Riverwoods Subdivision
Des Plaines River Berm

Village of Lincolnshire

ENGINEERING RESOURCE ASSOCIATES, INC.
Consulting Engineers, Scientists & Surveyors

Goals and Facts about the Villagewide Drainage Study

- The purpose of the Villagewide Drainage Study is to identify and prioritize future drainage improvement projects
- The Village is not actively seeking out properties along Lincolnshire Drive for condemnation and has no plans for doing so
- The FEMA Flood Buyout Program is a Voluntary Program that requires acceptance from the property owner
- The Village is not aware of or actively working with the Lincolnshire Marriott on any plans to expand the resort over to Lincolnshire Drive

Background & Location

- Berm system along the Des Plaines River on the west side of the Riverwoods Subdivision
- Extends approx 1,850 ft on east bank (53 Lincolnshire Dr. to 79 Lincolnshire Dr.)
- Earthen berm is designed to protect against a 10-yr flood event; 4 homes are below the 10-yr flood elevation

Background

- Records show berm was constructed around 1962 to alleviate flooding.
- Material was taken from overdig of sanitary sewer system and placed along the Des Plaines River
- Historical accounts indicate that the berm as altered by property owners
- The construction of the Marriott was credited for helping to mitigate some of the historical flooding

Riverwoods Subdivision Internal Drainage System

- 324-acre watershed that drains through six main storm sewer systems into the Des Plaines River

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Flood Terminology

- Flood sizes are measured both by elevation and flow rate of the floodwater.
- A flood event of a certain size is categorized by its likelihood of occurrence each year.
- A “2-year flood” has a 1 in 2 (50%) chance of happening each year.
- A “5-year flood” has a 1 in 5 (20%) chance of happening each year.
- A “10-year flood” may happen twice in two years; not every 10-year flood event is separated by exactly 10 years.

Rainfall Depth Updates

- The Illinois State Water Survey (ISWS) published Bulletin 70 in 1989
- Bulletin 70 is a technical document that provides rainfall depths for different storm frequencies and durations for Illinois
- In March 2019 ISWS has updated Bulletin 70 rainfall depth to reflect observed increases in precipitation in recent decades
- Example: the 100-yr, 24-hr rainfall depth for northeastern Illinois has been updated to 8.57” from a previous depth of 7.58”
- The internal drainage system has been re-modeled to reflect changes to rainfall depths

2-yr Internal Drainage Inundation (free outfall, previous rainfall)

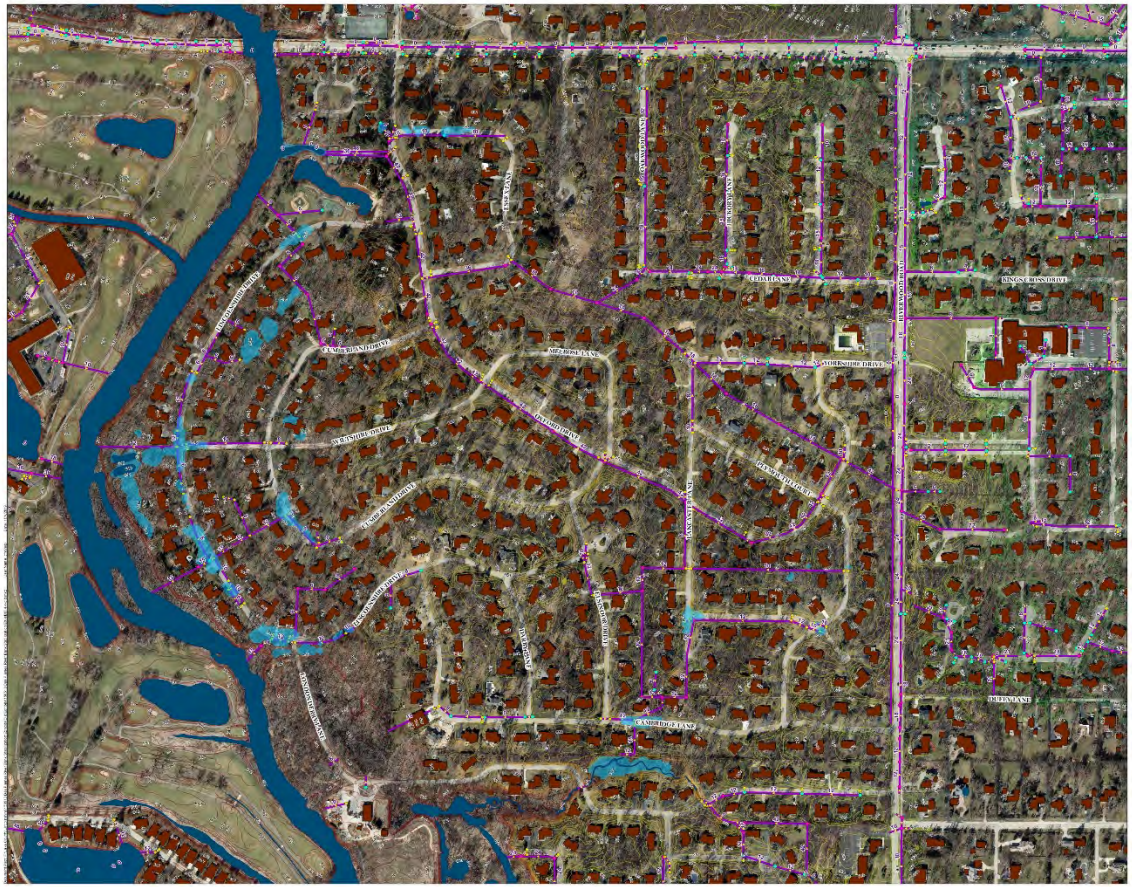


EXHIBIT 4.4
RIVERWOODS WATERSHED
2-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(FREE OUTFALL)
LINCOLNSHIRE, IL

Legend

Lincolnshire Building

Lincolnshire Hydrology

Existing Conditions 2-Year No Tailwater

Storm Sewer Network

Structure Type

Storm Sewer

Inlet

Catch Basin

Manhole

Discharge Point

N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

1 inch = 200 feet

0 100 200 400 600 800 Feet

2-yr Internal Drainage Inundation (free outfall, updated rainfall)

10-yr Internal Drainage Inundation (free outfall, previous rainfall)

