduced stall dimensions and efficient stall configurations like 45-degree angle parking. Phantom parking would allow a development to use fewer parking spaces than required by code, with the understanding that reserved green space would be activated (i.e. paved) if proven necessary. The City could also allow developers to provide “parking studies” to demonstrate that a reduced number of spaces is adequate.
8. Increase setback from stream bank and require a vegetated buffer.
 - a. City code¹⁶ currently requires that “development along natural watercourses shall have residential lot lines, commercial or industrial improvements, parking areas or driveways set back a minimum of fifteen (15) feet from the top of the existing stream bank.” Most watercourses through the City are 10 to 20 feet deep, so the current buffer could allow development to occur too close an over-steeped (less than 1.5 horizontal : 1 vertical) streambank.
 - b. Frontenac¹⁷ requires a 25-foot undisturbed natural vegetative buffer from the top of bank.
 - c. Ladue¹⁸ requires a 50-foot undisturbed natural vegetative buffer from streams depicted as a blue line on the USGS quad map (e.g. River des Peres). For all other streams that buffer is 25-foot minimum. They go on to add an additional setback of 25-feet measured horizontally from the edge of the undisturbed natural buffer beyond which all impervious area shall be prohibited. University City lots are generally smaller than Ladue, and may not have the luxury of establishing setbacks of this size, but the concept of establishing buffers relative to stream size is worth considering.

We would be delighted to meet with City officials to discuss these recommendations.

\\HRGWDFILE002\ProjectData\2019\191803\Design\Calc\05_ReportOfFindings\CodeReview\Mem_Code_20230210.docx

¹⁴ Webster Groves Cod 82.100 b

¹⁵ Town & Country Code Section 415.105 A.3

¹⁶ University City Code Section 405.21 A.3.b.6

¹⁷ Frontenac Code Section 506.48

¹⁸ Ladue Ordinance 1951



MEMORANDUM

TO: Darren Girdler, Director of Public Works
 Mirela Celaj, CFM, Assistant Director of Public Works
 FROM: Stormwater Master Plan Team (HR Green and Reitz & Jens)
 SUBJECT: University City Stormwater Master Plan
Public versus Private – Recommended Definition Scope of work Task 2.2
 DATE: February 28, 2023

An important piece of our work to develop a Stormwater Master Plan for University City is to assist in developing a definition of a public stormwater project versus a private stormwater project. Phase II of the Master Plan development will develop a list of stormwater Capital Improvement Projects (CIP) and stormwater Operation & Maintenance (O&M) projects. A clear definition of public versus private projects is needed so that the Stormwater Master Plan focuses on projects that are considered in the public interest and worthy of public funding. Other municipalities have determined the difference between public and private problems – either in practice or through a set of criteria. Our experience and observations of other municipalities have informed the proposed criteria which follows.

We propose utilizing a series of criteria to determine whether a stormwater project should be considered public. We recommend that public stormwater projects meet at least two of the following criteria:

1. Two or more private properties would benefit
2. Required improvements extend to at least two private properties
3. The drainage area is greater than or equal to 1 acre
4. Flooding or erosion to a public or private building occurs
5. Frequent flooding or erosion to a roadway occurs
6. Repair or upgrade to existing publicly-owned stormwater handling system is needed
7. Repair of publicly-owned retaining wall is needed
8. High-flow overland path for runoff from the backyard to the street is blocked by soil or other obstruction and is causing structural flooding. Repair would require work on neighboring yard.
9. Project cost exceeds 10% of the total appraised value of the property

The paragraphs and table below present examples of public and private stormwater problems.

- Some stormwater problems are clearly public. They reduce ongoing operating costs or minimize losses to public infrastructure.
- Some stormwater problems are clearly private. The source of the stormwater concern and the project needed to address the stormwater concern both occur within a single private property.

Below are examples of projects evaluated against each criterion. Note that a public project requires a positive response to at least two of these criteria.

Criteria	Example
1 Two or more private properties would benefit	At 7591 Amhurst (at North and South Rd), a creek bank has eroded to within 9 ft of home. Mitigation would involve stabilizing the creek bank and would benefit multiple properties. The creek bank erosion is caused by runoff from scores of properties. (See Erosion Project 1 attached.)



2	Required improvements extend to at least two private properties	Street flow exceeds gutter capacity at two driveways and runs into basement garages at Old Bonhomme east of Alanson Drive. MSD has studied the problem and recommends upsizing the existing storm sewer which crosses at least 4 properties (See Street Project 2.)
3	The drainage area is greater than or equal to 1 acre	Runoff from nearby commercial property flows through several residential backyards in the Grenville Subdivision. The drainage area to the backyard of 1561 Westmont Place through 1573 Westmont Place is approximately 3.3 acres. (See Backyard Project 3.)
4	Flooding or erosion to a public or private building occurs	Several basement garages along Amherst Ave flood from street drainage which escapes the gutter and flows down the driveways. (See Street Project 1.)
5	Frequent flooding or erosion to a roadway occurs	The erosion of River Des Peres threatens Mona Drive. The top of the bank is 16 ft high and 5 ft from the curb. (See Erosion Project 2.)
6	Repair or upgrade to existing publicly-owned stormwater handling system is needed.	An MSD-owned area inlet in the backyard of 7353 Milan Ave clogs easily and may also have inadequate capacity. Water frequently backs up, flooding the entire yard, back patio, and basement. (See Backyard Project 2.)
7	Repair of a publicly-owned retaining wall is needed	At 7425 Shaftesbury Ave a privately-owned wood tie wall protects a yard from River Des Peres (RDP) bank erosion. Flow in the RDP drains a large area. This would <u>not</u> meet the criteria in question and therefore might not be considered a public project. (See Erosion Project 5.)
8	High-flow overland path for runoff from the backyard to the street is blocked by soil or other obstruction and is causing structural flooding. Repair would require work on neighboring yard.	Runoff from yards on Stanford Ave flow into several backyards at 7842 through 7820 Balson Ave. Inadequate overland flow path causes flooding of at least two homes. (See Backyard Project 1.)
9	Project cost exceeds 10% of the total appraised value of the property	

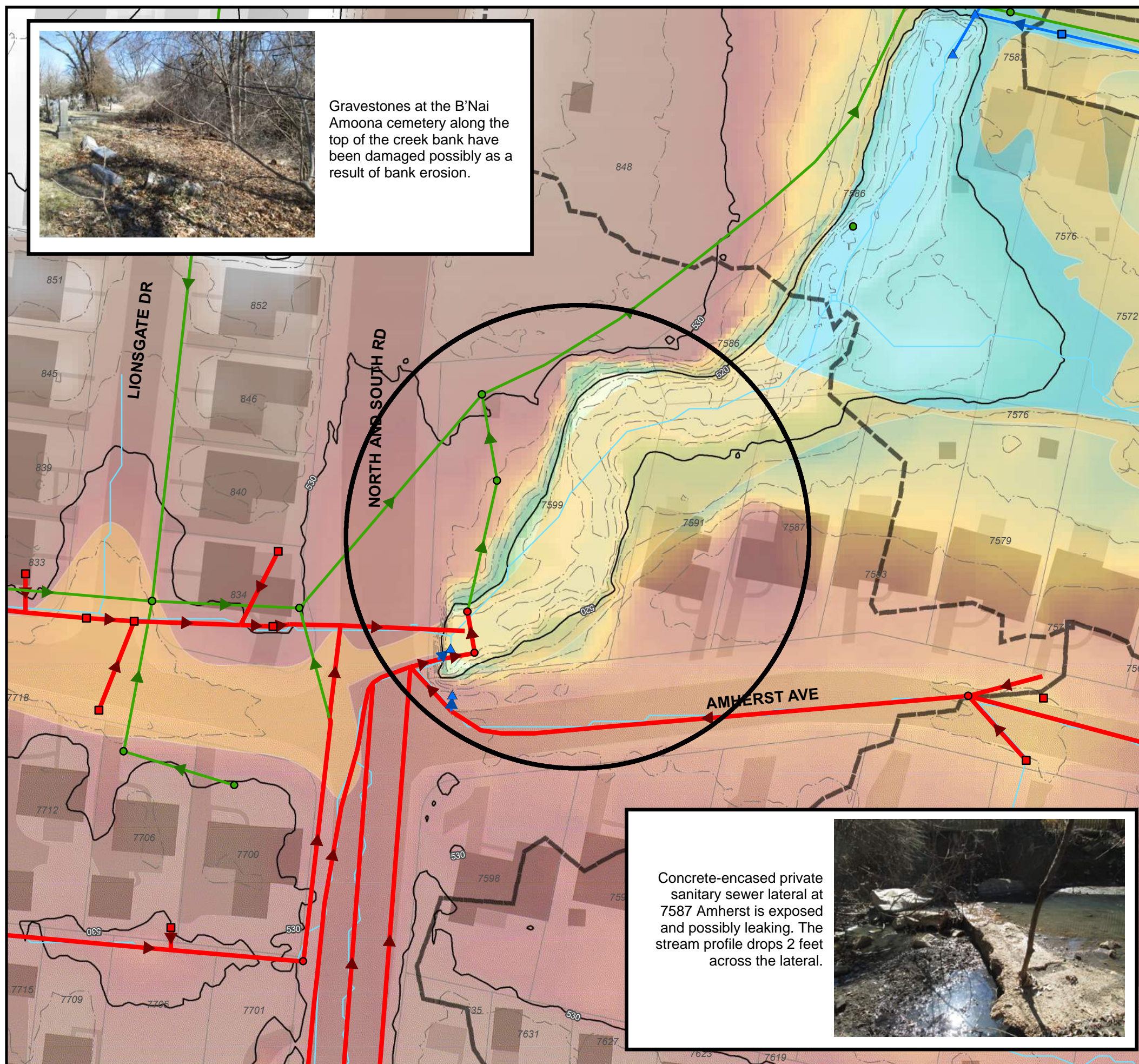
We would be delighted to meet with City officials to discuss these recommendations.

Attachments:

- Erosion Project 1: Tributary to River Des Peres Between Amherst Ave and Blackberry Ave
- Erosion Project 2: River Des Peres at Mona Dr
- Erosion Project 5: River Des Peres at 7425 Shaftesbury Ave
- Street Project 1: Amherst Ave
- Street Project 2: Old Bonhomme Rd
- Backyard Project 1: Balson Ave
- Backyard Project 2: Milan Ave
- Backyard Project 3: Grenville Subdivision



Gravestones at the B'Nai Amoona cemetery along the top of the creek bank have been damaged possibly as a result of bank erosion.



Concrete-encased private sanitary sewer lateral at 7587 Amherst is exposed and possibly leaking. The stream profile drops 2 feet across the lateral.

Problem Description:

An un-named tributary to the River des Peres flows from a closed storm sewer outfall at Amherst and North & South. A 500-foot reach of the creekbank is over-steepened and actively eroding. MSD and the City initially identified this bank erosion in 1988, and MSD confirmed the issue and developed a conceptual solution and cost estimate in 2007.

The 13-foot high eroding bank at 7591 Amherst is 20 feet from the home (measured from the toe of bank), and has not advanced significantly since 2006, but is considered severe by MSD's bank erosion rating (V/H=1.46). The July 26, 2022 flood was above the basement floor of 7591 Amherst and collapsed their fence.



The 13-foot high eroding bank at 7591 Amherst is 9 feet from the home (measured from the top of bank).

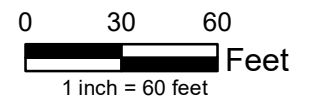


Creek erosion along 7587 Amherst is undermining their fence. The erosion rating at 7587 Amherst is considered a threat to the home (V/H=0.25).



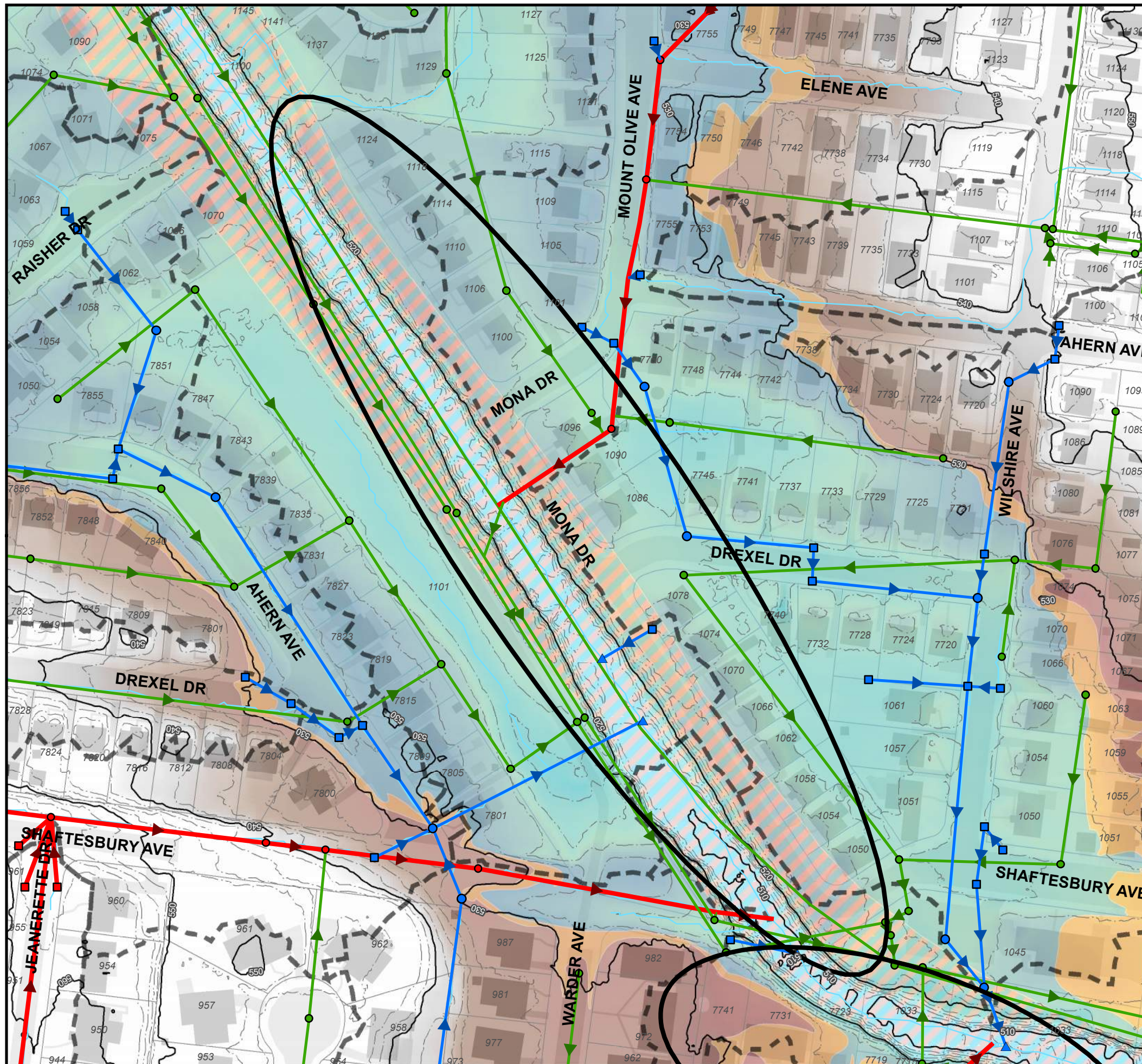
Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- Watershed Boundary
- Existing MSD System
 - Combined Inlet
 - Storm Inlet
 - ▲ Storm Intake-Outfall
 - Combined Manhole
 - Sanitary Manhole
 - Storm Manhole
 - Combined Sewer
 - Sanitary Sewer
 - Storm Sewer
- Flood Hazard Zone
 - 1.0% Annual Chance Flood Hazard
 - 0.2% Annual Chance Flood Hazard
 - Regulatory Floodway



**Tributary to River Des Peres
Between Amherst Ave and
Blackberry Ave**

Ranked #1 in the Erosion Category



Problem Description:

A 700-foot reach of the River des Peres is over-steepened and actively eroding. The top of bank is 16-feet high and has eroded to within 5 feet of the curb line of Mona Drive. The north end of Mona Drive is the only road access/egress for six homes. Using MSD's erosion rating, the street is more severely threatened (V/H=0.44) than the homes (V/H=0.18). MSD installed riprap along portions of Mona Drive in approximately 2017, but most of this riprap has since eroded and slid off the bank. An additional 600-foot reach of bank along the downstream end of Mona Drive is somewhat more stable. The homes along Mona Drive flooded on July 26, 2022.

Over-steepened channel banks threaten Mona Drive which provides the only access to 6 houses.



Over-steepened channel banks, and the remains of riprap placed by MSD that has since eroded and slid off the bank.

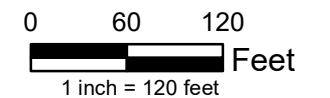


Channel bottom contains riprap, some of which slid off the bank from a previously installed MSD project.

