Floodplain Site Study: Deer Creek

Village of Downers Grove, DuPage County, IL

The Village of Downers Grove (Village) contracted with Engineering Resource Associates, Inc. (ERA) to study drainage and flooding in the Deer Creek neighborhood. The Deer Creek subdivision was platted in the early 1960's and 1970's. Aerial photography from 1978 shows the subdivision to be fully developed at that time. Deer Creek Subdivision is located within the St. Joseph Creek Watershed. Approximately 1,500 acres (2.3 square miles) are tributary to the subdivision. Deer Creek makes up about 4% of the total tributary area. See Figure 1. The majority of this area is located within the Village of Westmont to the south and east. A significant portion of the subdivision is located within the floodplain. See Figure 2.

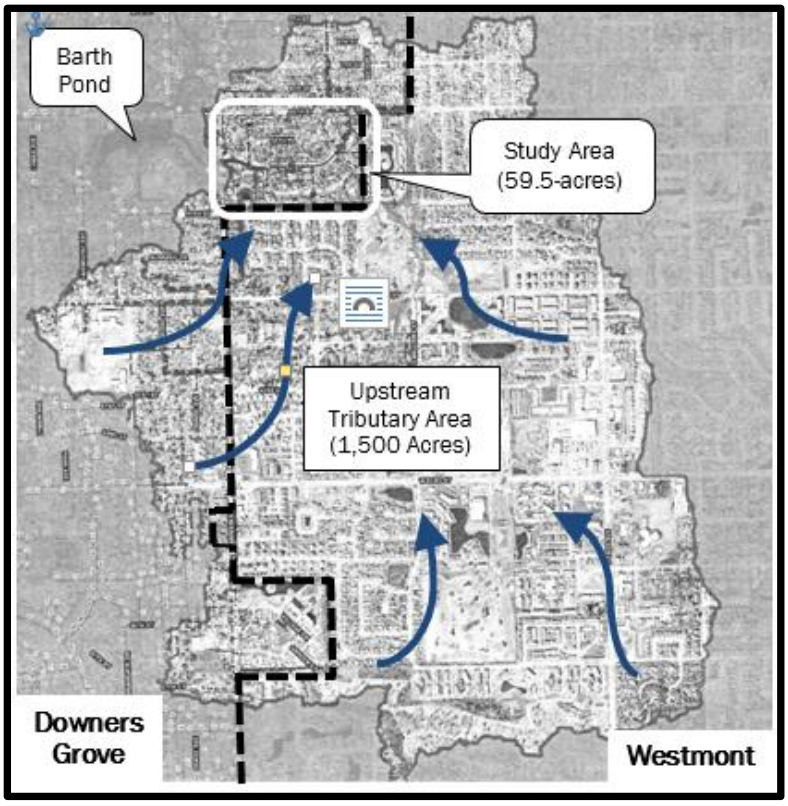

Figure 1: Tributary Area to Deer Creek Subdivision

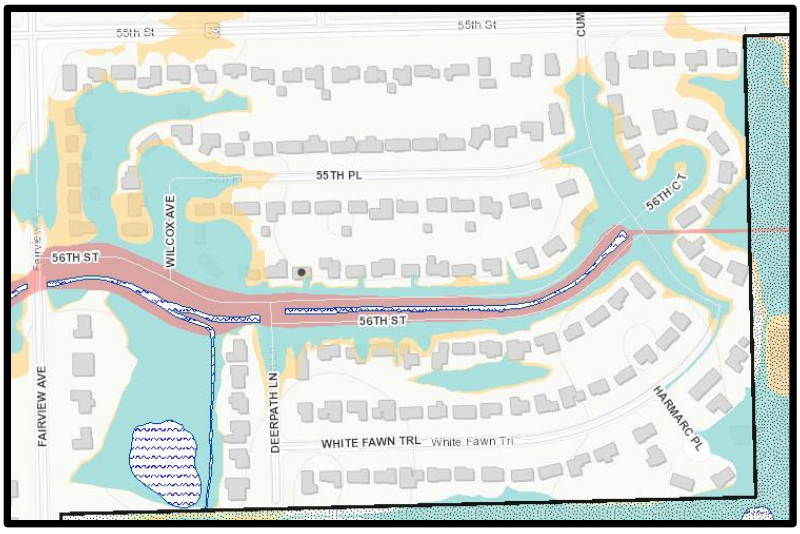

Figure 2: Limits of floodplain within Deer Creek Subdivision

DuPage County has undertaken a watershed study of St. Joseph's Creek. The study will encompass approximately 7,100 acres in Westmont, Downers Grove, Lisle and unincorporated DuPage County. Due to the large tributary area, amount of floodplain, and complexity of the drainage system within the Deer Creek Subdivision, the watershed study will further evaluate regional improvements to drainage issues that are beyond the scope of Village improvements.