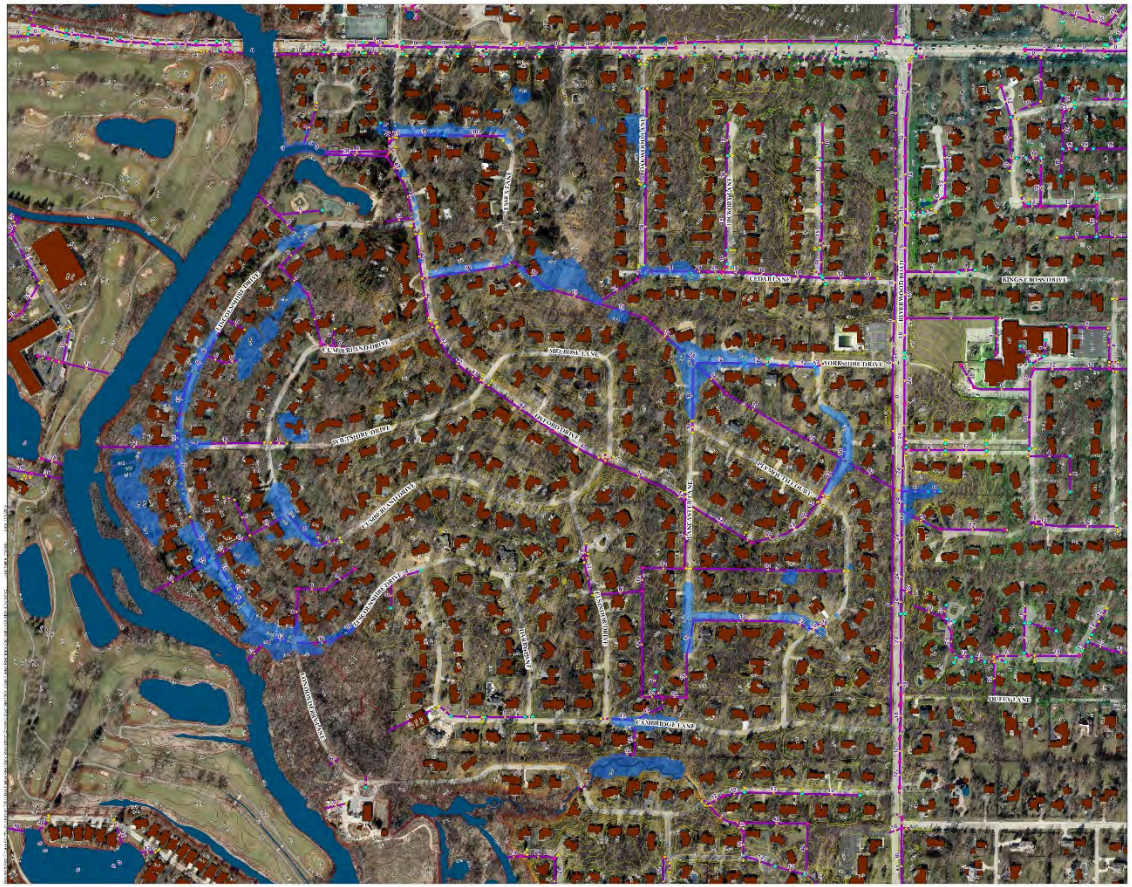


EXHIBIT 4.5
RIVERWOODS WATERSHED
10-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(FREE OUTFALL)
LINCOLNSHIRE, IL

Legend

Lincolnshire Building

Lincolnshire Hydrology

Existing Conditions 10-Year No Tailwater

Storm Sewer Network

Structure Type

Storm Sewer

Inlet

Catch Basin

Manhole

Discharge Point

N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

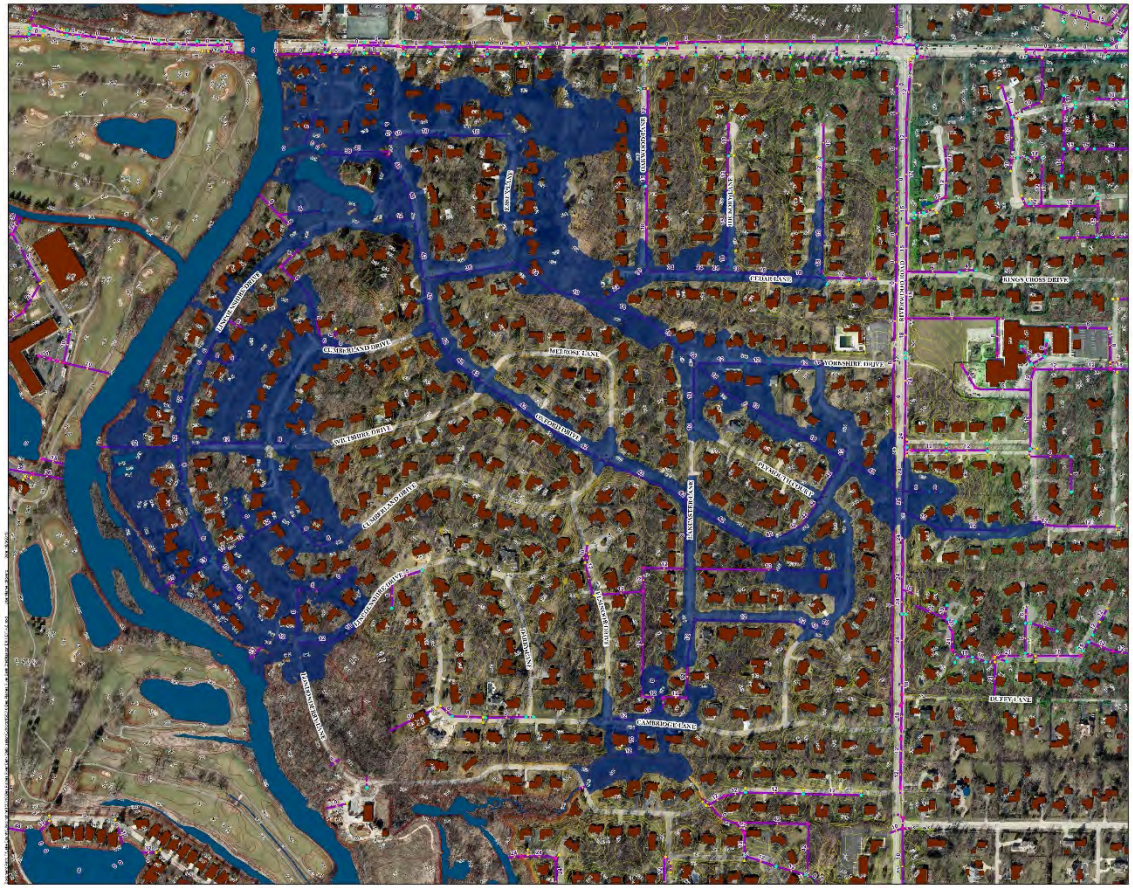
1 inch = 200 feet

0 100 200 400 600 800 Feet

10-yr Internal Drainage Inundation (free outfall, updated rainfall)

100-yr Internal Drainage Inundation (free outfall, previous rainfall)

100-yr Internal Drainage Inundation (free outfall, updated rainfall)



2-yr Internal Drainage Inundation (10-yr tailwater, previous rainfall)