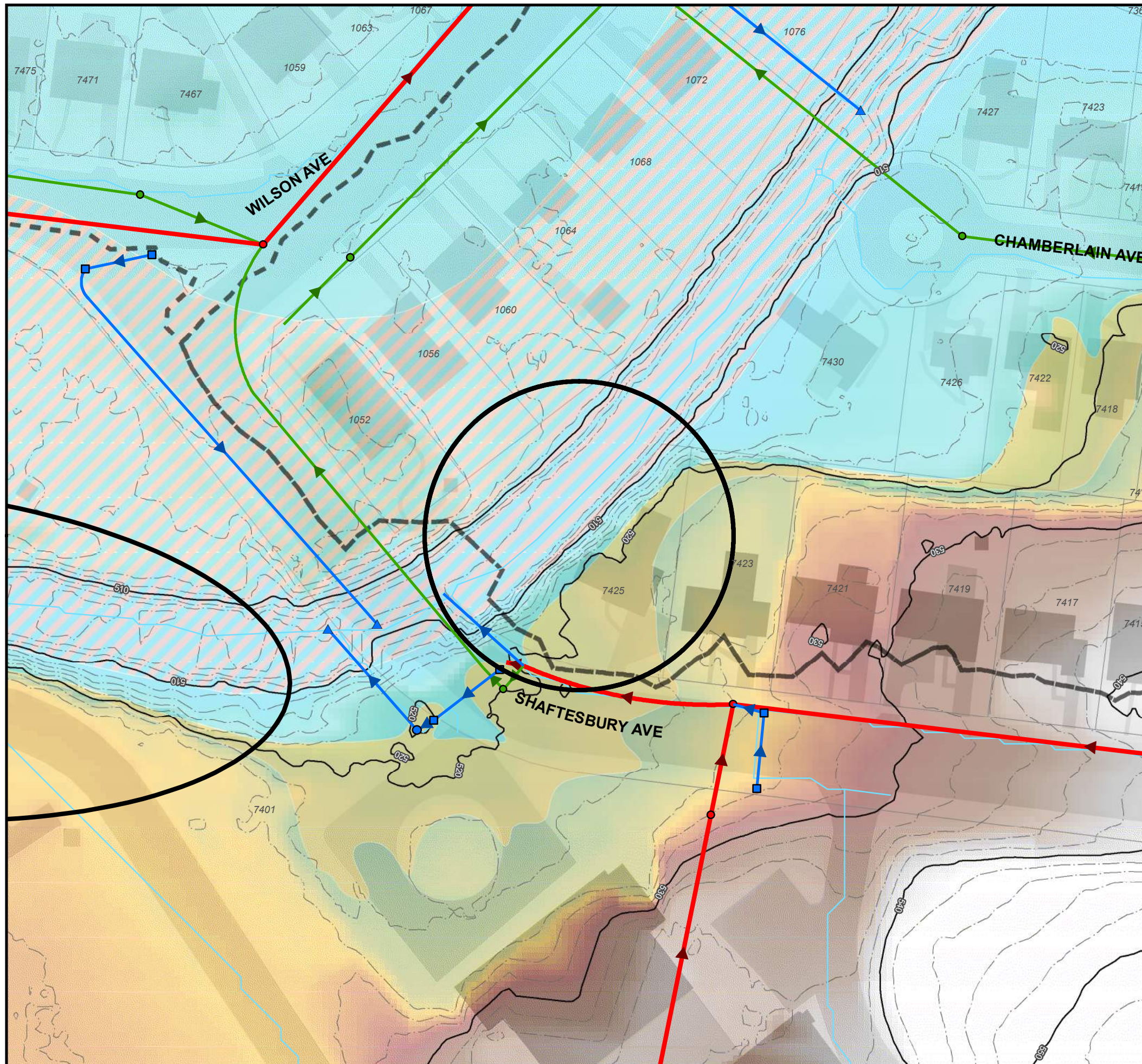


Legend

- | | |
|-----------------------------------|----------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| ▭ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | — Combined Sewer |
| | — Sanitary Sewer |
| | — Storm Sewer |



River Des Peres at Mona Dr
Ranked #2 in the Erosion Category



Problem Description:

A 16-foot high bank with a combination of public and private walls is compromised and a house located only 7 feet from the top of wall is at risk. The wood tie wall is compromised, but the lower 6-feet of the bank of the Rider des Peres at this location is a WPA hand-placed stone wall, which appears stable.



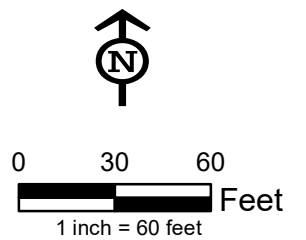
Wood tie wall and WPA block wall. 7425 Shaftesbury Ave is the house behind the wall in the photo.



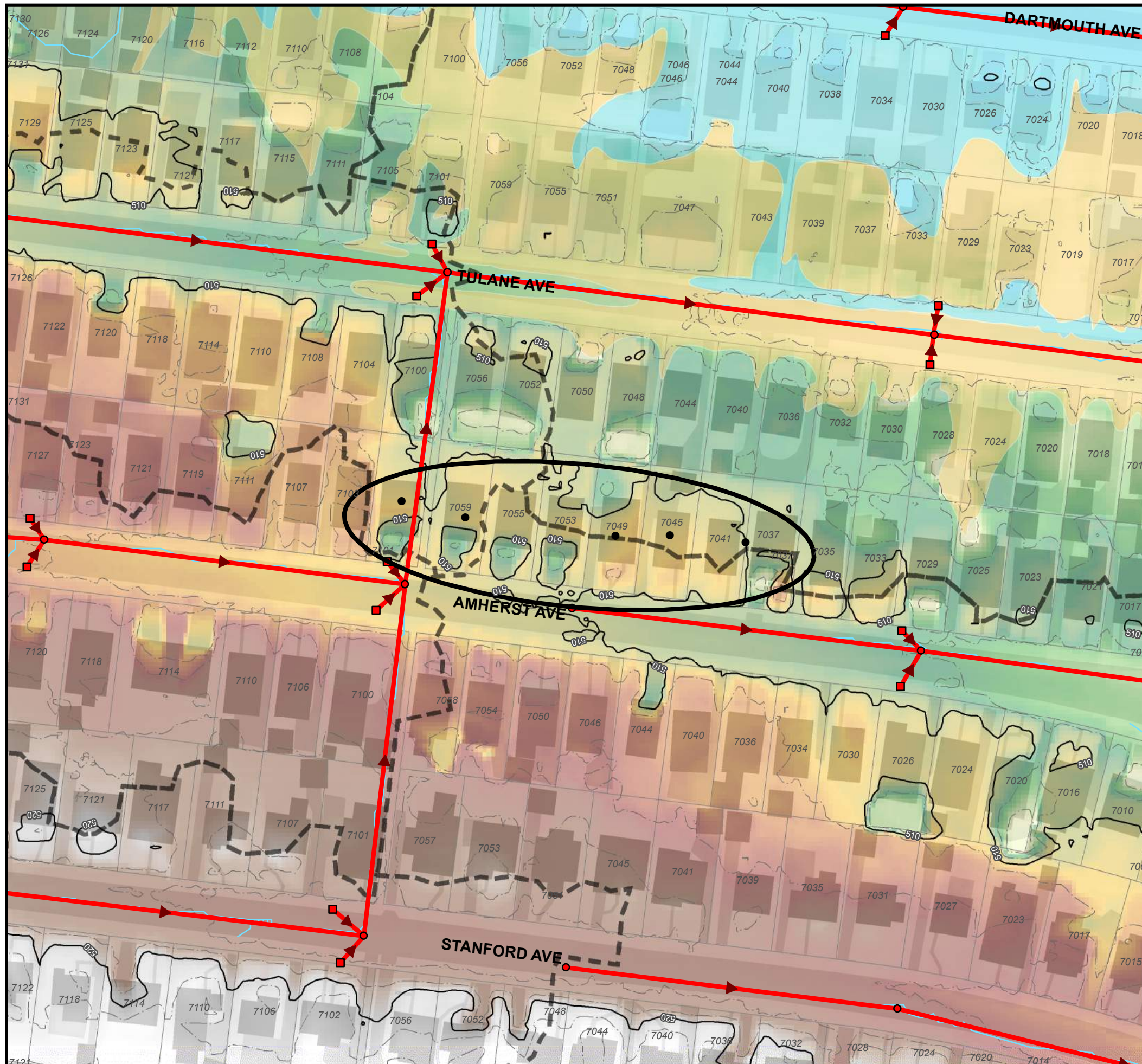
Wood tie wall and WPA block wall, looking downstream.

Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- ▭ Watershed Boundary
- Flood Hazard Zone**
- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway
- Existing MSD System**
- Combined Inlet
- Storm Inlet
- Storm Intake-Outfall
- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined Sewer
- Sanitary Sewer
- Storm Sewer



River Des Peres at 7425 Shaftesbury Ave
Ranked #5 in the Erosion Category



Problem Description:

Several basement garages along Amherst Avenue flood from street drainage. Combined sewers with street inlets exist on the street. Amherst Ave is very flat, which reduces inlet capacity.

Although not all of these residents responded, it is likely that 7101, 7059, 7055, 7053, and 7037 Amherst Ave have frequent basement flooding due to water escaping the street and flowing down the driveway.

Grated drains were observed near each garage door. It is likely that each of these are connected into the nearby combined sewer. Therefore, it is possible the flooding is due to backup from the combined sewer main.

The driveway at 7101 Amherst Ave.



The driveway at 7037 Amherst Ave.

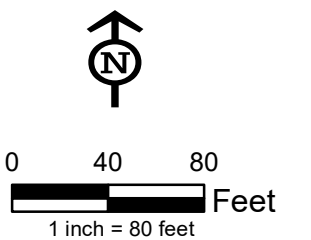


Looking east along Amherst Ave towards the inlets between 7033/7029 Amherst Ave.

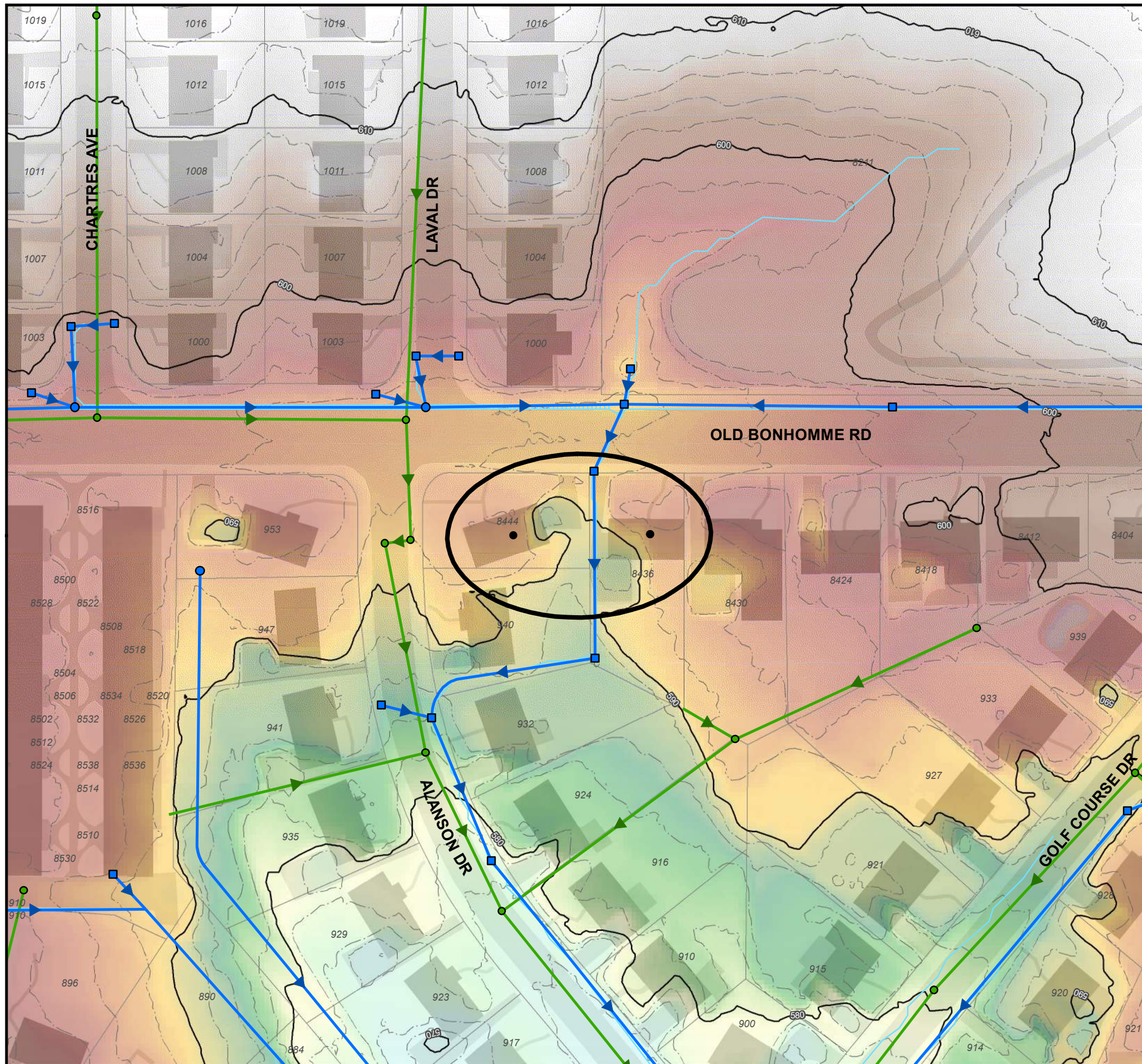


Legend

- | | |
|-----------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



Amherst Ave
Ranked #1 in the Street Category



Problem Description:

Basement garages at 8444 and 8436 Old Bonhomme Rd flood frequently from water which comes down the driveway at 8436 from the street. There is a triple curb inlet in front of 8436 Old Bonhomme Rd which accepts water from about 1,200 feet of Old Bonhomme Rd. The downstream pipe is 24" in diameter.

MSD has studied the problem and identified storm sewer upsizing as a solution. It may also be beneficial to investigate other opportunities for improvement, such as: A) increase inlet capacity at the street by adding inlets east of the triple inlet, B) raise a portion of the driveway at 8436 to keep water in the street, or C) provide a conveyance path down driveway and towards the at the property corner between #8436 and 940/932 Alanson Dr.



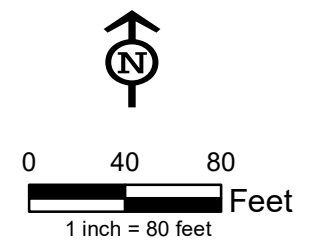
Looking south across Old Bonhomme Rd. #8436 is on the left and #8444 is on the right.



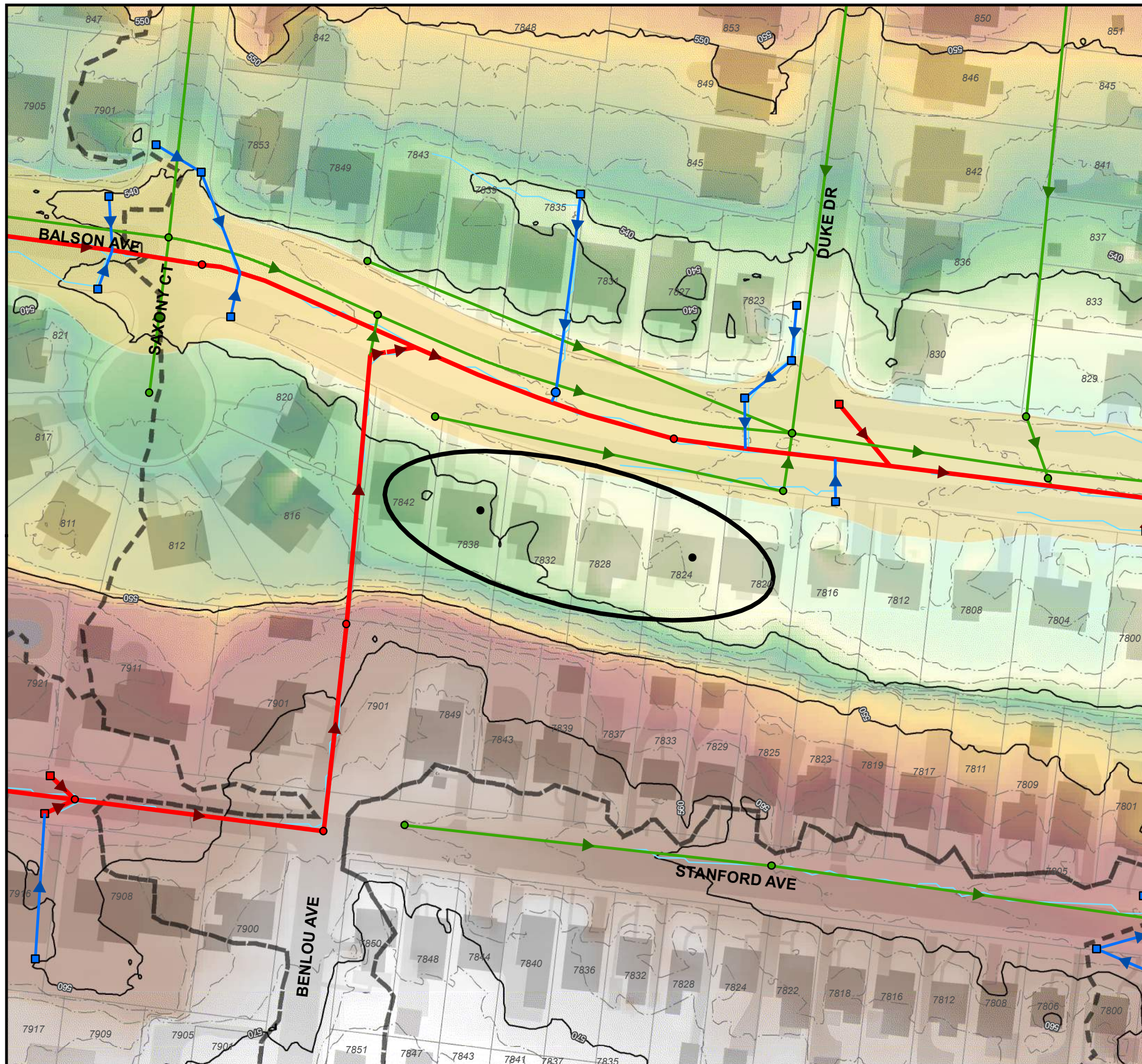
Looking at the ground in front of the driveway at 8436 Old Bonhomme Rd.

Legend

- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| ▭ Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Box | ● Combined Manhole |
| Light Orange Box | ● Sanitary Manhole |
| Light Green Box | ● Storm Manhole |
| Light Blue Box | — Combined Sewer |
| Light Green Box | — Sanitary Sewer |
| Light Blue Box | — Storm Sewer |



Old Bonhomme Rd
Ranked #2 in the Street Category



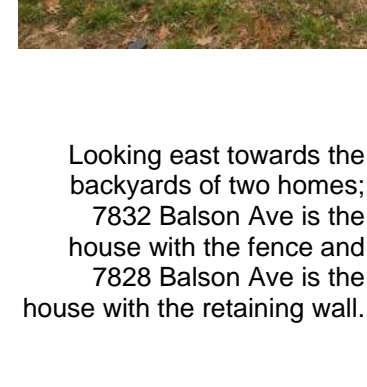
Problem Description:

The homes on Stanford Avenue sit about 18 feet higher than the homes on Balson Ave. Between the houses is at a 3:1 slope. The flow path from the backyards to the front yards on Balson Ave is inadequate, causing frequent flooding to at least two of the homes on Balson Ave. The drainage area to the back of the homes is about 1.3 acres.