The Village commissioned this study to identify potential improvements to the stormwater system that could be implemented in a timely manner, and did not involve a significant purchase of property, construction of large volumes of detention, or adversely impact other properties. This report summarizes the findings of this study. For the purposed of this study the subdivision was separated into five study areas: White Fawn, Cumnor, Wilcox, 56th Place, and 55th Street. The five study areas are depicted in Figure 3 below.

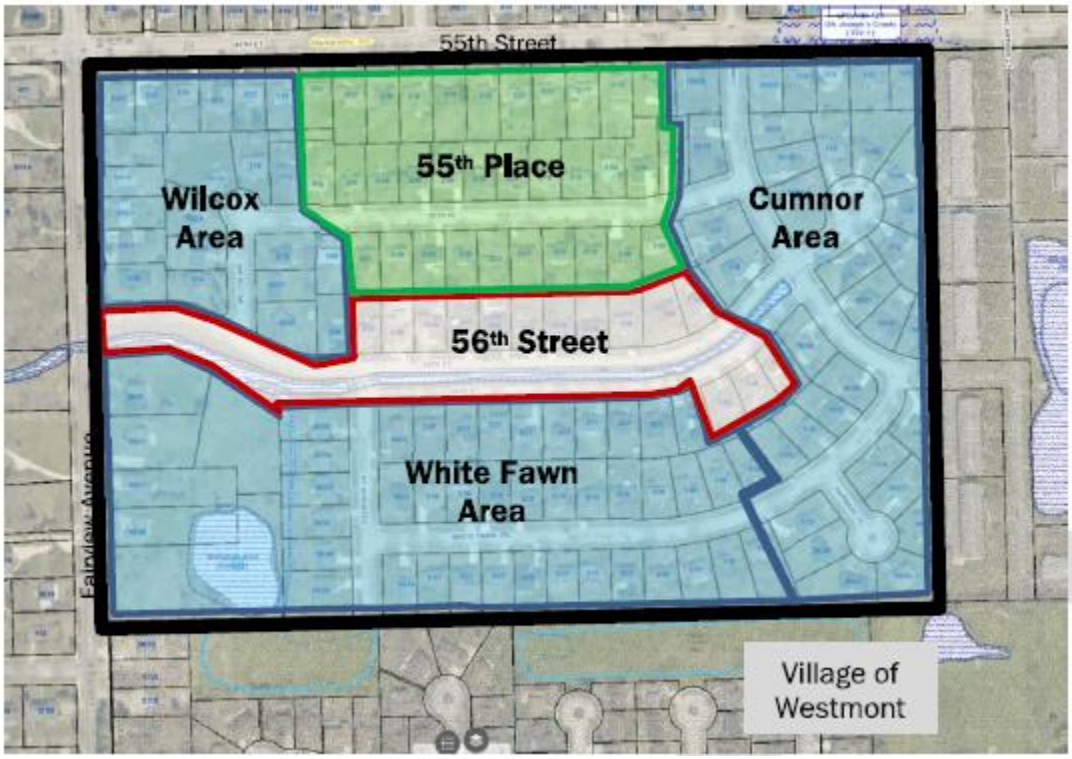

Figure 3: Project area with five study areas along the border of the Village of Westmont and Downers Grove

Existing Conditions & Proposed Improvements:

The existing conditions, proposed improvements and estimated costs for each of the five study areas are described in the following sections:

1. White Fawn Area

Existing Conditions: Runoff from smaller storm events flows from the south to the King Arthur Court Apartments on the east side of Deer Creek Subdivision, and to St. Joseph Creek through a storm sewer in the Cumnor Area (See Figure 4, #1 & #2). The storm sewer discharges into the 56th Street right-of-way to St. Joseph Creek.