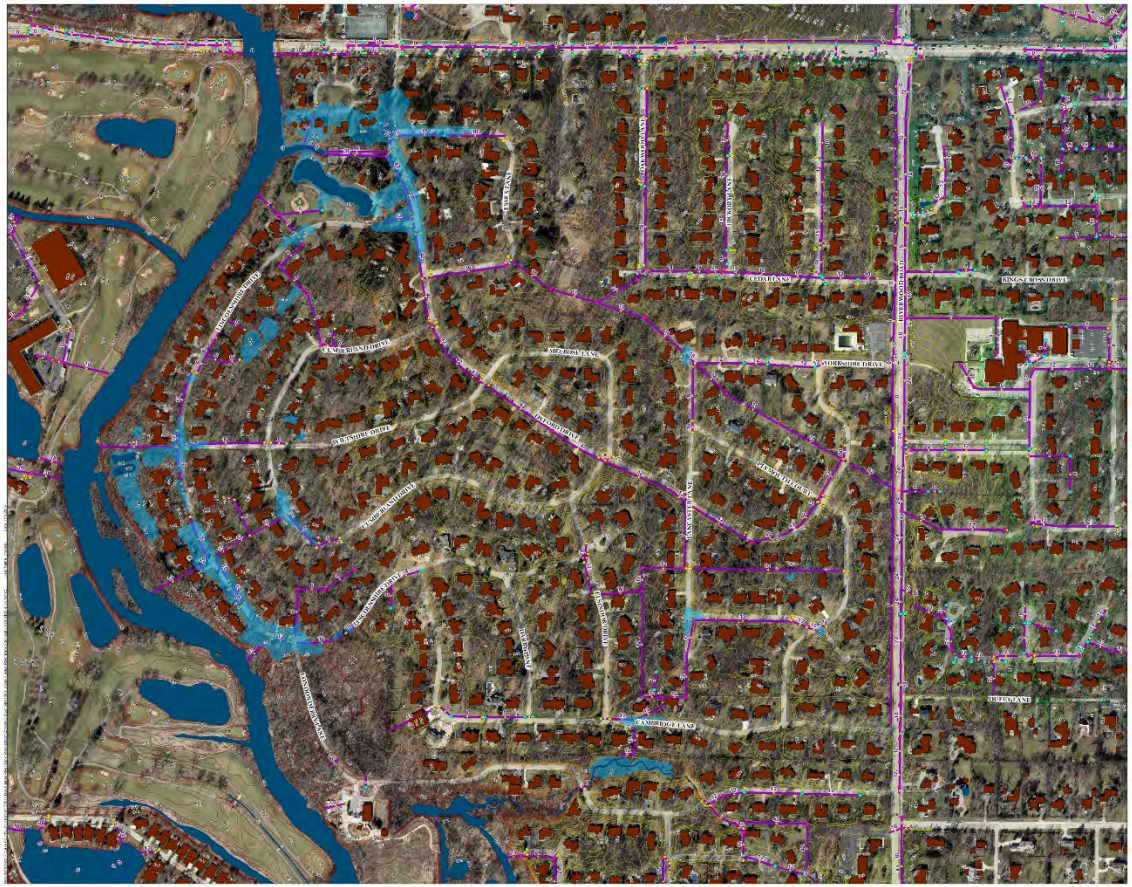


EXHIBIT 4.7
RIVERWOODS WATERSHED
2-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(10-YEAR TAILWATER)
LINCOLNSHIRE, IL

Legend

Lincolnshire Building

Lincolnshire Hydrology

Existing Conditions 2-Year Tailwater

Storm Sewer Network

Structure Type

Storm Sewer

Inlet

Catch Basin

Manhole

Discharge Point

N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

1 inch = 200 feet

0 100 200 400 600 800 Feet

2-yr Internal Drainage Inundation (10-yr tailwater, updated rainfall)

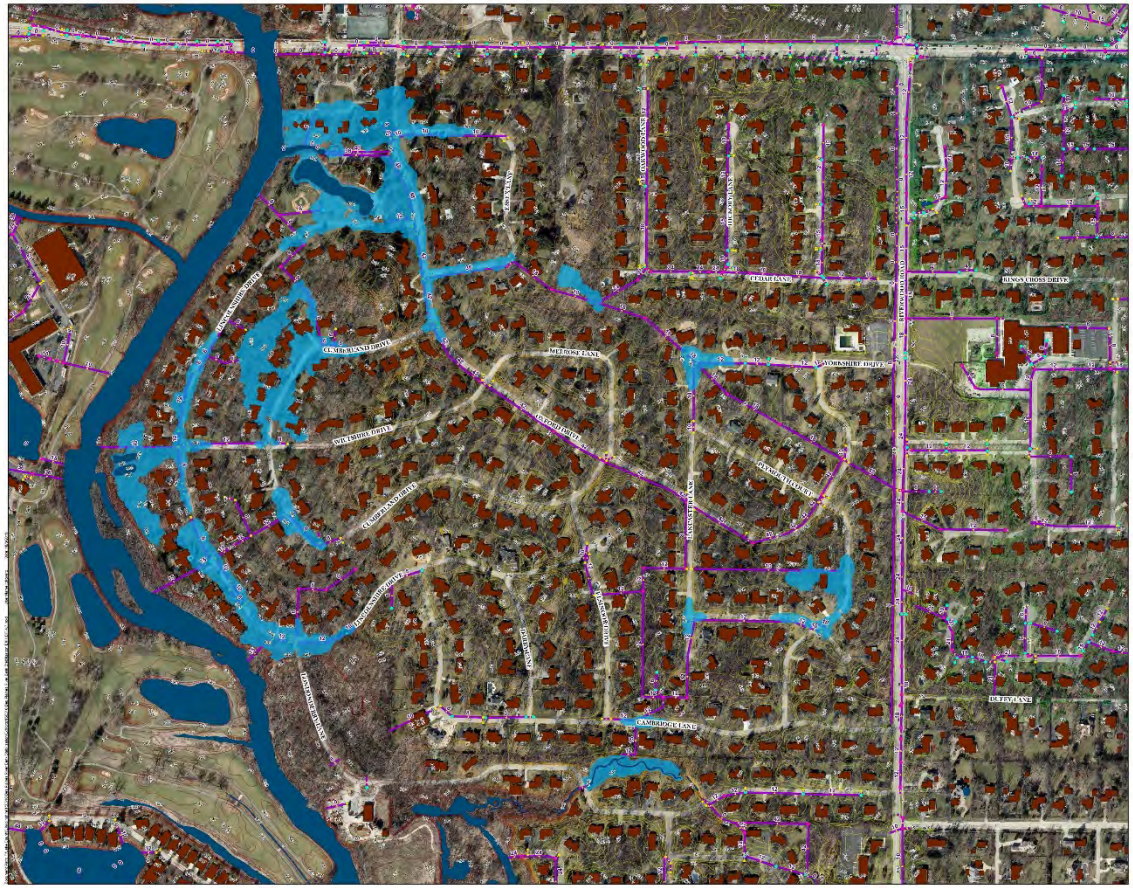


EXHIBIT 4.7
RIVERWOODS WATERSHED
2-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(10-YEAR TAILWATER)
LINCOLNSHIRE, IL