The basement stairwell at 7838 Balson Ave. Sand bags and sump pumps have been added to try to keep the basement from flooding.



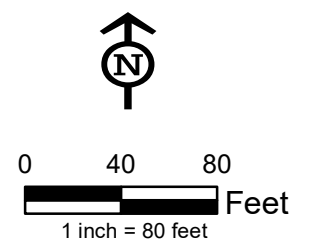
Looking west in the backyard of 7838 Balson Ave. The house is on the right.



Looking east towards the backyards of two homes; 7832 Balson Ave is the house with the fence and 7828 Balson Ave is the house with the retaining wall.

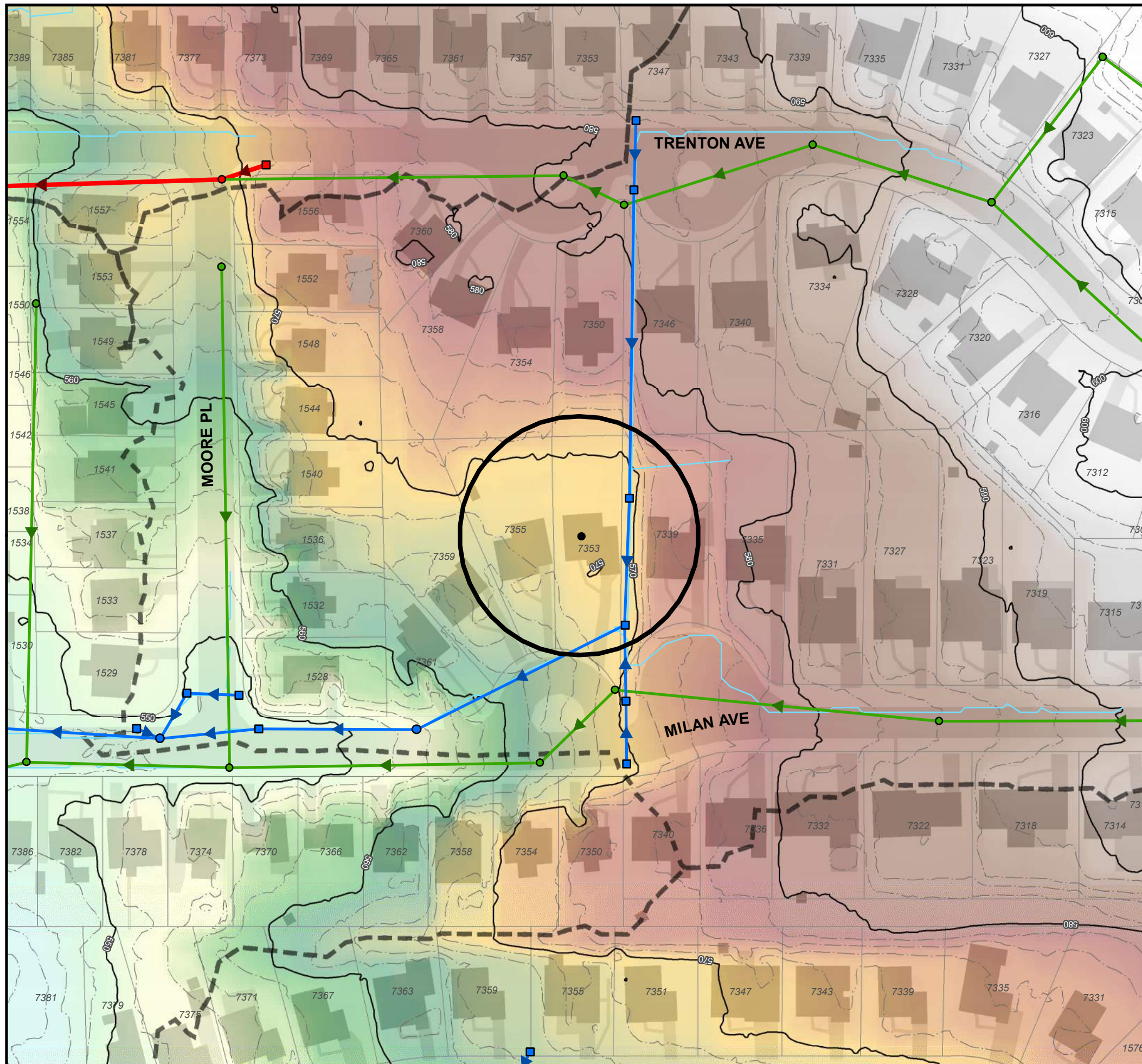
Legend

- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Box | ● Combined Manhole |
| Yellow Box | ● Sanitary Manhole |
| Light Blue Box | ● Storm Manhole |
| Light Blue Box | → Combined Sewer |
| Light Blue Box | → Sanitary Sewer |
| Light Blue Box | → Storm Sewer |



Balson Ave

Ranked #1 in the Backyard Category



Problem Description:

About 3 acres of drainage flows to the backyard at 7353 Milan Ave. An area inlet just east of the backyard clogs easily and may also have inadequate capacity. Water backs up, flooding the entire yard until it can flow east. Water has nearly reached the threshold of the back door to the house. The basement has flooded from both seepage and overland flow in 2014, 2015, and 2022.

Looking south along the property line between #7353 and 7339.



Looking towards the back patio at #7353. Ponded water has nearly reached the threshold of the door into the house (not the door to the screened in patio).

Looking north towards the area inlet in the backyards. #7353's backyard is on the left.

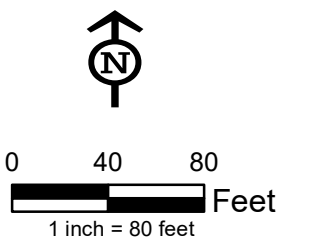


Legend

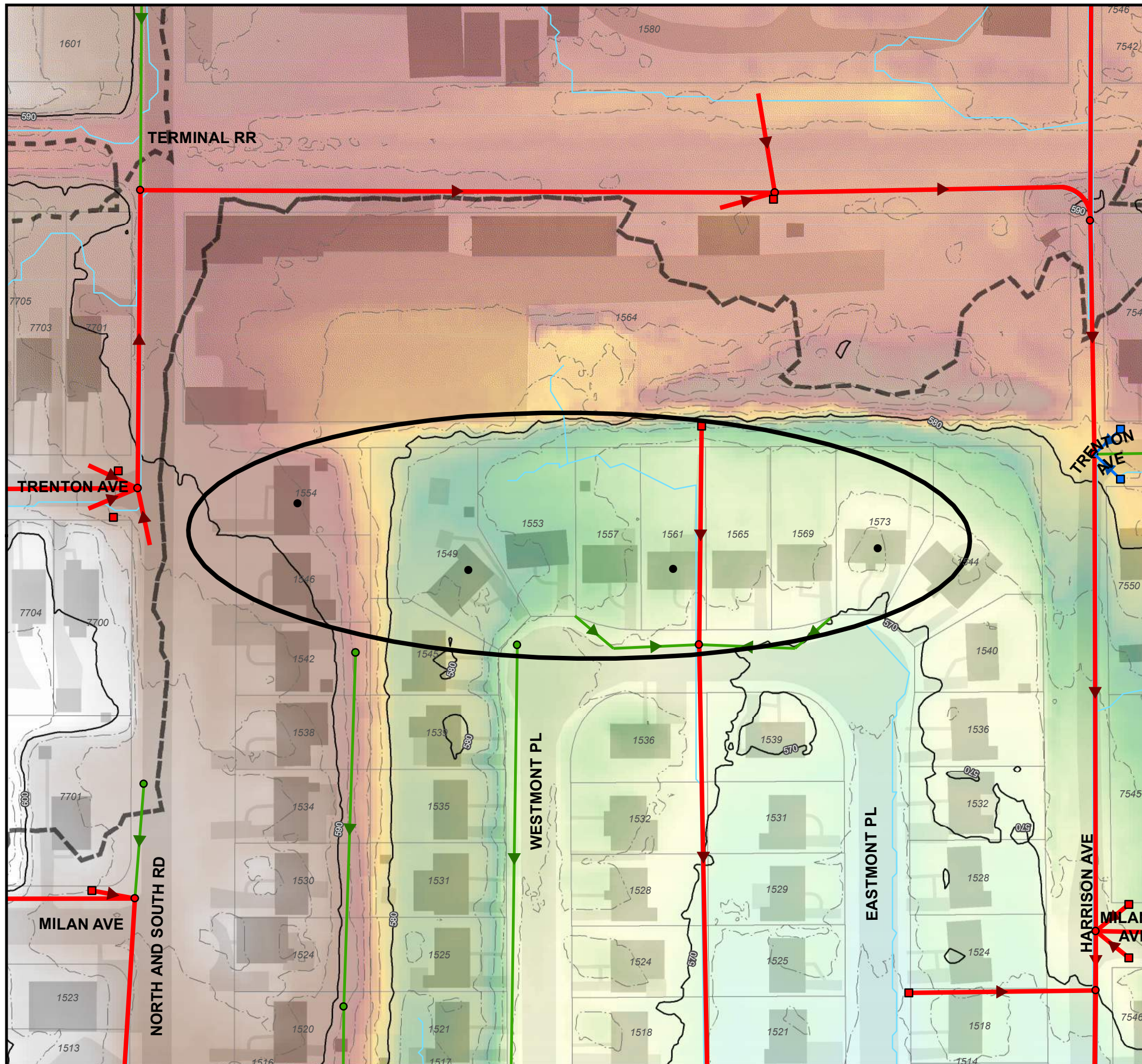
- Stormwater Problem Point
- Problem Location
- Flow Path Line
- - - Watershed Boundary
- Existing MSD System
- Combined Inlet
- Storm Inlet
- ▲ Storm Intake-Outfall
- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined Sewer
- Sanitary Sewer
- Storm Sewer

Flood Hazard Zone

- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway



Milan Ave
Ranked #2 in the Backyard Category



Problem Description:

The property north of the Grenville Subdivision sits about 6-10 feet above the backyards of several houses. About 3.3 acres of drainage reaches the backyards of 1561 to 1573 Westmont Place.

The backyards are relatively flat; there is no adequate conveyance which carries water from the backyards to the street, so the yards flood frequently. Seepage occurs into the basements of some of the homes.

There is an inlet behind 1561, but only about half of a side is able to accept water due to grading issues. Note the inlet appears to be in a strip of ROW between the houses and business.

Looking northwest towards the strip of ROW between homes (on the left) and the business to the north (on the right).



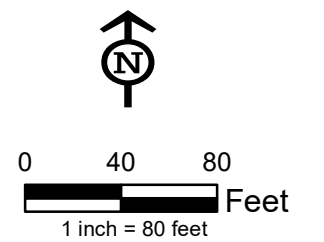
Looking towards the inlet north of #1561. Due to grading, the inlet does not appear to collect much runoff.



Looking south towards the backyard at #1561.

Legend

- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| ⋯ Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue | ● Combined Manhole |
| Light Yellow | ● Sanitary Manhole |
| Light Blue/Yellow | ● Storm Manhole |
| Light Blue/Yellow | — Combined Sewer |
| Light Blue/Yellow | — Sanitary Sewer |
| Light Blue/Yellow | — Storm Sewer |



Grenville Subdivision
Ranked #3 in the Backyard Category



▶ 16020 Swingley Ridge Road | Suite 205
Chesterfield, MO 63017
Main 636.519.0990 + **Fax** 713.965.0044
▶ HRGREEN.COM

December 30, 2022

Mr. Darren Dunkle, CPRP
Director of Parks, Recreation and Forestry
Acting Director of Public Works
City of University City
6801 Delmar Boulevard
University City, MO 63130

RE: Selection of Stormwater Projects for Further Study – Stormwater Master Plan
Via: FTP transfer and USPS

HR Green is completing a Stormwater Master Plan for University City to identify and prioritize stormwater problems in the community. We have nearly completed **Phase I: Data Collection and Analysis to Identify Stormwater Problems**. We have collected data from many sources, including residents, the Metropolitan St. Louis Sewer District (MSD), the Stormwater Task Force Report, the Army Corps of Engineers, and site visits. We have analyzed the data to determine the types of stormwater problems in the City, as well as the locations with the highest need for mitigation.

We are transitioning to **Phase II: Conceptual Development and Prioritization of Stormwater Projects**. This is a natural checkpoint to seek feedback to ensure the planning process is appropriate. We are contracted to study ten stormwater problems in detail to determine a conceptual solution, cost, and benefit assessment.

As you know, there are many more than ten stormwater problems in the City. We have identified nineteen stormwater problems which stand out as higher in severity, frequency, or pervasiveness. See attached table for the list of nineteen problems. Also attached are exhibits for each problem which shows the location, a brief description of the problem, and photos.

Of the nineteen stormwater problems, we have highlighted ten that appear to be the most significant problems. However, the differences between all nineteen problems are subtle, so your input is important.

Please let us know when you are ready to discuss and we would be delighted to meet in person at your convenience.

Sincerely,

HR GREEN, INC

A handwritten signature in black ink that reads 'Garry Aronberg'.

Garry Aronberg, PE, CFM
Senior Engineer

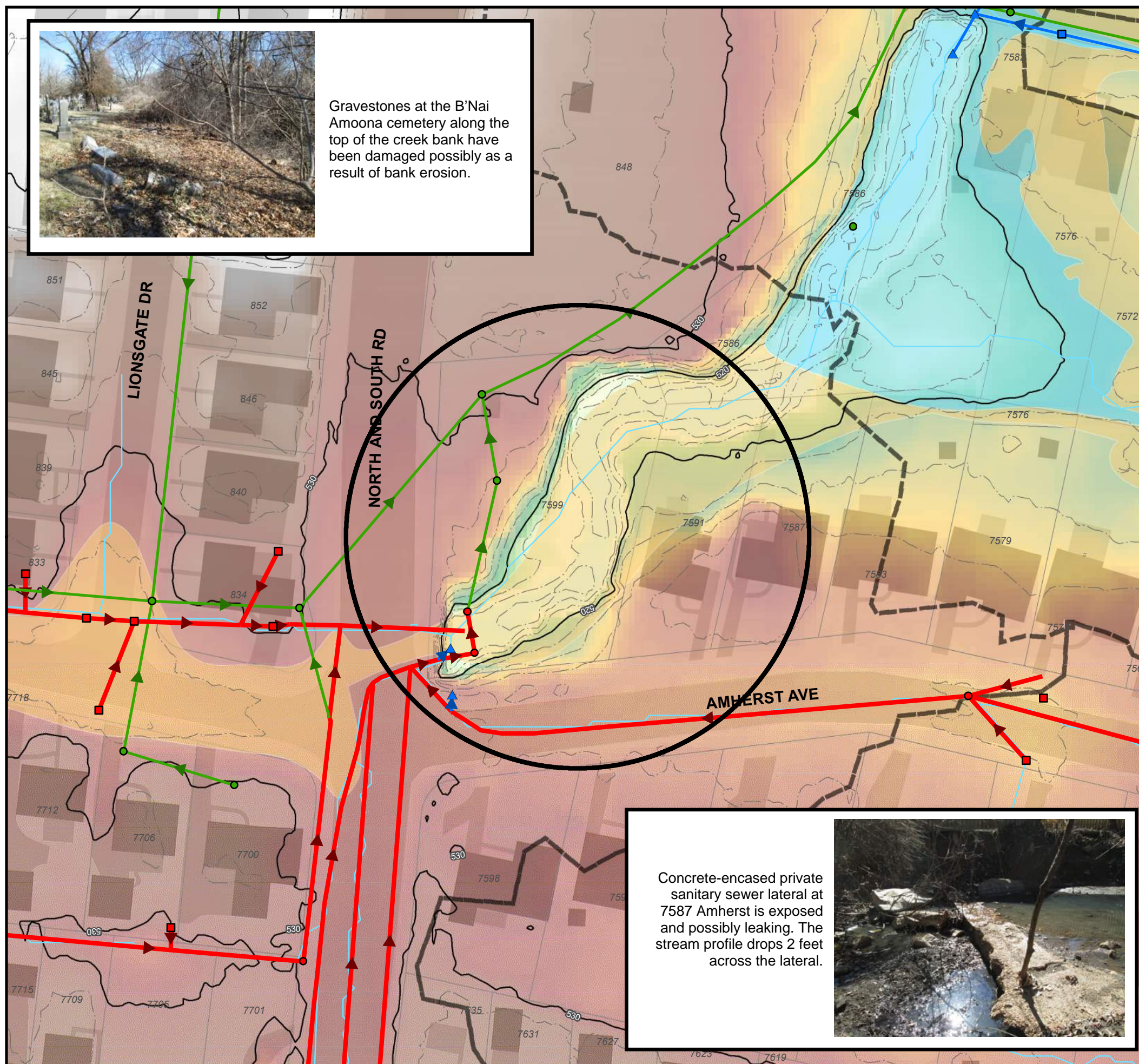
University City Stormwater Master Plan
Suggested Problems for Detailed Study