During larger storm events, runoff also flows west into the East and West Ponds located south of Deer Creek in Westmont (See Figure 4, #3). These ponds were designed in 1977 in conformance with regulations that were in place at that time. Based upon limited modeling, it shows the East and West Ponds reach capacity during the 2-year design storm and overtop the east and west berms (See Figure 4, #4 and #5). Although historic data shows it overtops less frequently.

The berm behind White Fawn was determined to be 4.5-inches lower than the original design. In addition, the weir between the East and West pond is approximately 1.5-feet higher than what is shown on the original engineering plans. Survey data from the 1980's show the elevations of the berm and weir being the same as the current condition (723.83 and 722-feet, respectively). It is unclear if the berm and weir were not built in accordance with the approved plan or modified at a later date. As a result of the higher weir elevation between the ponds and lower berm height, the East Pond overtops more frequently than the original design.

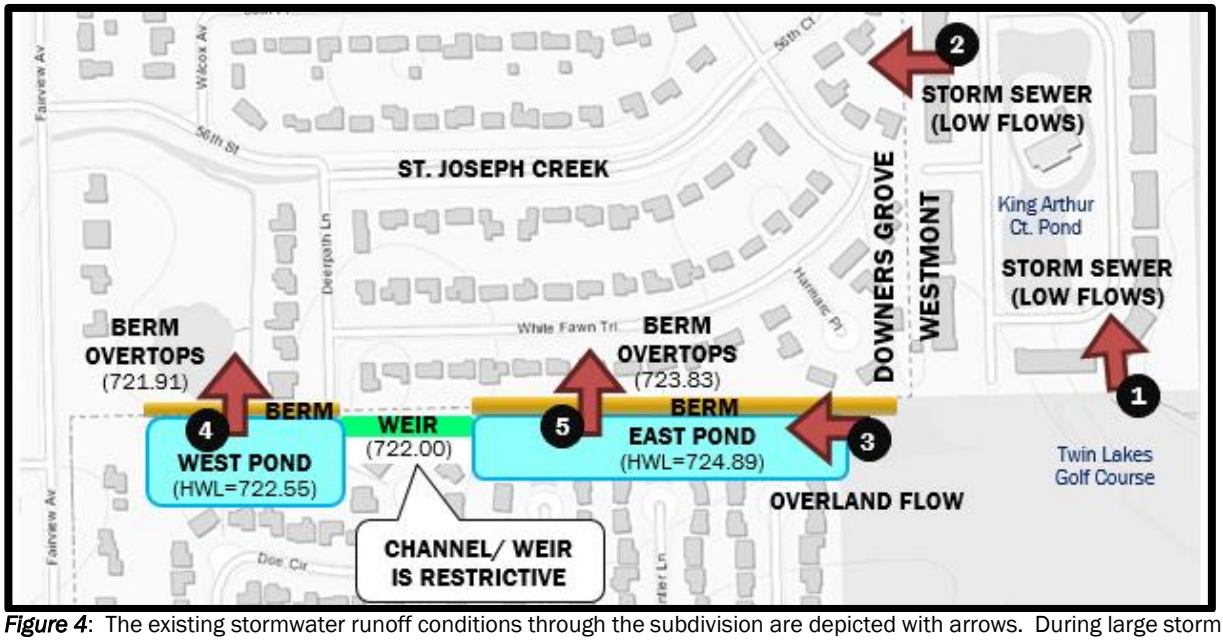

Figure 4: The existing stormwater runoff conditions through the subdivision are depicted with arrows. During large storm events, high flows fill the ponds and stormwater overtops the berms.

A storm sewer drains the low flow of the East Pond north through properties in the White Fawn area, and then to St. Joseph Creek in the 56th Street right-of-way (See Figure 4, #5). Storm sewers behind the houses on both sides of White Fawn connect to this storm sewer. As the water elevation in the pond rises these properties experience yard flooding even before the basin overtops.