Legend

Storm Sewer Network

Structure Type

Storm Sewer

Inlet

Catch Basin

Manhole

Discharge Point

N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

1 inch = 200 feet

0 100 200 400 600 800 Feet

10-yr Internal Drainage Inundation (10-yr tailwater, previous rainfall)

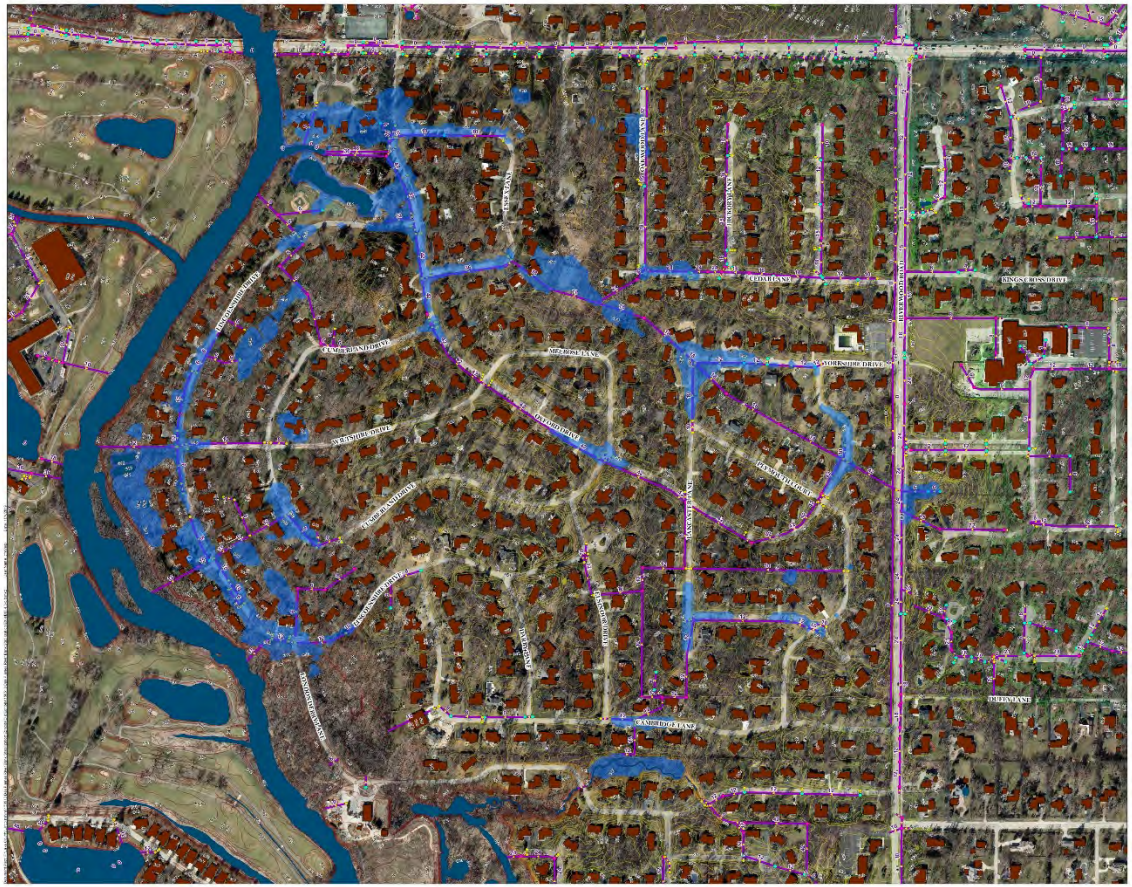


EXHIBIT 4.8
RIVERWOODS WATERSHED
10-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(10-YEAR TAILWATER)
LINCOLNSHIRE, IL

Legend

Lincolnshire Building
Lincolnshire Hydrology
Existing Conditions 10-Year Tailwater

Storm Sewer Network

Structure Type

Storm Sewer
Inlet
Catch Basin
Manhole
Discharge Point

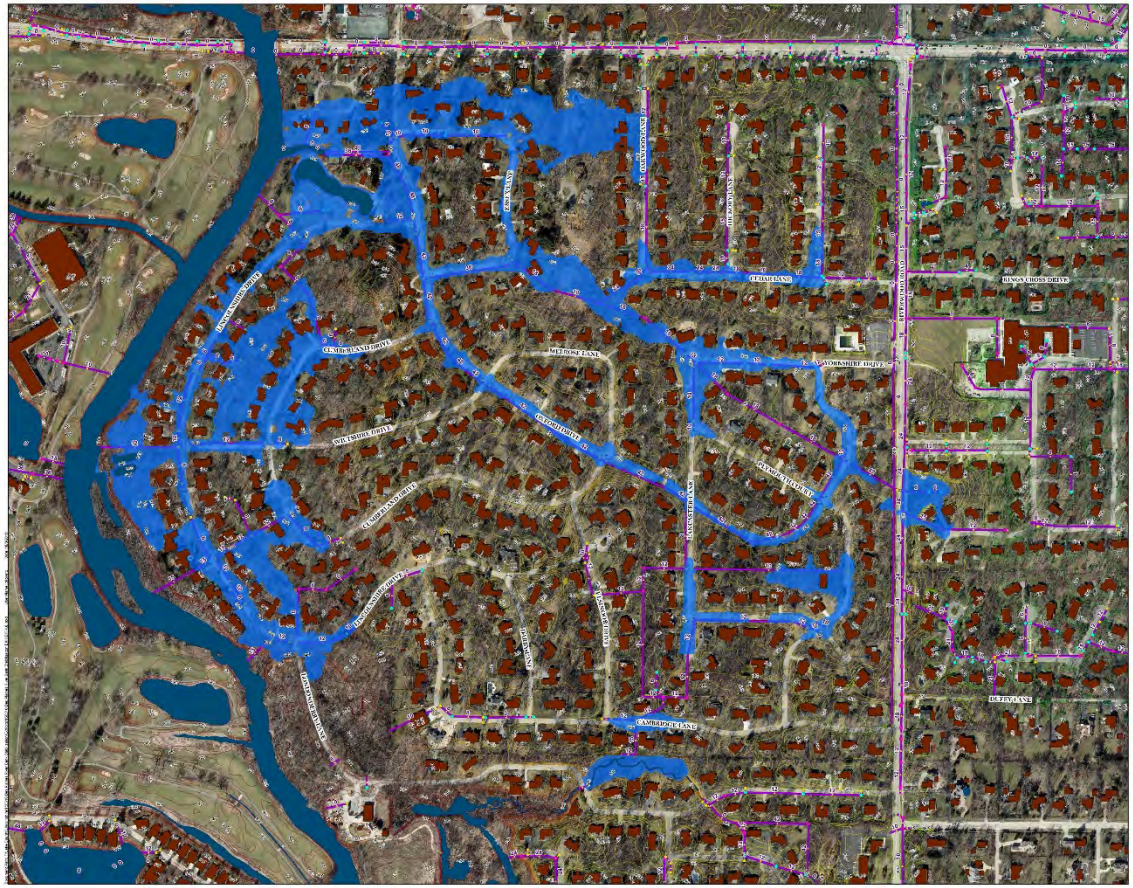
N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