12/22/2022

Page Number	Name	Category Rank	Description	Recommended	Ward
Category: Erosion					
1	Tributary to River Des Peres Between Amherst Ave and Blackberry Ave	1	Erosion of a tributary to the River Des Peres threatens a house. The bank is 13' high and 20' from the house.	*	2
2	River Des Peres at Mona Dr	2	Erosion of the River Des Peres threatens the street (Mona Dr). The bank is 16' high and 5' from the curb.	*	2
3	River Des Peres at Wild Plum Ln	3	Creek erosion is threatening a parking lot and apartment buildings. The bank is 18' high.	*	2
4	River Des Peres at 7401 Balson Ave (University City High School)	4	Creek erosion is threatening the University City High school track and field.		2
5	River Des Peres at 7425 Shaftesbury Ave	5	A tall stone and wood tie wall near a residential structure is at risk of collapse.		2
6	Tributary to River Des Peres at Olive Blvd	6	A concrete lined channel has been undermined and is threatening a parking lot and MSD infrastructure.		2
Category: Street					
7	Amherst Ave	1	Several basement garages along Amherst Ave flood from street drainage. Combined sewer inlets exist on the street.	*	2
8	Old Bonhomme Rd	2	Flow from Ruth Park and Old Bonhomme Rd flows down driveways and floods two basement garages at houses on Old Bonhomme Rd.	*	1
9	Midland Blvd and Balson Ave	3	Inlets backup and flood the commercial building. Owner marked frequency as 'Often'.	*	2
10	W Point Ct	4	Constant ponding in street at low point. Three residents have complained.		1
Category: Backyard					
11	Balson Ave	1	All flooding types marked - yard, street, nonhab, hab, and first floor. Drainage area is 1.3 acres.	*	2
12	Milan Ave	2	About 3 acres of drainage through the yard at 7353 Milan Ave. There is already public storm sewer at 7353; may need to be upsized or make inlet more efficient.	*	3
13	Grenville Subdivision	3	Commercial property to north releases drainage to backyards of homes that are close together. There is no overland flow path to the front yard.	*	3
14	Wellington Ave	4	Four houses on Wellington Ave receive runoff from behind and there is no overland path to the street. About 2 acres of drainage comes to these backyards.		3
15	Clayton Gardens Subdivision	5	About 2.3 ac of drainage flows to the backyards of 3-4 houses, causing flooding to yards and basements. There is no flow path out to street. Note there are also basement garages.		1
16	Forsyth Place Subdivision	6	Homes on Forsyth Blvd drain to backyards of Lindell Blvd. Houses are close together so there is no easy path for runoff past Lindell Blvd houses. Overall DA is about 2.3 acres.		1
17	Cornell Ct	7	1.8 ac of drainage reaches backyard with no outlet point. Basement and yard flooding at 8128 Cornell Ct.		1
18	Northmoor Park Subdivision	8	Yard and basement flooding from drainage area behind houses reaching backyards. 1 to 1.5 acres reaching backyards in a couple of places.		1
Category: Common Problems throughout City					
19	River Des Peres Flooding		Estimate number of homes in 10-yr, 50-yr, 100-yr floodplain. Estimate <u>typical</u> buyout cost. Develop <u>typical</u> B:C ratio ... maybe use Corps report.	*	2,3
20	Basement backups		A common problem that will be addressed in report, but will not be a listed project. Estimate number of basement backup problems and determine a " <u>typical</u> " B:C ratio		1,2,3



Gravestones at the B'Nai Amoona cemetery along the top of the creek bank have been damaged possibly as a result of bank erosion.



Concrete-encased private sanitary sewer lateral at 7587 Amherst is exposed and possibly leaking. The stream profile drops 2 feet across the lateral.

Problem Description:

An un-named tributary to the River des Peres flows from a closed storm sewer outfall at Amherst and North & South. A 500-foot reach of the creekbank is over-steepened and actively eroding. MSD and the City initially identified this bank erosion in 1988, and MSD confirmed the issue and developed a conceptual solution and cost estimate in 2007.

The 13-foot high eroding bank at 7591 Amherst is 20 feet from the home (measured from the toe of bank), and has not advanced significantly since 2006, but is considered severe by MSD's bank erosion rating (V/H=1.46). The July 26, 2022 flood was above the basement floor of 7591 Amherst and collapsed their fence.



The 13-foot high eroding bank at 7591 Amherst is 9 feet from the home (measured from the top of bank).

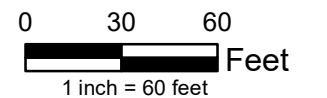


Creek erosion along 7587 Amherst is undermining their fence. The erosion rating at 7587 Amherst is considered a threat to the home (V/H=0.25).



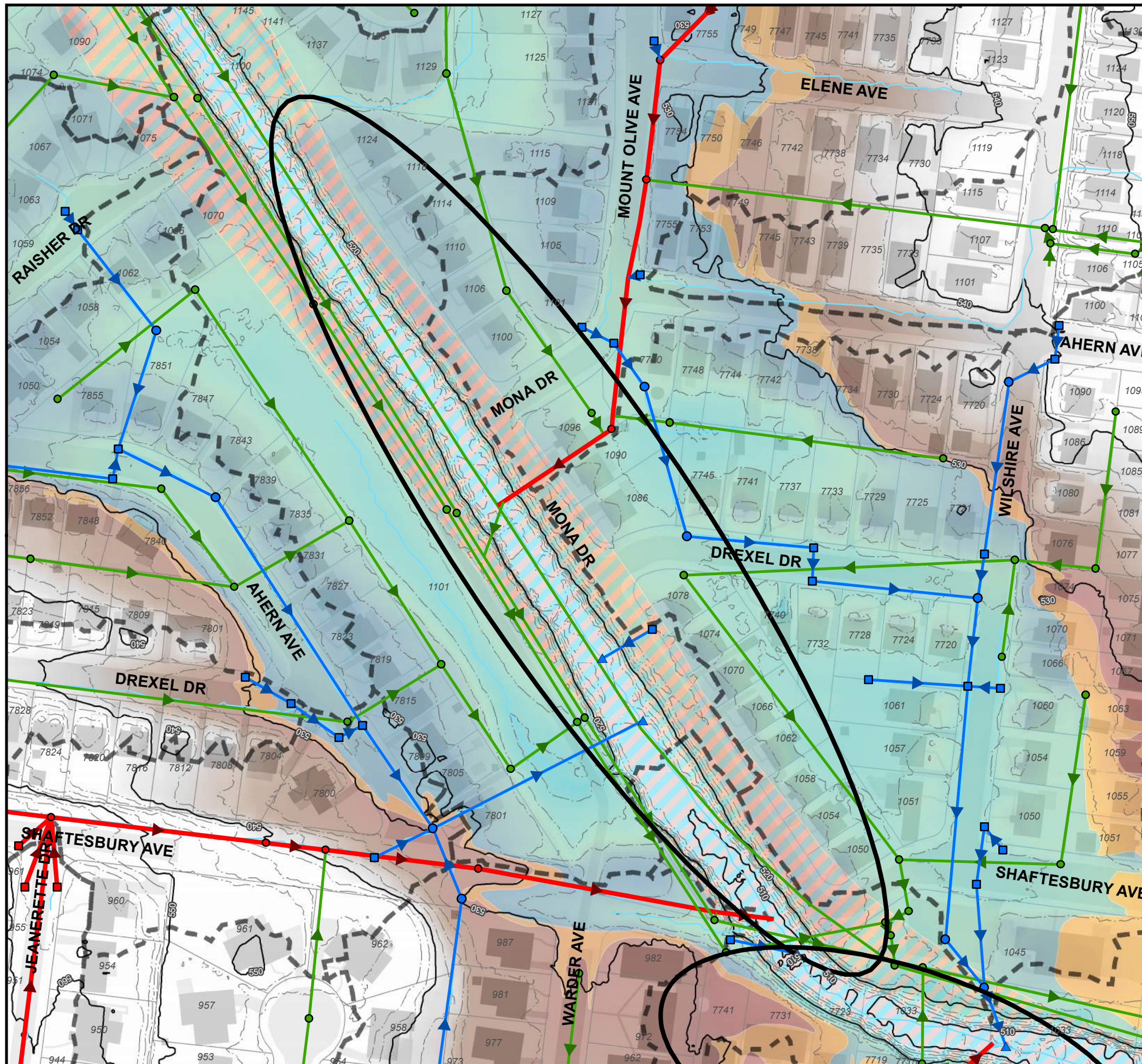
Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- ▭ Watershed Boundary
- Existing MSD System
 - Combined Inlet
 - Storm Inlet
 - ▲ Storm Intake-Outfall
 - Combined Manhole
 - Sanitary Manhole
 - Storm Manhole
 - Combined Sewer
 - Sanitary Sewer
 - Storm Sewer
- Flood Hazard Zone
 - 1.0% Annual Chance Flood Hazard
 - 0.2% Annual Chance Flood Hazard
 - Regulatory Floodway



**Tributary to River Des Peres
Between Amherst Ave and
Blackberry Ave**

Ranked #1 in the Erosion Category



Problem Description:

A 700-foot reach of the River des Peres is over-steepened and actively eroding. The top of bank is 16-feet high and has eroded to within 5 feet of the curb line of Mona Drive. The north end of Mona Drive is the only road access/egress for six homes. Using MSD's erosion rating, the street is more severely threatened (V/H=0.44) than the homes (V/H=0.18). MSD installed riprap along portions of Mona Drive in approximately 2017, but most of this riprap has since eroded and slid off the bank. An additional 600-foot reach of bank along the downstream end of Mona Drive is somewhat more stable. The homes along Mona Drive flooded on July 26, 2022.

Over-steepened channel banks threaten Mona Drive which provides the only access to 6 houses.



Over-steepened channel banks, and the remains of riprap placed by MSD that has since eroded and slid off the bank.

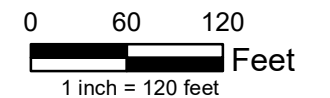


Channel bottom contains riprap, some of which slid off the bank from a previously installed MSD project.

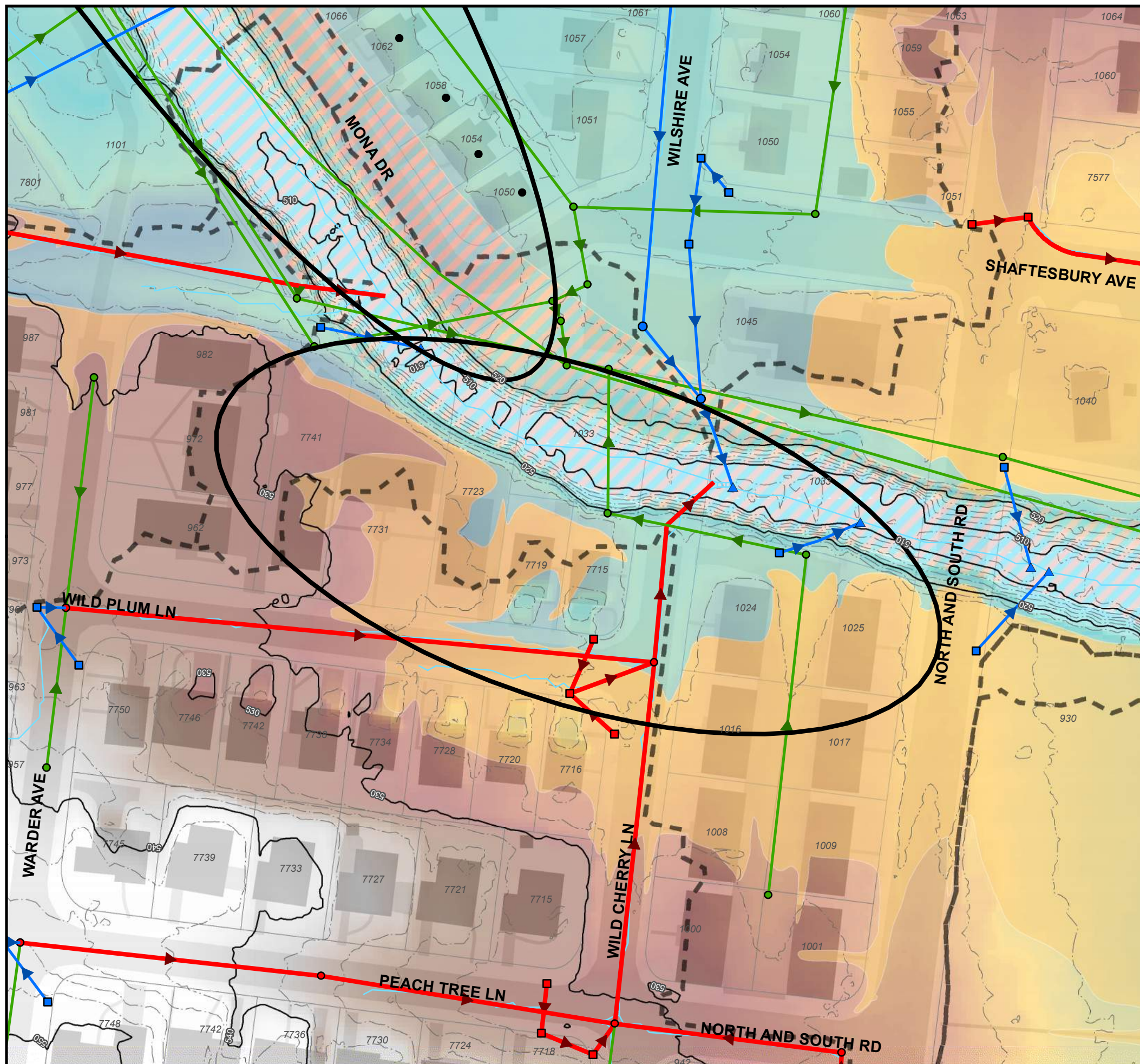


Legend

- Stormwater Problem Point
- ▭ Problem Location
- Flow Path Line
- - - Watershed Boundary
- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- ▨ Regulatory Floodway
- Existing MSD System
- Combined Inlet
- Storm Inlet
- ▲ Storm Intake-Outfall
- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined Sewer
- Sanitary Sewer
- Storm Sewer



River Des Peres at Mona Dr
Ranked #2 in the Erosion Category



Problem Description:

A 500-foot reach of the River des Peres is actively eroding. The top of bank is 18-feet high is threatening residential buildings and parking lots located along Wild Cherry and Wild Plum Lanes. Using MSD's erosion rating, the parking lot is more severely threatened (V/H=0.56) than the apartment buildings (V/H=0.2 to 0.4).

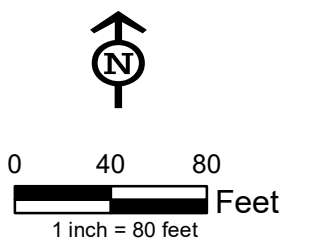
An approximately 175-foot reach of the right-descending river bank is lined with a concrete slab, but the integrity of the concrete is compromised by a 3-foot deep scour pool along the toe of bank. Failure of slab will likely cause failure in the parking lot.



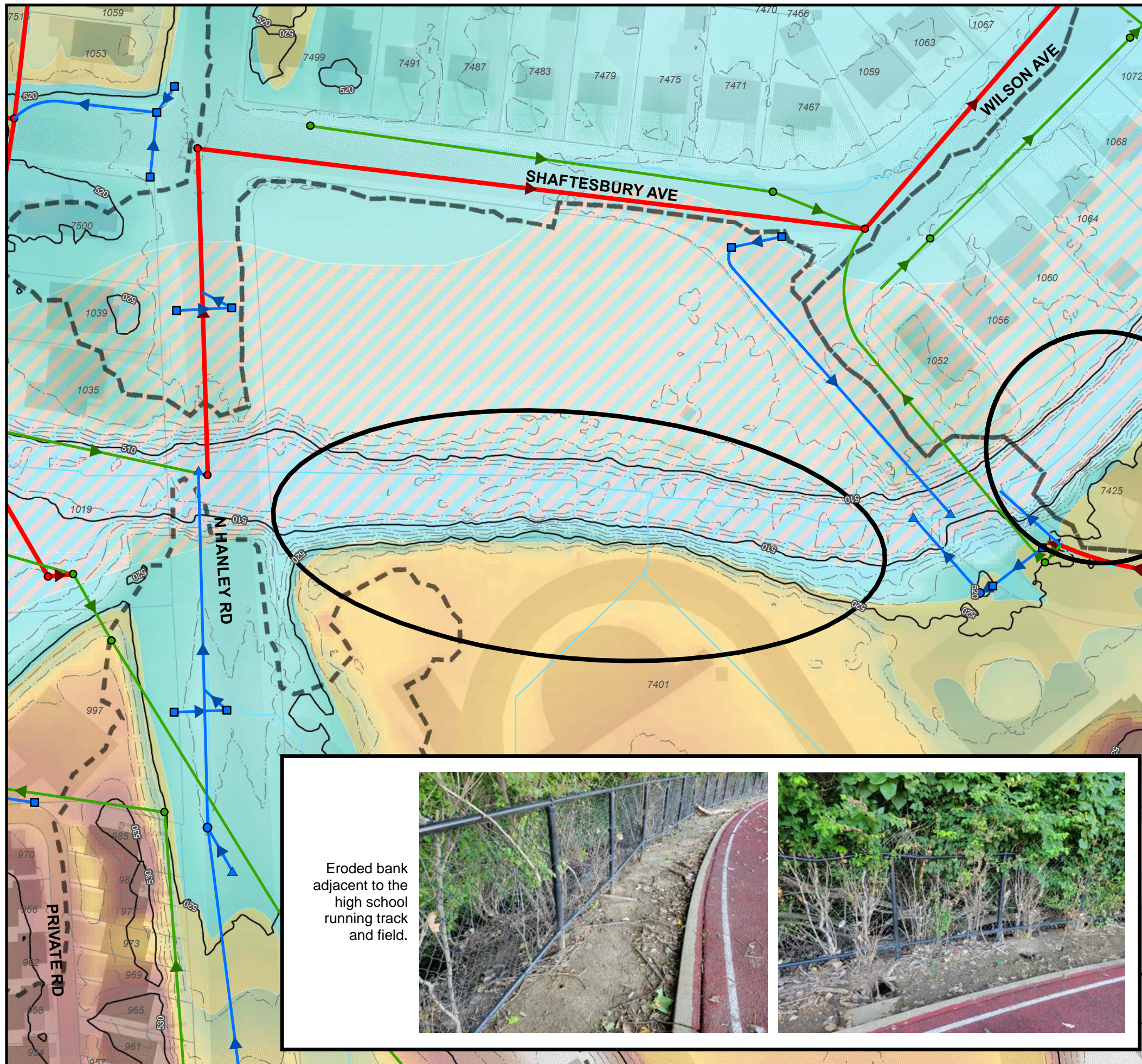
MSD infrastructure along the right-descending river bank is threatened by bank erosion including a combined sewer manhole, a combined sewer overflow (CSO) structure, and a storm sewer outflow structure.