Based on modeling and survey data completed by ERA, 22 structures in the White Fawn Area are at risk for structural flooding in the 100-year storm event. Table 2 depicts the number of homes during the 10-year, 50-year, and 100-year 3-hour design storm that are at risk for flooding in existing conditions.

Table 1: Number of Structures in White Fawn Area Impacted (Existing Conditions)

Storm Frequency 3-Hour (Critical Duration)	Number of Structures
10-Year	18
50-Year	21
100-Year	22

In order to prevent the berms from overtopping in a 100-year storm, significant stormwater storage volume and/or flood easements from numerous residents would be required to offset impacts to other properties. Initial estimates show upwards of 180 acre-feet of storage may be required. While the impacts of flooding can be reduced for smaller and more frequent rain events, the Village alone cannot reduce the impacts of larger rain events without causing stormwater issues for other areas. Ultimately, the solution to flooding in this area requires coordination with DuPage County and the Village of Westmont.

Recommended improvements:

- Elevate berm height at East pond to the 1977 plan
- Hydraulically disconnect backyard storm sewer from the East pond and install additional parallel storm sewer to St. Joseph's Creek
- Widen and lower the inter-pond weir
- Consider installing additional storm sewers to address drainage concerns
- Overland Flow Paths: Continue to work with DuPage County during their St. Joseph Creek Watershed Study to identify candidates for property acquisitions. Restore these properties to open space for additional detention and defined overland flow paths

2. Cumnor Area

Existing Conditions: St. Joseph Creek flows into the Cumnor Area from the King Arthur Court Apartment's pond in Westmont via storm sewers. The location of these storm sewers are shown on Figure 5. The existing storm sewers are undersized for the runoff from large storm events. Poorly defined overland flow paths through the yards in the Cumnor area result in structural flooding.

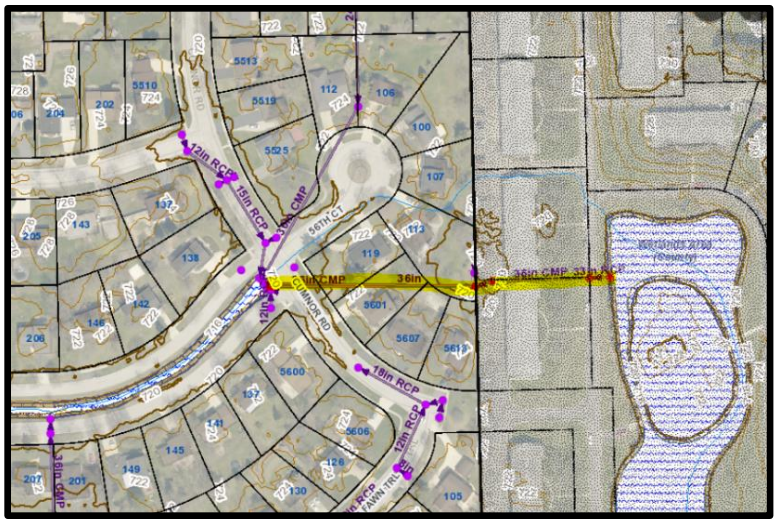

Figure 5: Highlighted pipe shows location of undersized storm sewer from King Arthur Court Apartment pond to St. Joseph Creek.

Based on modeling and survey data completed by ERA, 12 homes were identified as at-risk for structural flooding during the 100-year storm. Table 2 depicts the number of homes during the 10-year, 50-year and 100-year 3-hour design storm, that are at risk for flooding in existing conditions.

Table 2: Number of Structures in Cumnor Area Impacted (Existing Conditions)

Storm Frequency 3-Hour (Critical Duration)	Number of Structures
10-Year	1
50-Year	11
100-Year	12

Recommended Improvements:

- Overland Flow Paths: Continue to work with DuPage County during their St. Joseph Creek Watershed Study to identify candidates for property acquisitions. Restore these properties to open space for additional detention and defined overland flow paths.

3. Wilcox Area

Existing Condition: St. Joseph Creek is the primary source of flooding in this area. Based on modeling and survey data completed by ERA, one home was identified as at-risk for structural flooding during the 10-year, 50-year and 100-year storms. Other homes may be identified as structures at risk for flooding during the County's St. Joseph Creek Watershed Study.