1 inch = 200 feet

0 100 200 400 600 800 Feet

10-yr Internal Drainage Inundation (10-yr tailwater, updated rainfall)



100-yr Internal Drainage Inundation (10-yr tailwater, previous rainfall)

EXHIBIT 4.9
RIVERWOODS WATERSHED
100-YEAR INTERNAL
DRAINAGE FLOOD LIMITS
(10-YEAR TAILWATER)
LINCOLNSHIRE, IL

Legend

Lincolnshire Buildings

Lincolnshire Hydrology

Existing Conditions 100-Year Tailwater

Storm Sewer Network

Structure Type

Storm Sewer

Inlet

Catch Basin

Manhole

Discharge Point

N
W E
S

ENGINEERING
RESOURCE ASSOCIATES

1 inch = 200 feet

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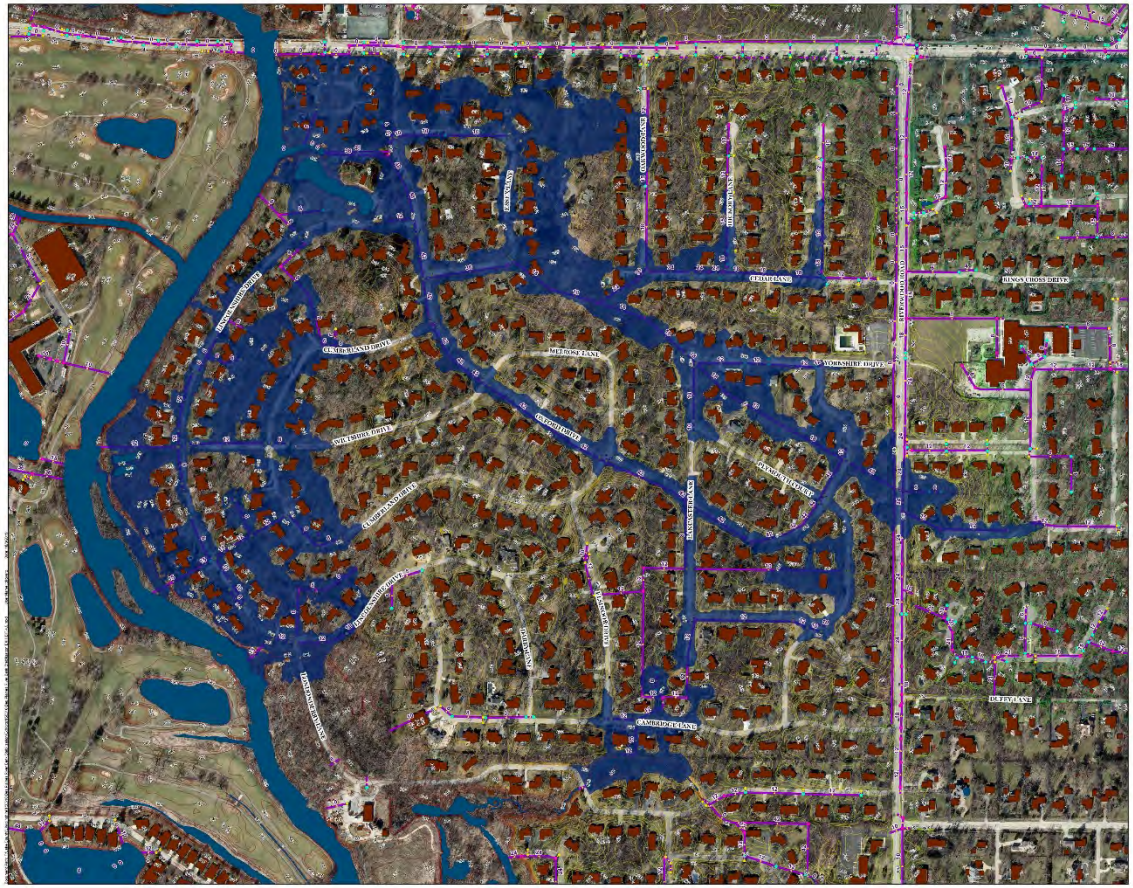
100-yr Internal Drainage Inundation (10-yr tailwater, updated rainfall)



Des Plaines River Flooding History

- 1986: 17-year flood (6% chance)
- 1987: 3-year flood (29% chance)
- 1996: 5-year flood (21% chance)
- 1997: 4-year flood (26% chance)
- 2004: 4.5-year flood (22% chance)
- 2007: 4.5-year flood (22% chance)
- 2013: 17-year flood (6% chance)
- 2017: 20-year flood (5% chance)

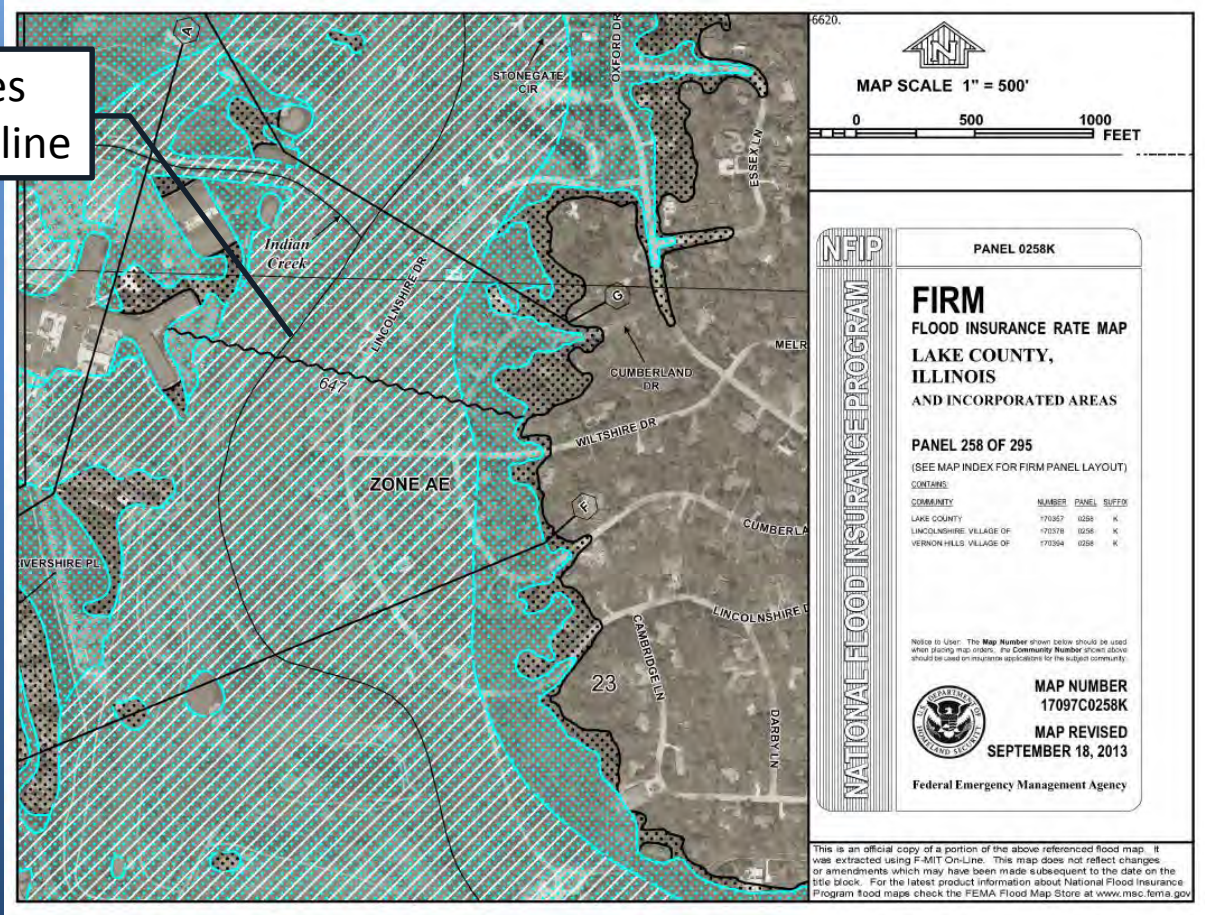
*Data from stream gage at Des Plaines, IL, as noted in the report by the US Army Corps of Engineers, titled "Upper Des Plaines River And Tributaries, Illinois And Wisconsin," found at http://www.lrc.usace.army.mil/Portals/36/docs/projects/desplainesII/August%202015%20replacement%20documents/UpperDesPlainesFeasibility_MainReport_JAN2015.pdf