Legend

- | | |
|---------------------------------|----------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| ▭ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| ⋯ Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | ● Combined Manhole |
| 1.0% Annual Chance Flood Hazard | ● Sanitary Manhole |
| 0.2% Annual Chance Flood Hazard | ● Storm Manhole |
| Regulatory Floodway | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



River Des Peres at Wild Plum Ln
Ranked #3 in the Erosion Category



Problem Description:

Erosion on the South bank of the River des Peres has destabilized the bank leading up to the University City High School track and field. These features are located immediately adjacent to a 3.5-foot high fence along the top of the eroding bank, and are at risk.

The foundation of a 6-foot high mid-slope fence is eroded and the fence is collapsing. It appears that riprap was added from the top of slope to address an area of gulley erosion, but this riprap is sliding down the bank. The weight of this riprap is contributing to the fence failure.



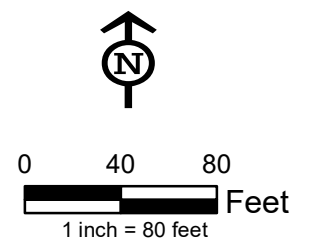
On the right descending bank are the eroding bank, collapsing fence, and sliding riprap.



On the right descending bank are the eroding bank, collapsing fence, and sliding riprap.

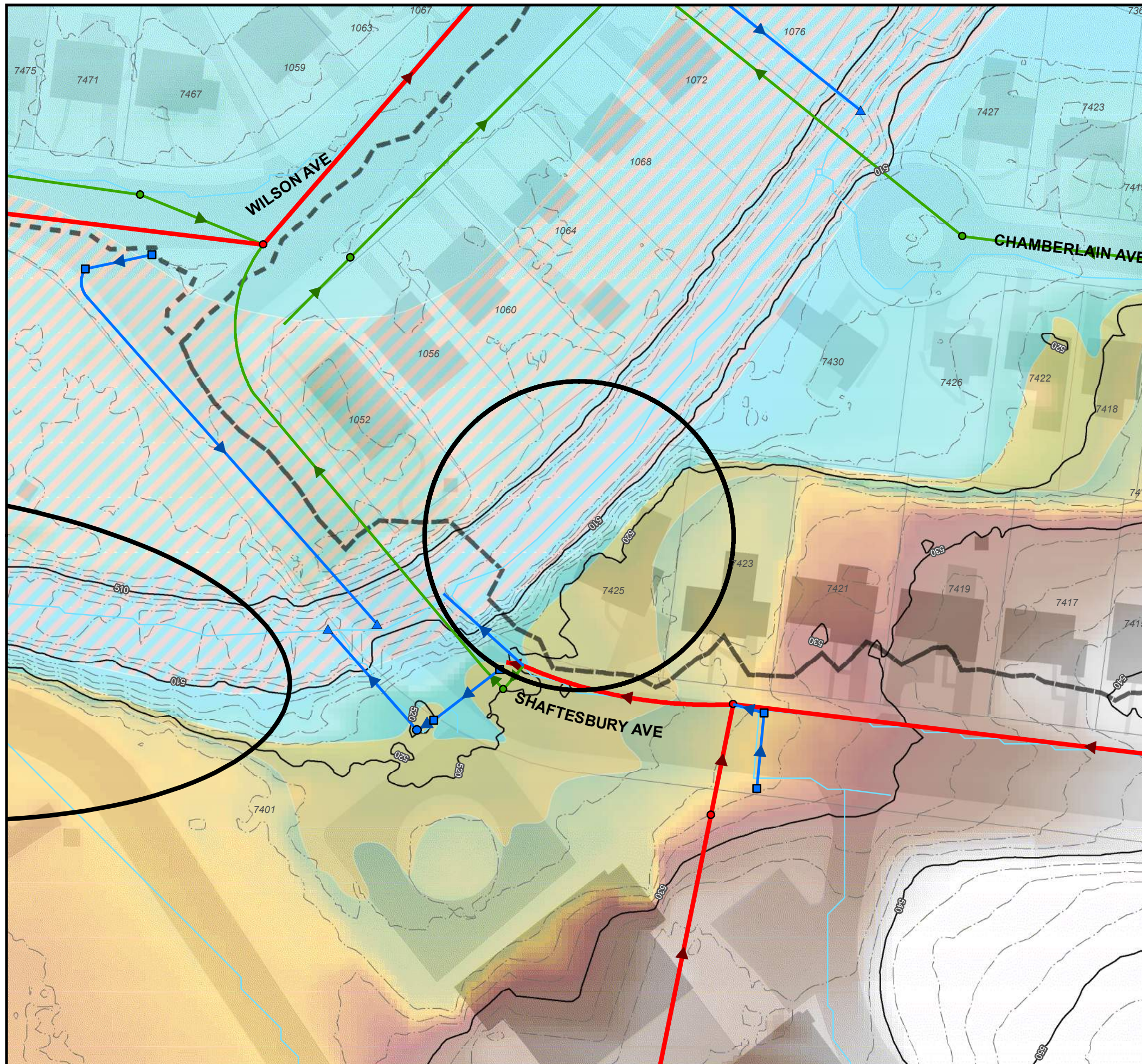
Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- Watershed Boundary
- Flood Hazard Zone**
- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway
- Existing MSD System**
- Combined Inlet
- Storm Inlet
- Storm Intake-Outfall
- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined Sewer
- Sanitary Sewer
- Storm Sewer



River Des Peres at 7401 Balson Ave (University City High School)

Ranked #4 in the Erosion Category



Problem Description:
 A 16-foot high bank with a combination of public and private walls is compromised and a house located only 7 feet from the top of wall is at risk. The wood tie wall is compromised, but the lower 6-feet of the bank of the Rider des Peres at this location is a WPA hand-placed stone wall, which appears stable.



Wood tie wall and WPA block wall. 7425 Shaftesbury Ave is the house behind the wall in the photo.



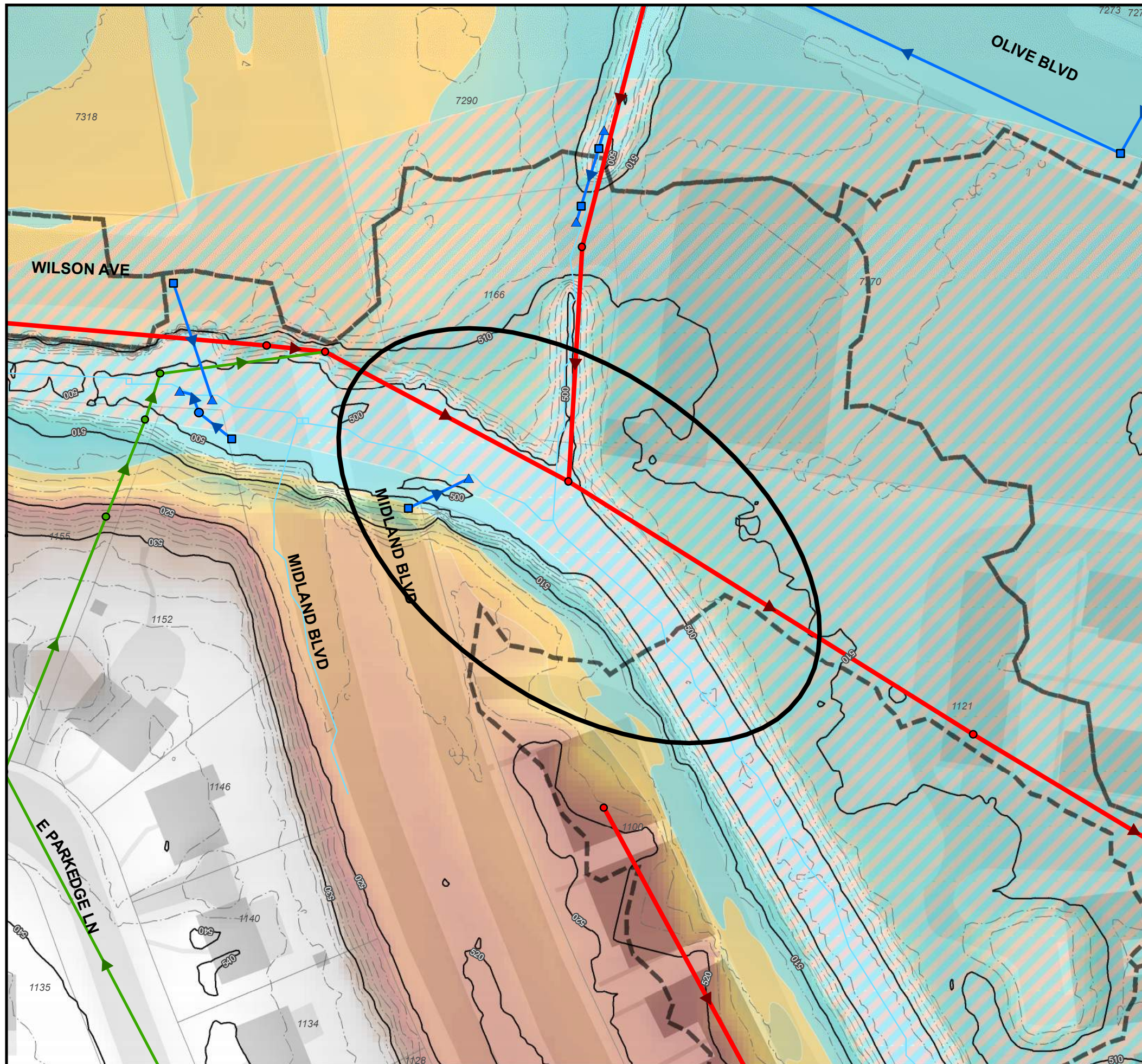
Wood tie wall and WPA block wall, looking downstream.

Legend

● Stormwater Problem Point	Existing MSD System
□ Problem Location	■ Combined Inlet
— Flow Path Line	■ Storm Inlet
--- Watershed Boundary	▲ Storm Intake-Outfall
Flood Hazard Zone	● Combined Manhole
1.0% Annual Chance Flood Hazard	● Sanitary Manhole
0.2% Annual Chance Flood Hazard	● Storm Manhole
Regulatory Floodway	→ Combined Sewer
	→ Sanitary Sewer
	→ Storm Sewer

1 inch = 60 feet

River Des Peres at 7425 Shaftesbury Ave
Ranked #5 in the Erosion Category



Problem Description:
Concrete slabs lining a tributary to the River des Peres are undermined and have failed, looking upstream. The foundation of the concrete-curb adjacent U-Haul parking lot is exposed on the east side of the channel. At-risk infrastructure includes the commercial parking lot, an inlet manhole, and a pipe outfall.



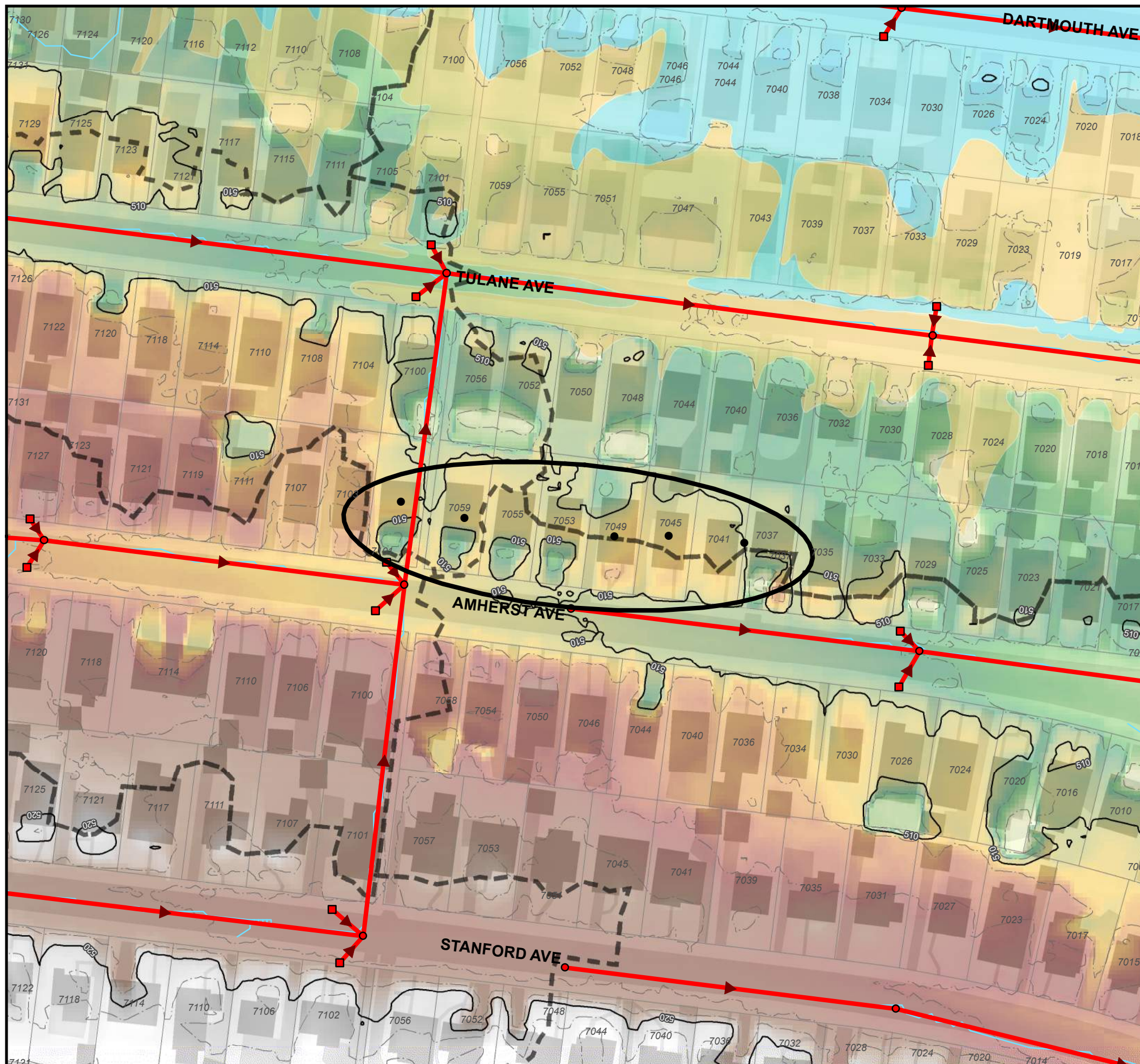
Undermined concrete slabs with adjacent at-risk infrastructure, looking upstream. The concrete box culvert under Olive Boulevard (background) appears stable.

Exposed foundation of the adjacent parking lot.

Legend

● Stormwater Problem Point	Existing MSD System
▭ Problem Location	■ Combined Inlet
— Flow Path Line	■ Storm Inlet
▭ Watershed Boundary	▲ Storm Intake-Outfall
Flood Hazard Zone	● Combined Manhole
Light Blue 1.0% Annual Chance Flood Hazard	● Sanitary Manhole
Yellow 0.2% Annual Chance Flood Hazard	● Storm Manhole
Light Blue with Hatching Regulatory Floodway	— Combined Sewer
	— Sanitary Sewer
	— Storm Sewer

Tributary to River Des Peres at Olive Blvd
Ranked #6 in the Erosion Category



Problem Description:

Several basement garages along Amherst Avenue flood from street drainage. Combined sewers with street inlets exist on the street. Amherst Ave is very flat, which reduces inlet capacity.

Although not all of these residents responded, it is likely that 7101, 7059, 7055, 7053, and 7037 Amherst Ave have frequent basement flooding due to water escaping the street and flowing down the driveway.

Grated drains were observed near each garage door. It is likely that each of these are connected into the nearby combined sewer. Therefore, it is possible the flooding is due to backup from the combined sewer main.

The driveway at 7101 Amherst Ave.



The driveway at 7037 Amherst Ave.

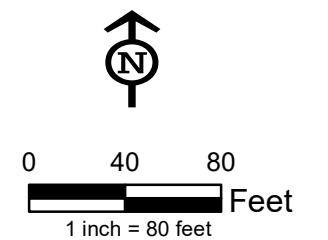


Looking east along Amherst Ave towards the inlets between 7033/7029 Amherst Ave.