Recommended Improvements:

- Potential Cost Share project(s) – may include storm sewer, underdrains, regrading swales, etc. to address local drainage issues
- Recommendations to individual property owners for flood proofing – berms, flood walls, regrading, etc.
- Overland Flow Paths: Continue to work with DuPage County during their St. Joseph Creek Watershed Study to identify candidates for property acquisitions. Restore these properties to open space for additional detention and defined overland flow paths.

4. 56th Street

Existing Condition: Flooding issues in this area are due primarily to the flooding of St. Joseph Creek. The majority of this area contains floodplain and floodway, which results in structural flooding and blocked roadway access. Potential reductions to this flooding are beyond the scope of this report and are included with the DuPage County St. Joseph Creek Watershed Study that is currently under development.

5. 55th Place

Existing Condition: Non-structural flooding occurs in this area

Recommended Improvements:

- Potential Cost Share project(s) – may include storm sewer, underdrains, regrading swales, etc. to address local drainage issues
- Recommendations to individual property owners for flood proofing – berms, flood walls, regrading, etc.

Overall Recommendations:

The recommendations for the entire project area are summarized below, and categorized by short and long term improvements. Cost estimates are also provided. Because of the prevalence of floodplain that significantly contributes to flooding in this subdivision, the implementation of potential improvements that will reduce flooding in large storm events will involve the construction of substantial amounts of detention volume in jurisdictions that are likely outside of Downers Grove. This increases the complexity and cost of implementing what are identified as "Long Term Recommendations." Short Term Recommendations will reduce the impacts from smaller and more frequent storm events; however, will also involve cooperation from the Village of Westmont. The entities that will be involved with each improvement are indicated below.

- Short-Term Recommendations (Village of Downers Grove initiatives)
    - Elevate berm height at East pond to the 1977 plan ($30,000) - VoDG, Westmont
    - Widen and lower the inter-pond weir, Phase 1 ($80,000) - VoDG, Westmont
    - Hydraulically disconnect backyard storm sewer from the East pond and install additional parallel storm sewer to St. Joseph's Creek ($300,000) – VoDG

Initial modeling results show that constructing all of the above recommend improvements would reduce the frequency residents experience drainage/flooding issues along White Fawn Trail. It would reduce the frequency from a 2-year event to a 5-year event. Again, this was based on limited modeling completed. Historic data shows it overtops less frequently.

Storm Frequency and Duration	Rainfall Depth (inches)
2-year, 3-hour	1.94
5-year, 3-hour	2.43
10-year, 3-hour	2.86
50-year, 3-hour	4.14
100-year, 3-hour	4.85

Table 3: Rainfall (inches) for given storm events evaluated

Storm Frequency and Duration	Rainfall Depth (inches)	# of Rainfall Events
2-year, 3-hour	1.94, 1.96, 1.97, 2.0, 2.41	5
5-year, 3-hour	2.48	1
10-year, 3-hour	-	-
50-year, 3-hour	-	-
100-year, 3-hour	-	-

Table 4: Rain events in 2009-2011 that equaled or Exceeded the given storm event

- Long-Term Recommendations (Regional, DuPage County, Downers Grove, Westmont initiatives)
    - Improve the overflow from the West Pond, Phase 2 ($50,000) - VoDG, Westmont
    - Lower the inter-pond weir further, Phase 2***** ($60,000) - VoDG, Westmont, DuPage Co.
    - Grade and establish an overland flow path to St. Joseph Creek from the West Pond ($150,000) - VoDG, Westmont
    - Regional detention storage (Determined as part of the Watershed Study) - VoDG, Westmont, DuPage Co
    - Property acquisition and easements (Determined as part of Watershed Study) - VoDG, Westmont, DuPage Co

    *****Requires significant property acquisition for storage to offset the downstream impacts, may be as much as 180 ac-ft of storage. This would be roughly equivalent to 20 Washington Parks.

- Maintenance Recommendations (Village initiative)
    - Remove brush and trees along the creek and clean and stabilize creek banks (Cost varies based upon extent of improvements. $5,000 to $850,000)