Des Plaines River Flooding History

- It the last 5-10 years it's been observed that the river is much more susceptible to sharp rises/spikes than previously experienced.
- Possible reasons
  - Development
  - More frequent intense storms
  - Example: Electronics and Information Technology Manufacturing Zone (EITM) in Wisconsin along I-94
    - Comparably less stringent regulations in Wisconsin
    - "Fast-tracked" exemptions granted
    - 38 acres of wetlands have been impacted to date
    - https://www.lakecountyil.gov/553/Stormwater-Management-Commission

Level of Flood Protection

Des Plaines River Centerline



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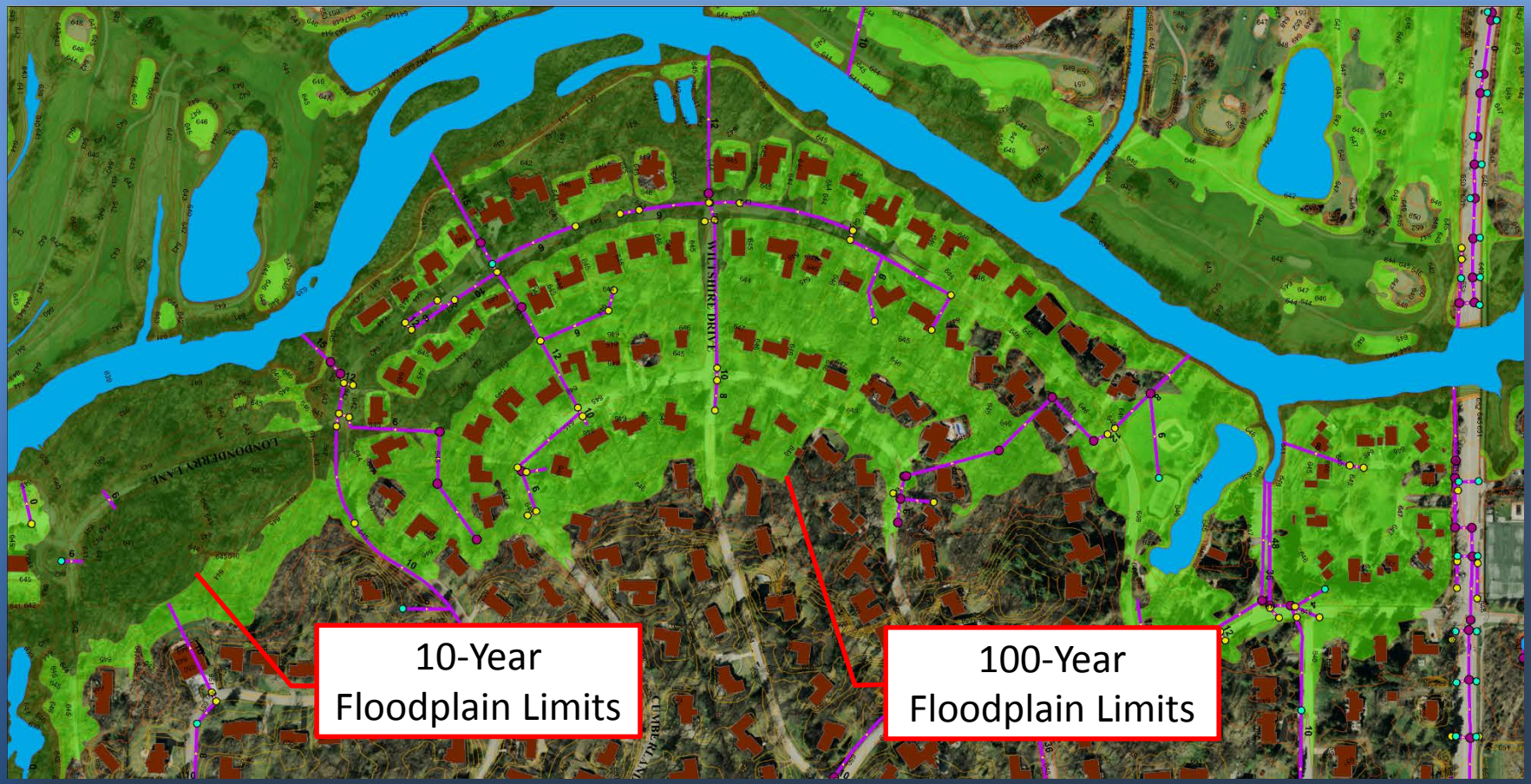
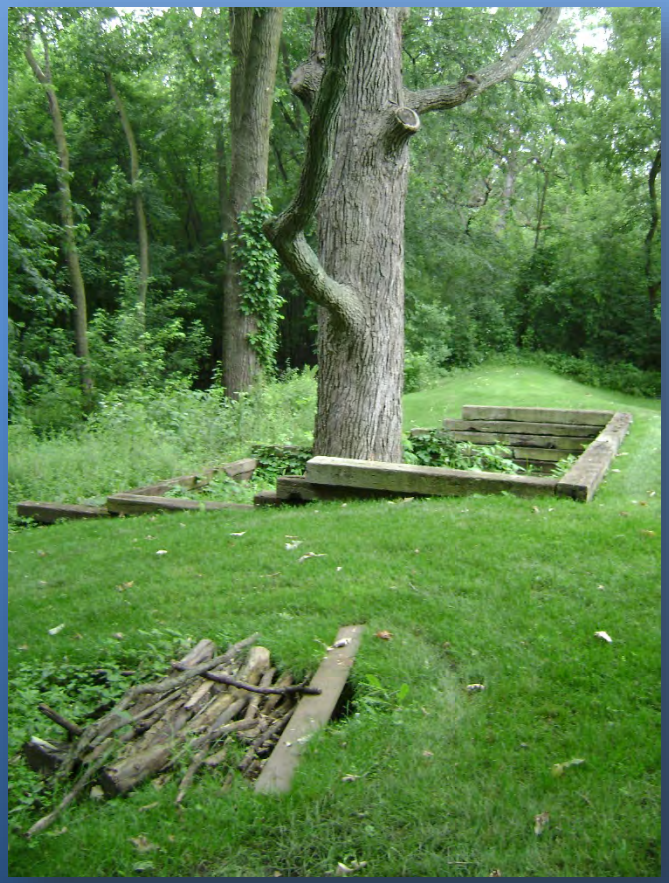
Current Level of Flood Protection