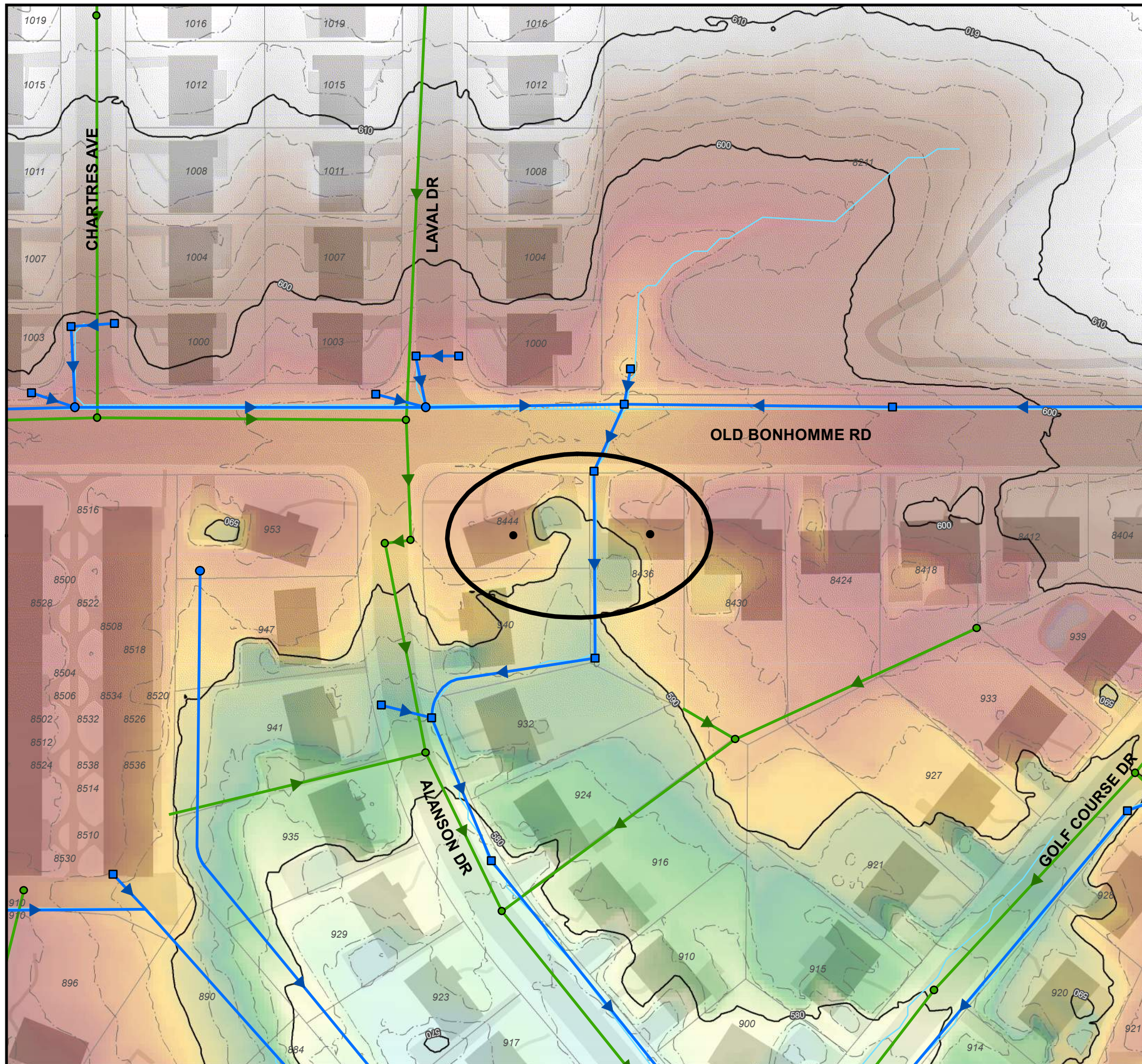


Legend

- | | |
|-----------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| --- Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | — Combined Sewer |
| | — Sanitary Sewer |
| | — Storm Sewer |



Amherst Ave
Ranked #1 in the Street Category



Problem Description:

Basement garages at 8444 and 8436 Old Bonhomme Rd flood frequently from water which comes down the driveway at 8436 from the street. There is a triple curb inlet in front of 8436 Old Bonhomme Rd which accepts water from about 1,200 feet of Old Bonhomme Rd. The downstream pipe is 24" in diameter.

MSD has studied the problem and identified storm sewer upsizing as a solution. It may also be beneficial to investigate other opportunities for improvement, such as: A) increase inlet capacity at the street by adding inlets east of the triple inlet, B) raise a portion of the driveway at 8436 to keep water in the street, or C) provide a conveyance path down driveway and towards the at the property corner between #8436 and 940/932 Alanson Dr.



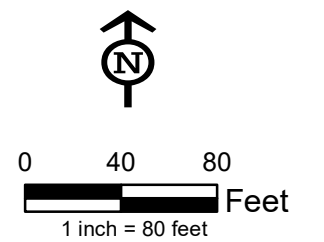
Looking south across Old Bonhomme Rd. #8436 is on the left and #8444 is on the right.



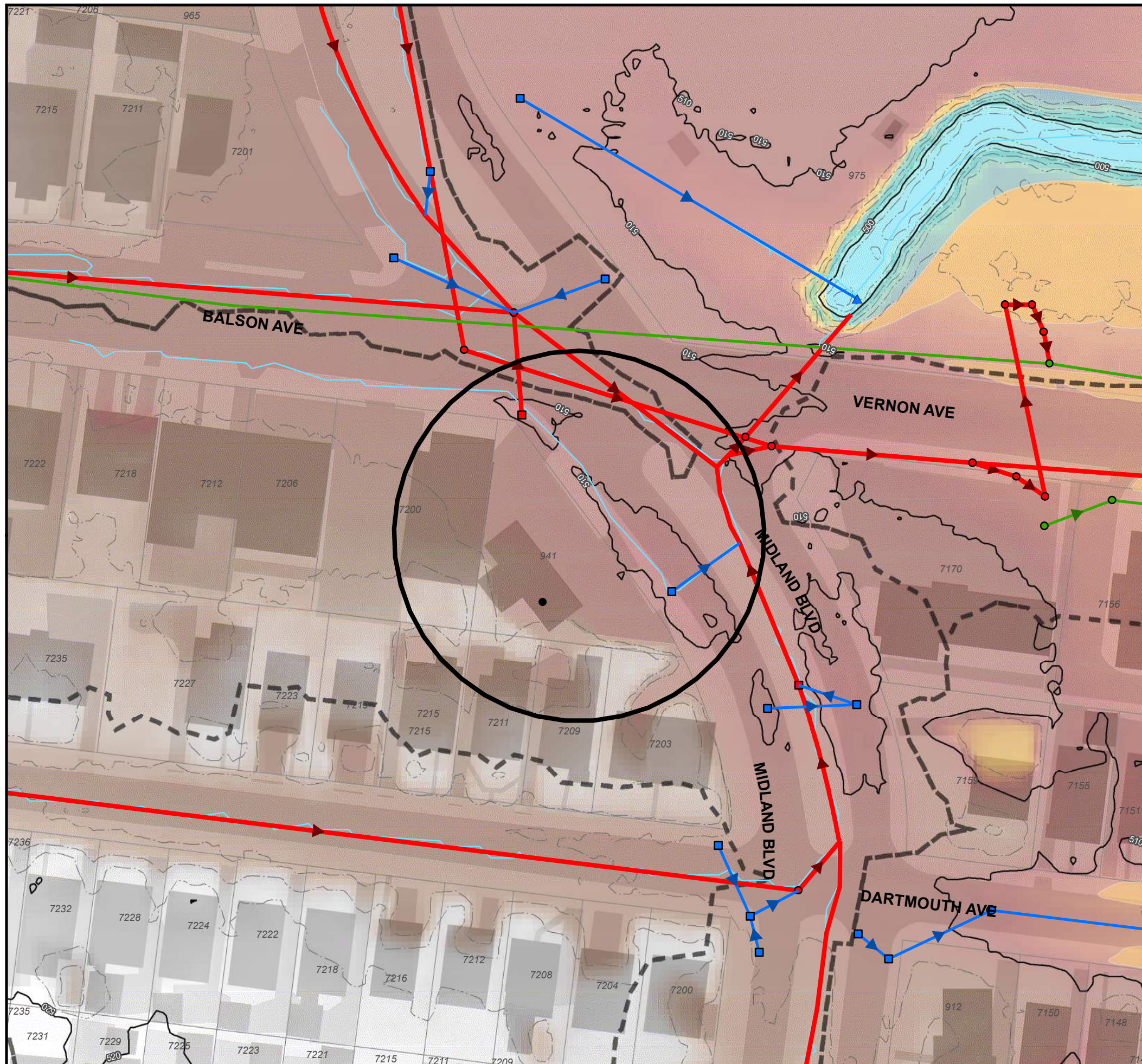
Looking at the ground in front of the driveway at 8436 Old Bonhomme Rd.

Legend

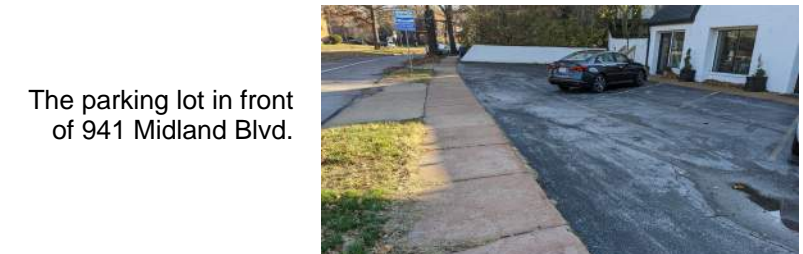
- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| ▭ Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Box | ● Combined Manhole |
| Light Orange Box | ● Sanitary Manhole |
| Light Green Box | ● Storm Manhole |
| Light Red Box | → Combined Sewer |
| Light Blue Box | → Sanitary Sewer |
| Light Green Box | → Storm Sewer |



Old Bonhomme Rd
Ranked #2 in the Street Category



Problem Description:
 The commercial building at 941 Midland Blvd has been flooded by ponded water in the street. The owner indicated that when this happens, the inlets won't drain. Investigation is necessary to determine if the flooding issue is due to inlet capacity, pipe capacity, or high tailwater from the River Des Peres, or a combination of these issues.



The parking lot in front of 941 Midland Blvd.



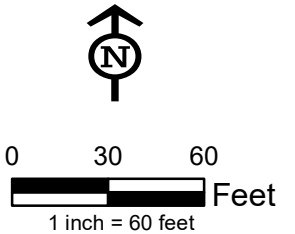
Looking north towards the inlet at the southwest corner of Midland Blvd and Balson Ave.



Looking southeast along Midland Blvd at the inlet east of 941 Midland Blvd.

Legend

- | | |
|---------------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Flood Hazard | ● Combined Manhole |
| Light Orange Flood Hazard | ● Sanitary Manhole |
| Light Blue/Orange Regulatory Floodway | ● Storm Manhole |
| | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



Midland Blvd and Balson Ave
Ranked #3 in the Street Category



Problem Description:

Residents say that the low point on W Point Ct floods constantly. The street does not have a distinct crown. Asphalt patching has made the street uneven in some places. There are 4 inlets near the low point, but non appear very efficient. There is not a well-defined sag and inlets appear to clog easily with leaves.



Looking towards the grated curb inlet with side intake between #416 and 414. The side intake is rather narrow and the grate is clogged with leaves.



Looking south towards the inlets in front of #414 and 415. Both of these inlets are grated with a side intake.



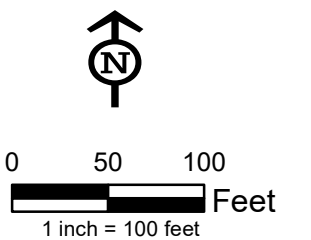
Looking north towards the northern two inlets on W Point Ct. Both are grated inlets with side intakes.

Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- Watershed Boundary
- Combined Inlet
- Storm Inlet
- ▲ Storm Intake-Outfall
- Combined Manhole
- Sanitary Manhole
- Storm Manhole
- Combined Sewer
- Sanitary Sewer
- Storm Sewer

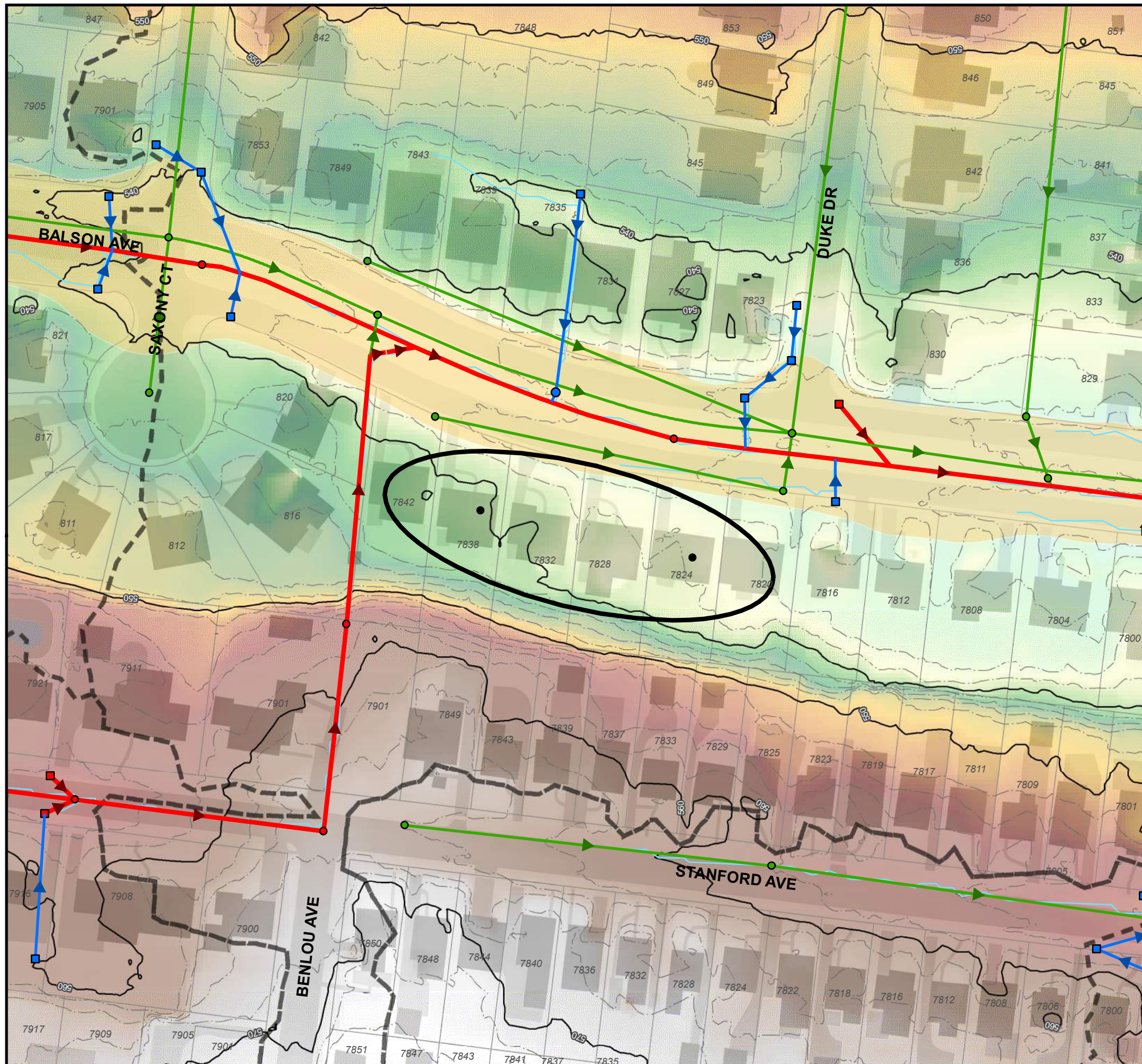
Flood Hazard Zone

- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway



W Point Ct

Ranked #4 in the Street Category



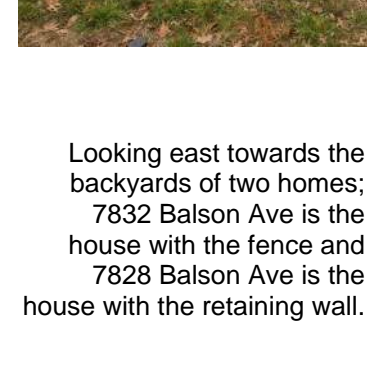
Problem Description:

The homes on Stanford Avenue sit about 18 feet higher than the homes on Balson Ave. Between the houses is at a 3:1 slope. The flow path from the backyards to the front yards on Balson Ave is inadequate, causing frequent flooding to at least two of the homes on Balson Ave. The drainage area to the back of the homes is about 1.3 acres.

The basement stairwell at 7838 Balson Ave. Sand bags and sump pumps have been added to try to keep the basement from flooding.



Looking west in the backyard of 7838 Balson Ave. The house is on the right.



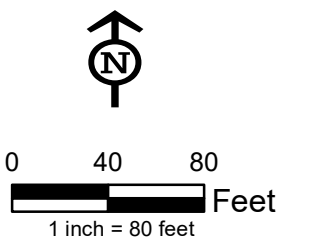
Looking east towards the backyards of two homes; 7832 Balson Ave is the house with the fence and 7828 Balson Ave is the house with the retaining wall.

Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- Watershed Boundary
- Existing MSD System
 - Combined Inlet
 - Storm Inlet
 - ▲ Storm Intake-Outfall
 - Combined Manhole
 - Sanitary Manhole
 - Storm Manhole
 - Combined Sewer
 - Sanitary Sewer
 - Storm Sewer

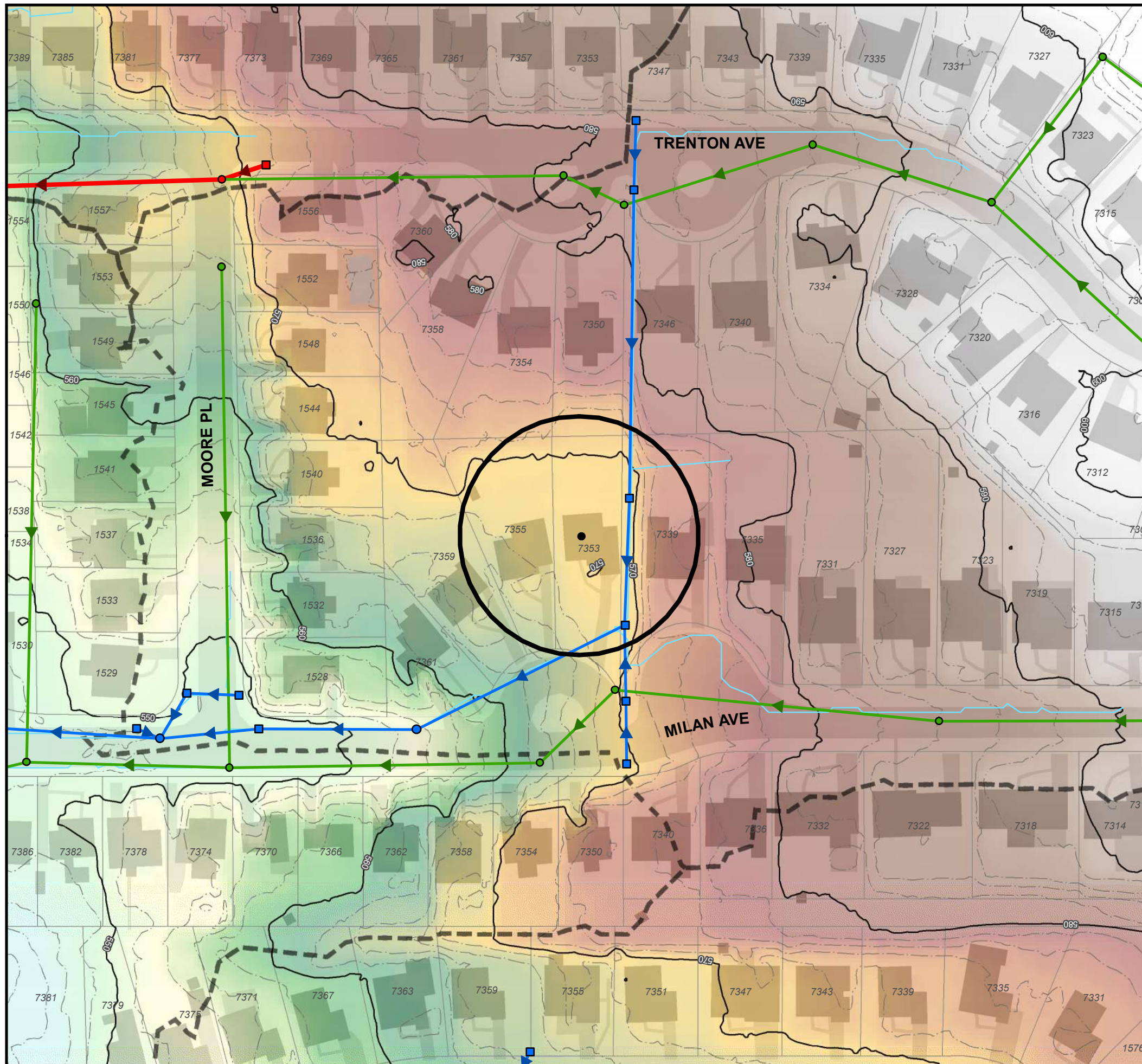
Flood Hazard Zone

- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway



Balson Ave

Ranked #1 in the Backyard Category



Problem Description:

About 3 acres of drainage flows to the backyard at 7353 Milan Ave. An area inlet just east of the backyard clogs easily and may also have inadequate capacity. Water backs up, flooding the entire yard until it can flow east. Water has nearly reached the threshold of the back door to the house. The basement has flooded from both seepage and overland flow in 2014, 2015, and 2022.

Looking south along the property line between #7353 and 7339.



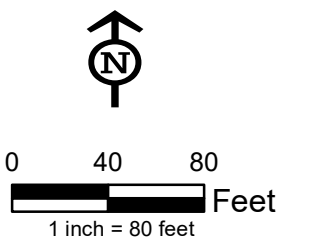
Looking towards the back patio at #7353. Ponded water has nearly reached the threshold of the door into the house (not the door to the screened in patio).

Looking north towards the area inlet in the backyards. #7353's backyard is on the left.

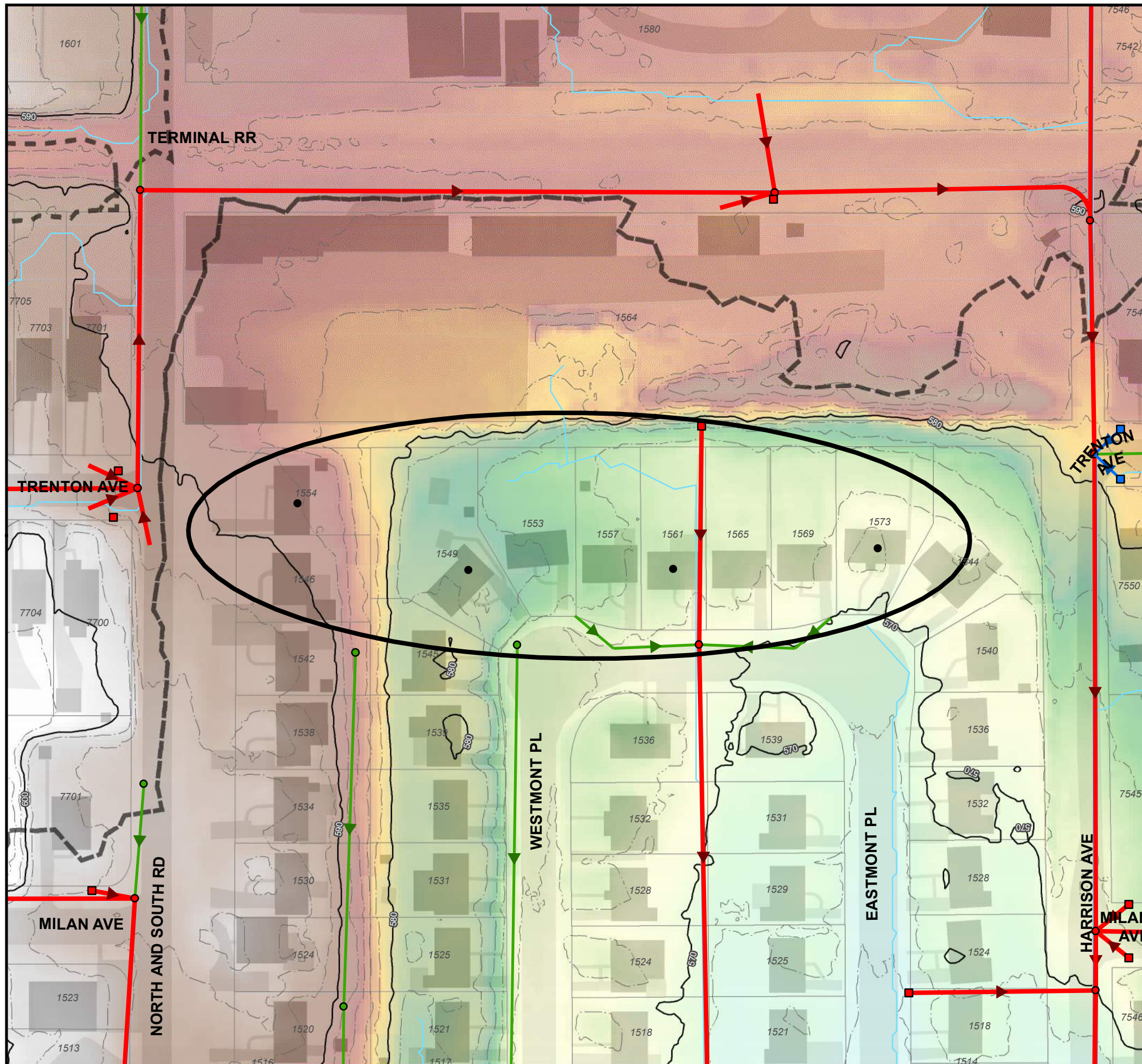


Legend

- | | |
|-----------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



Milan Ave
Ranked #2 in the Backyard Category



Problem Description:

The property north of the Grenville Subdivision sits about 6-10 feet above the backyards of several houses. About 3.3 acres of drainage reaches the backyards of 1561 to 1573 Westmont Place.

The backyards are relatively flat; there is no adequate conveyance which carries water from the backyards to the street, so the yards flood frequently. Seepage occurs into the basements of some of the homes.

There is an inlet behind 1561, but only about half of a side is able to accept water due to grading issues. Note the inlet appears to be in a strip of ROW between the houses and business.

Looking northwest towards the strip of ROW between homes (on the left) and the business to the north (on the right).



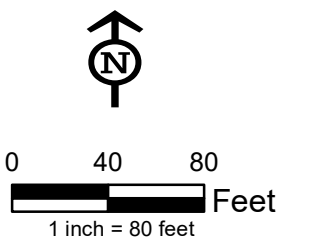
Looking towards the inlet north of #1561. Due to grading, the inlet does not appear to collect much runoff.



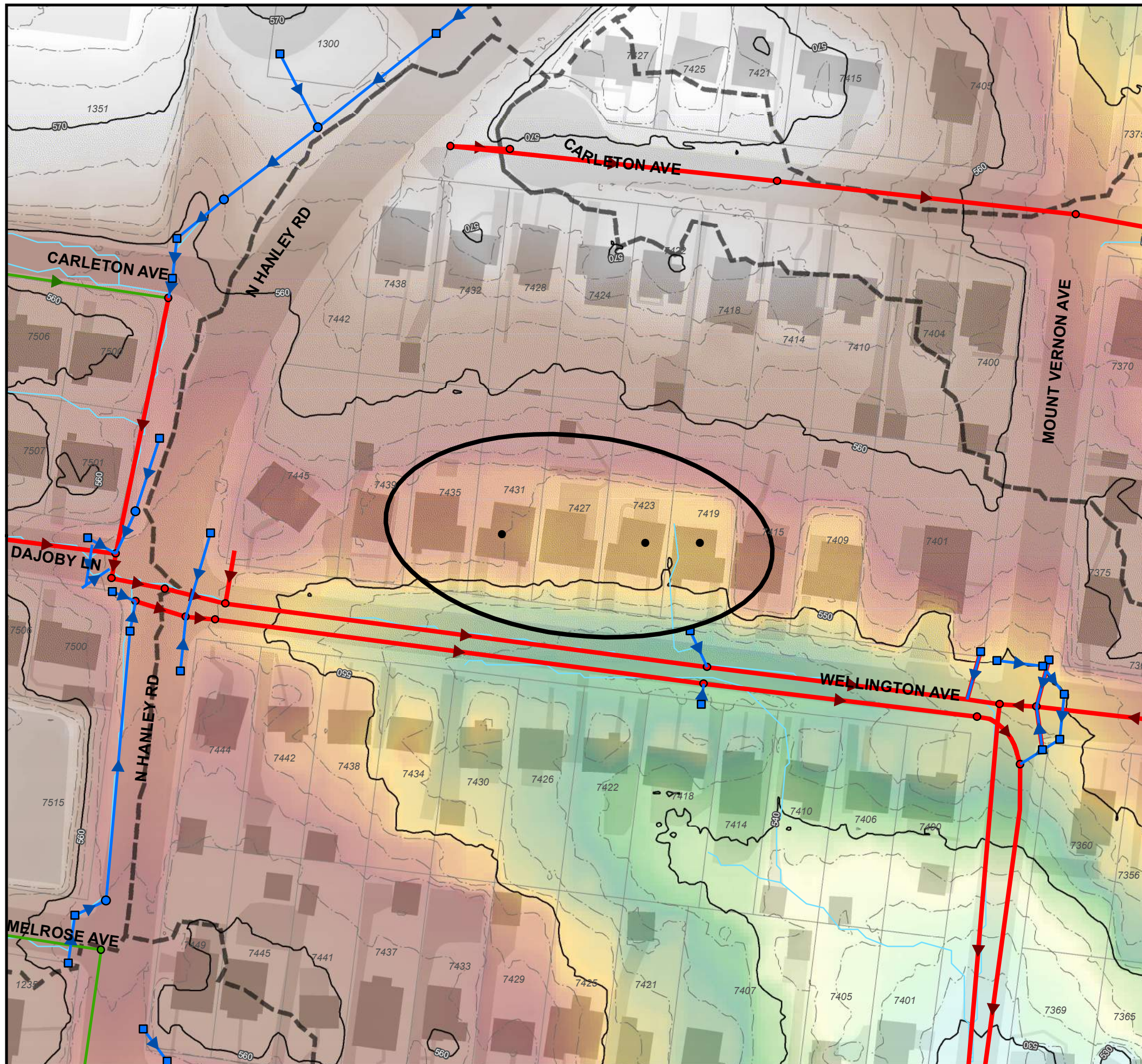
Looking south towards the backyard at #1561.

Legend

- | | |
|---------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| ⋮ Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | ● Combined Manhole |
| 1.0% Annual Chance Flood Hazard | ● Sanitary Manhole |
| 0.2% Annual Chance Flood Hazard | ● Storm Manhole |
| Regulatory Floodway | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



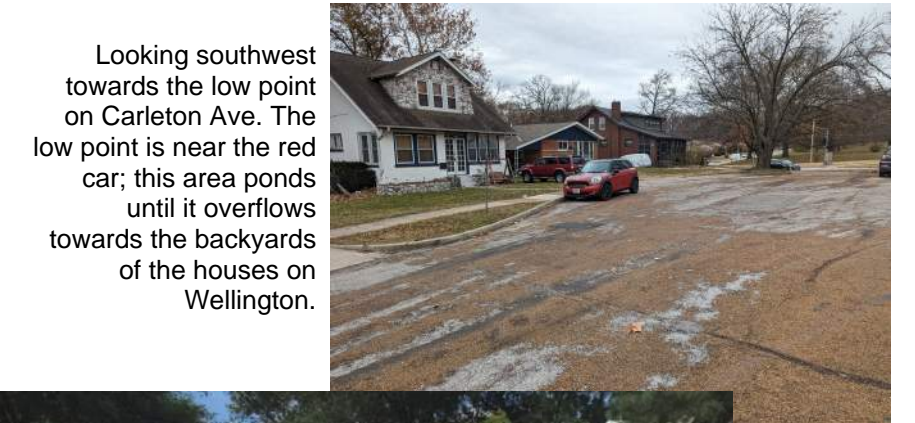
Grenville Subdivision
Ranked #3 in the Backyard Category



Problem Description:

About 2 acres of drainage reach the backyards between 7427-7419 Wellington Ave. There is not an adequate route for runoff to get past the houses and to the street, which is about 6 feet lower than the homes. As a result, the yards and basements of homes flood frequently.

It should be noted that there is a low point on the south end of the cul-de-sac for Carleton Ave which contributes to the drainage area; however, this area is not as significant as the contributing drainage area which includes the yards and homes of the surrounding properties.



Looking southwest towards the low point on Carleton Ave. The low point is near the red car; this area ponds until it overflows towards the backyards of the houses on Wellington.



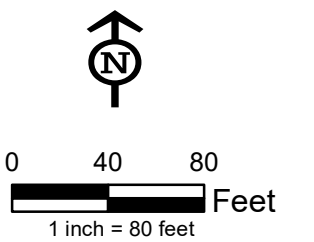
Looking north between #7423 (on the left) and #7419 (on the right). The space between houses may convey some of the runoff from the backyards, but the grading and available space is insufficient.

Legend

- Stormwater Problem Point
- Problem Location
- Flow Path Line
- Watershed Boundary
- Existing MSD System
 - Combined Inlet
 - Storm Inlet
 - ▲ Storm Intake-Outfall
 - Combined Manhole
 - Sanitary Manhole
 - Storm Manhole
 - Combined Sewer
 - Sanitary Sewer
 - Storm Sewer

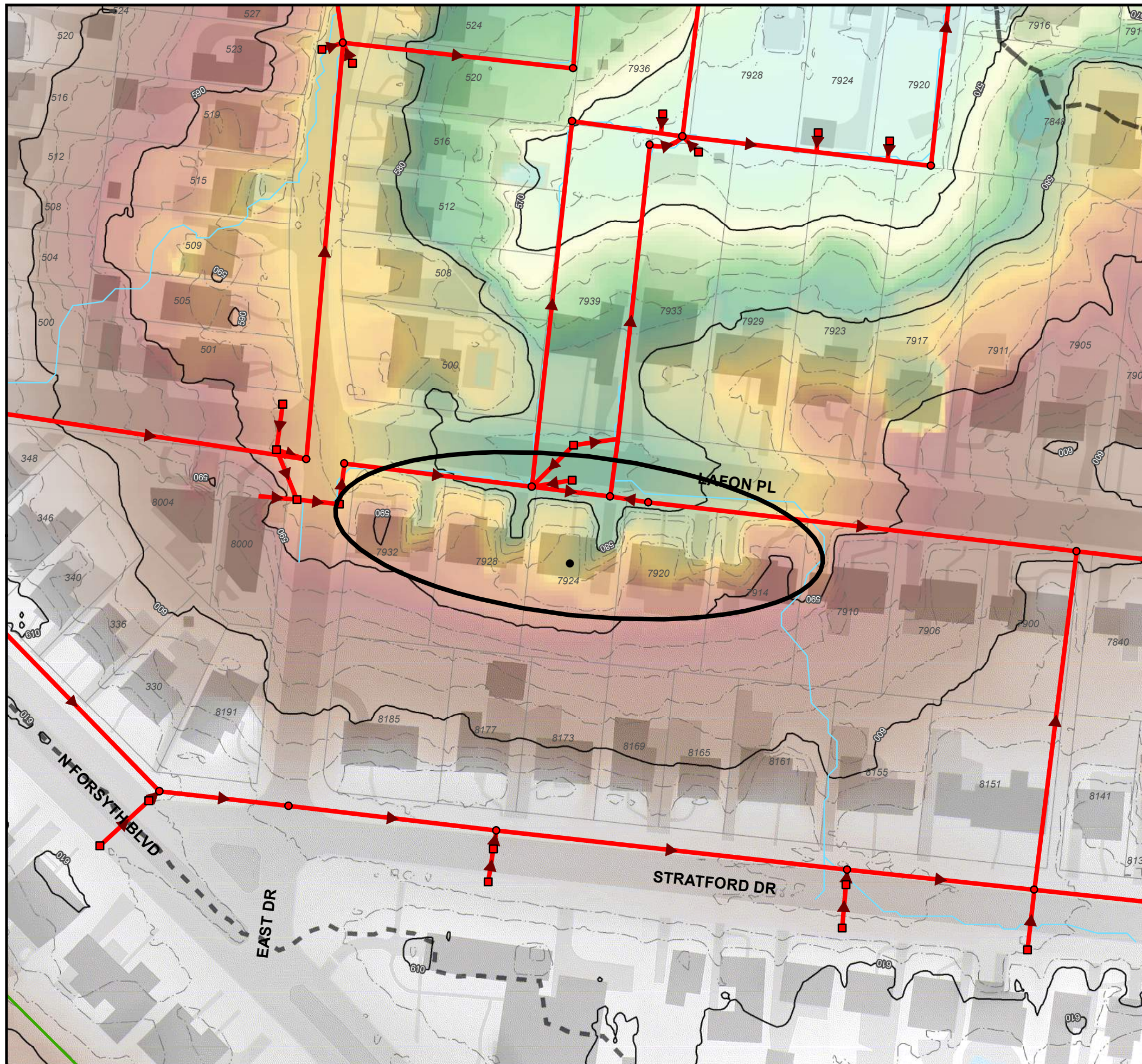
Flood Hazard Zone

- 1.0% Annual Chance Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Regulatory Floodway



Wellington Ave

Ranked #4 in the Backyard Category

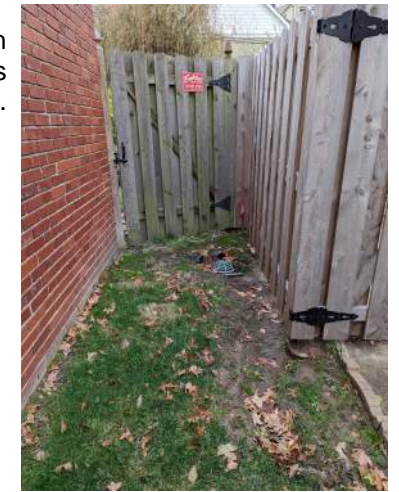


Problem Description:

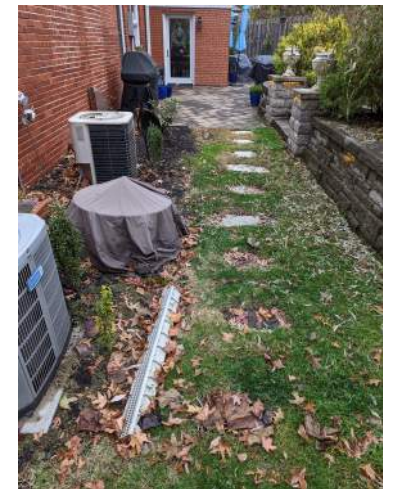
About 2.3 acres of drainage flows to the backyards of three houses, causing flooding to yards and basements. There is no flow path to carry runoff past the houses and to the inlets in the street.