What Can You Do To Protect Your Home?

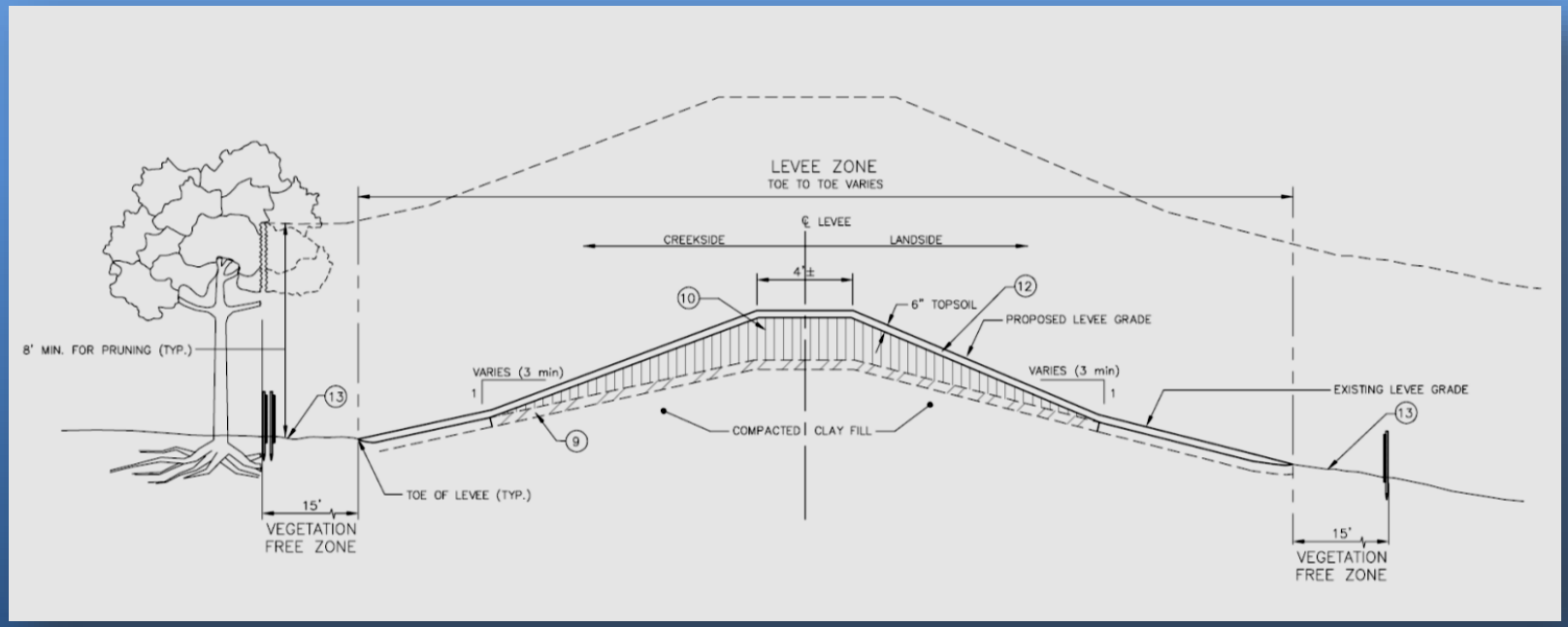
Berm Issues: Woody Obstructions

- Much of the berm is spotted with brush, shrubs, and trees, which:
  - Block maintenance and emergency routes
  - Allow water to seep through the berm along the tree root paths
  - Can fall and pull out sections of the berm; and
  - Block the growth of deep-rooted grasses on the berm



Berm Issues: Woody Obstructions

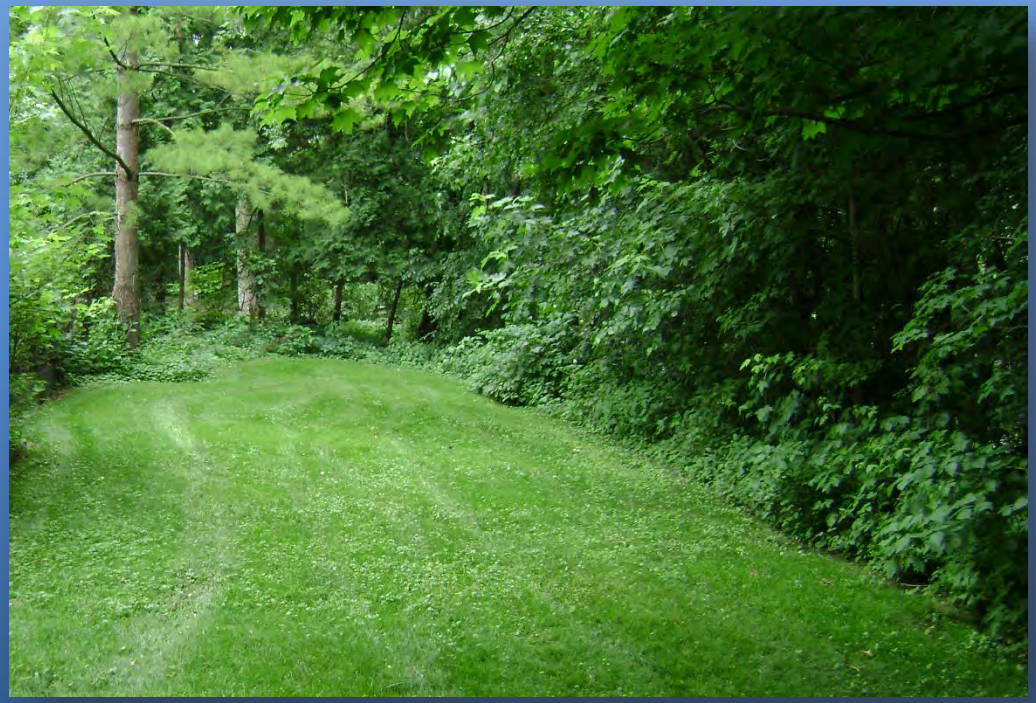
- For berm stability, the US Army Corps of Engineers recommends a tree/shrub-free zone for the entire width of the berm and 15-feet beyond