The houses in this area have basement tuck-under garages. The street and sidewalk flood but the basement garages have not flooded.

Looking north between #7924 and 7928 towards erosion and a yard drain.



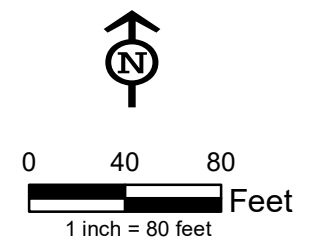
Looking west in the backyard of 7924 Lafon Pl. The house is out of frame on the right. The yard slopes towards the back of the house.



Looking east along the back of 7924 Lafon Pl. A yard drain was installed in an attempt to reduce ponding near the house.

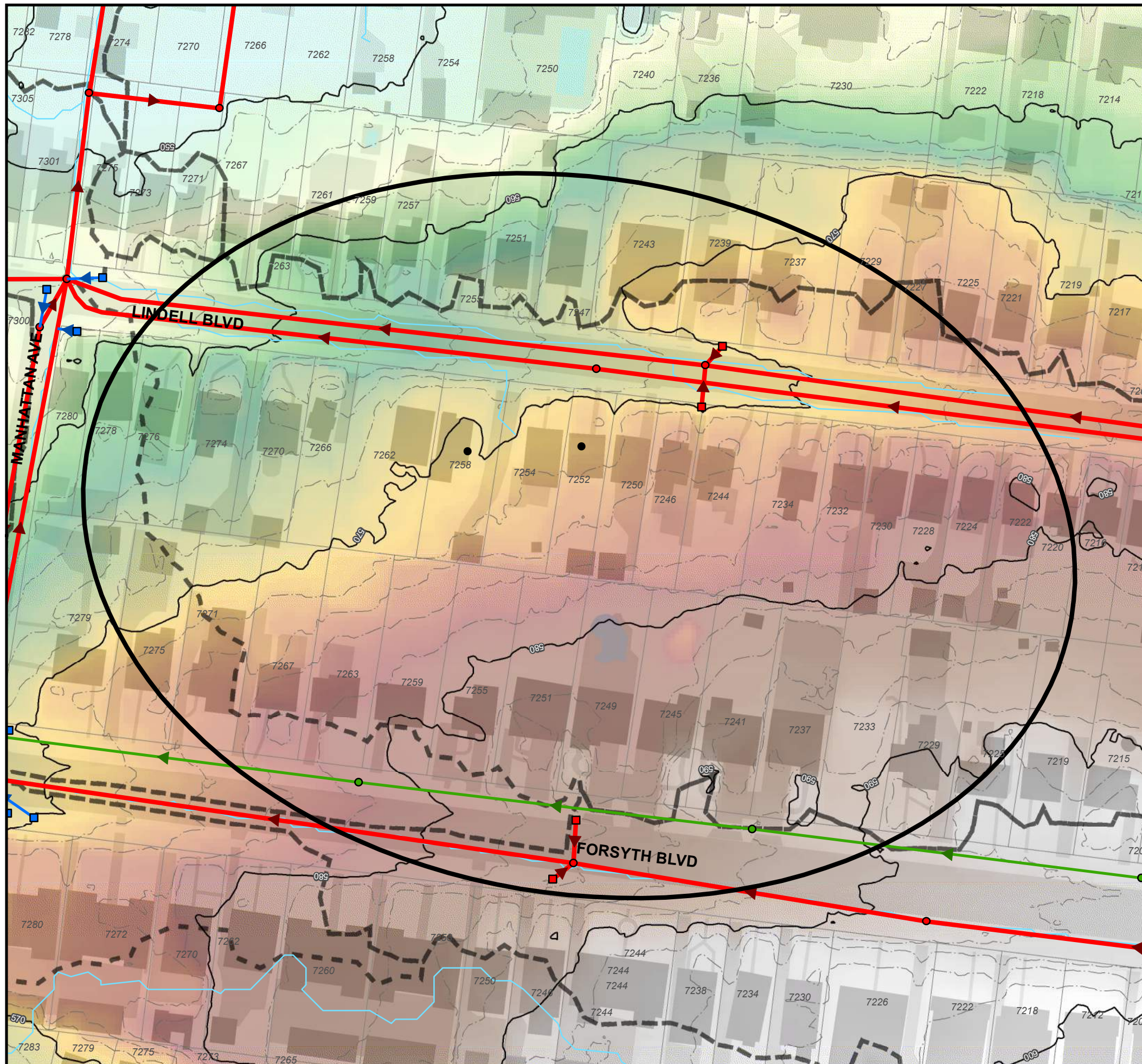
Legend

- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| --- Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Box | ● Combined Manhole |
| Yellow Box | ● Sanitary Manhole |
| Light Blue Box | ● Storm Manhole |
| Light Blue Box | → Combined Sewer |
| Light Blue Box | → Sanitary Sewer |
| Light Blue Box | → Storm Sewer |



Clayton Gardens Subdivision

Ranked #5 in the Backyard Category



Problem Description:

The homes on Forsyth Blvd drain to the backyards of Lindell Blvd. There is no defined path for runoff to continue flowing to the street, so the yards, detached garages, and basements have frequent flooding. The drainage area to the back of the homes is about 2.3 acres.

Looking west towards the backyard at 7258 Lindell Blvd. The stairwell to the basement is under the porch.



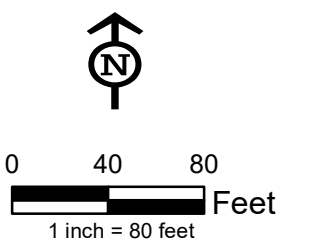
Looking north between #7252 (on the left) and #7250 (on the right). Basement windows are within 1-3 inches of the driveway - a potential source of flooding to the basements.



Looking west towards the backyard at 7252 Lindell Blvd. Ponding occurs near the steps to the patio. There is a stairwell to the basement under the porch.

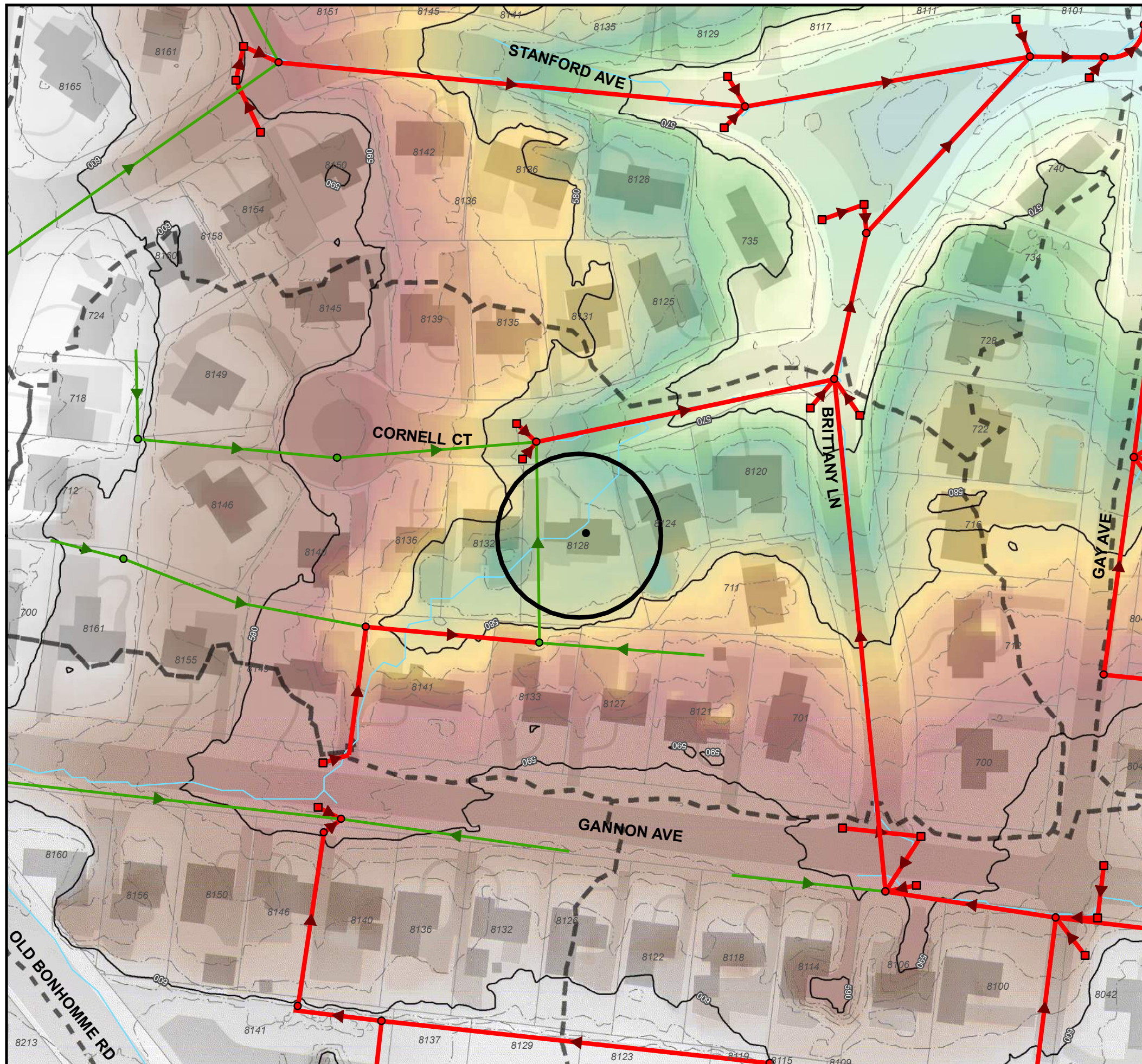
Legend

- | | |
|-----------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



Forsyth Place Subdivision

Ranked #6 in the Backyard Category



Problem Description:

About 1.8 acres of drainage reaches the backyards of 8132 and 8128 Cornell Ct. #8132 has a basement garage which flooded significantly in the July 2022 events. #8128 has frequent yard flooding as well as basement seepage.

Looking towards the backyard of 8132 Cornell Ct; the basement garage has flooded since it is the low point of about 1.8 acres.



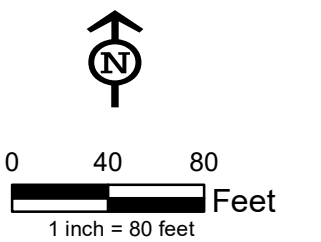
Looking west towards the backyard of #8132.

Looking southeast towards the backyard of 8128. The yard is sloped towards the house.



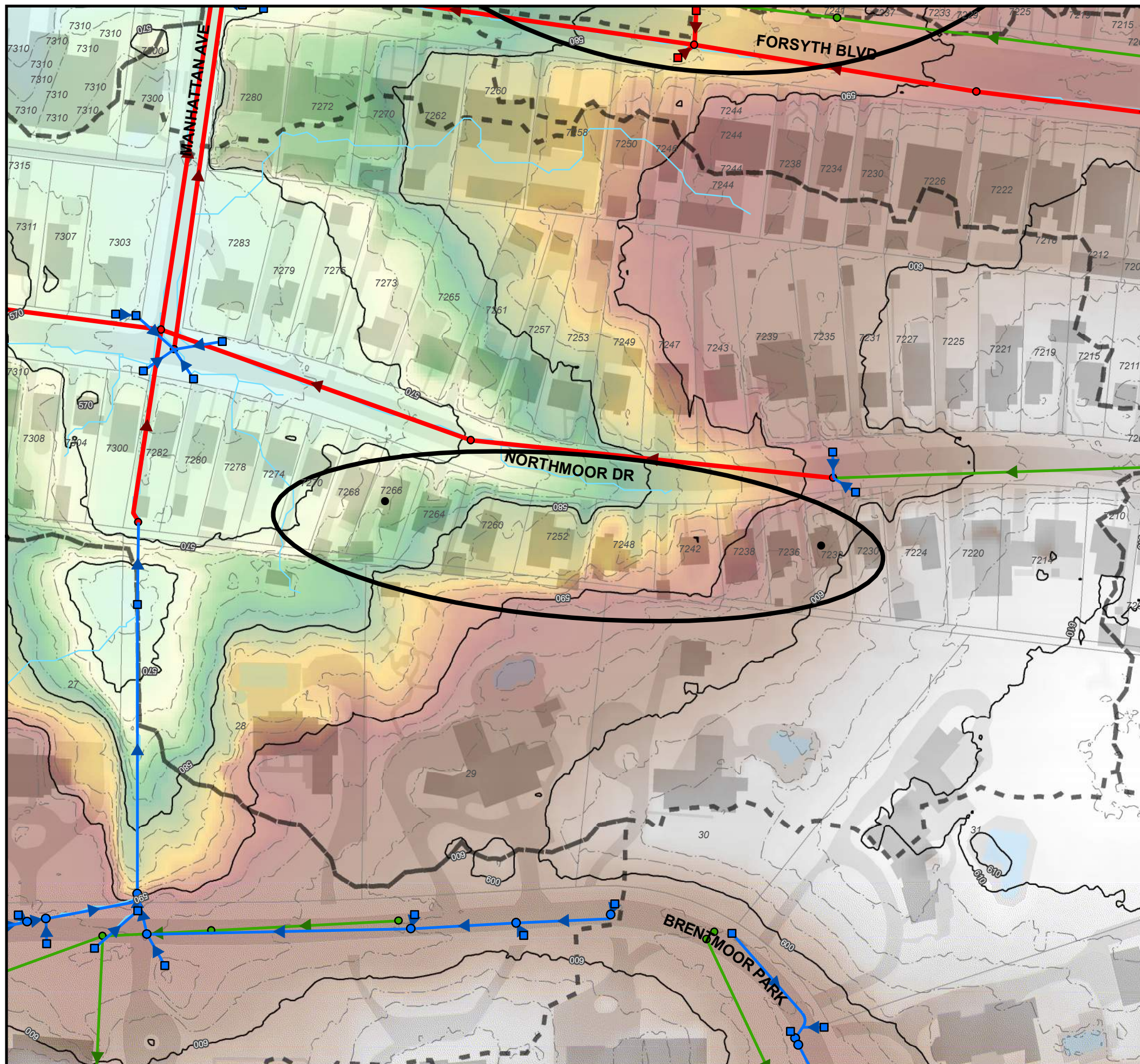
Legend

- | | |
|----------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| Light Blue Box | ● Combined Manhole |
| Light Orange Box | ● Sanitary Manhole |
| Light Blue/White Box | ● Storm Manhole |
| Light Blue/White Box | — Combined Sewer |
| Light Blue/White Box | — Sanitary Sewer |
| Light Blue/White Box | — Storm Sewer |



Cornell Ct

Ranked #7 in the Backyard Category



Problem Description:

The homes on Brentmoor Park drain to the backyards on Northmoor Dr. The backyards of some homes receive about 1 to 1.5 acres of drainage. The drainage path past the houses varies; some homes have ineffective conveyance past the house, causing yard and basement flooding.

A slotted drain was installed by the homeowner at 7232 Northmoor Dr to reduce ponding against the house. This type of private drainage is common in the area.



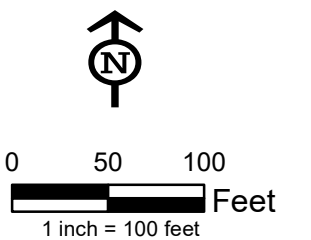
Looking north between #7236 (on the left) and #7232 (on the right). The tuck-under garage is at risk of flooding since the main flow path for water in the backyards is to flow down this driveway.



Looking east towards the backyard of 7236. The yard slopes towards the house; this is typical of the backyards in this area.

Legend

- | | |
|-----------------------------------|------------------------|
| ● Stormwater Problem Point | Existing MSD System |
| □ Problem Location | ■ Combined Inlet |
| — Flow Path Line | ■ Storm Inlet |
| - - - Watershed Boundary | ▲ Storm Intake-Outfall |
| Flood Hazard Zone | |
| ■ 1.0% Annual Chance Flood Hazard | ● Combined Manhole |
| ■ 0.2% Annual Chance Flood Hazard | ● Sanitary Manhole |
| ■ Regulatory Floodway | ● Storm Manhole |
| | → Combined Sewer |
| | → Sanitary Sewer |
| | → Storm Sewer |



Northmoor Park Subdivision

Ranked #8 in the Backyard Category