Berm Issues: Woody Obstructions

- All brush, trees, and shrubs between the toes of the slopes of the berm should be removed, and any holes filled with compacted clay and topsoil

- Any fallen tree debris along the top of the berm should be hauled away



Berm Issues: Bare Spots

- Plant material can help stabilize the berm
- Barren slopes are susceptible to erosion from rising floodwaters in the Des Plaines River
- Many areas along the berm are missing vegetation and showing signs of erosion

Berm Issues: Bare Spots

Berm Issues: Bare Spots

- Barren areas should be fully planted over the entire berm, ideally with native grasses; erosion control blanket might be necessary on steeper slopes

- Re-grassing slopes is only possible after removing woody vegetation

Berm Issues: Landscaping

- A variety of materials are acting as retaining walls along the berm slopes
- Collapse of these deteriorating walls could create holes in the berm
- Landscaping materials have been added on to the berm, which creates an obstruction during Village sandbagging operations

Berm Issues: Landscaping

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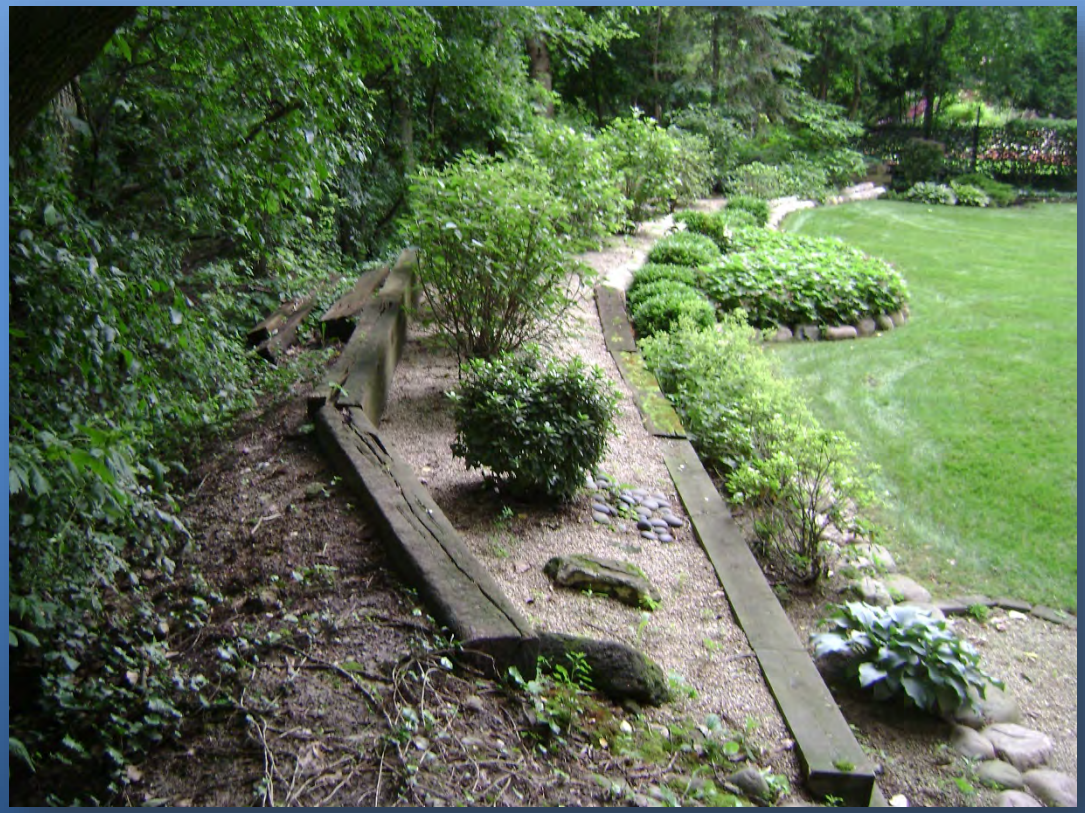
Berm Issues: Landscaping

- All fences, planter boxes, retaining walls, posts, stones, etc. should be removed from the flood control berm to provide clear access and prevent berm failure



Berm Issues: Drain Lines

- Plastic drain lines penetrate through the berm walls at many spots
- Piping through the berm decreases its stability and can cause seepage through the berm
- Piping also allows floodwater from the river to back up into backyards

Berm Issues: Drain Lines

- Only Village-owned sewers should pass through the berm
- Small plastic drain lines should ideally be relocated to another area of the yard
- If necessary, drain lines may pass over the top of the berm

Riverwoods Subdivision
Des Plaines River Berm Evaluation

Summary of recommendations

1. Remove woody vegetation on the berm*
2. Remove all fallen trees on the berm*
3. Replant grass in areas devoid of vegetation on the berm*
4. Remove all landscaping, fences, walls, and posts along the berm
5. Remove pvc drains through the berm
6. Annual berm inspection

*Indicates improvements that may be done without a permit.

Drainage Maintenance Activities

- Leaf pickup & street sweeping program ($165,000 annually)
- Inspection/maintenance of 60 detention basins and outfalls
- Storm sewer televising and cleaning
- Storm sewer and storm structure repairs
- Drainage Structure cleaning
- Over $60,000 spent annually on maintenance + 4 staff members
- 2016 purchase of $150,000 sewer flusher

Past Drainage Improvements

- Over $600,000 spend in the last 5 years
- Lincolnshire Creek Streambank Stabilization at Londonderry Lane
- Lincolnshire Creek between Riverwoods and Coventry
- Indian Creek Streambank Stabilization
- North Branch of Chicago River outfall improvements
- Mayfair drainage system improvements
- Robinhood Ct. drainage system improvements
- Spring Lake Park/Cumberland Drive drainage improvements

Future Drainage Improvements

- $1.3 million budgeted in the next 5 years
- Lincolnshire Drive Drainage System Improvements
- Queensway Drainage System Improvements
- Mayfair Detention System Improvements
- Surrey Lane Drainage Area Improvements
- Villagewide Drainage Projects resulting from $150,000 Drainage Study

What are other Organizations Doing for Flood Mitigation?

1. Des Plaines River Watershed Workgroup –Local municipalities
   1. Improving water quality in a variety of different ways
2. Des Plaines River Watershed Plan –Lake County SMC
   A. Evaluating Des Plaines river and all of its tributaries in Lake County and southern Wisconsin
   B. 2 Year Process
   C. Vision Statement - *The Des Plaines River Watershed will be a destination valued by residents, businesses and governments that join together to actively engage in education and participate in improving water quality. Stakeholders will preserve and enhance regional green infrastructure, resulting in cleaner streams and lakes, better plant and animal biodiversity and reduced flood damage while balancing a sustainable native landscape with development and economic growth*
3. All Natural Hazard Mitigation Planning –County and Local Municipalities

Questions?

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