

2016 Annual Conference

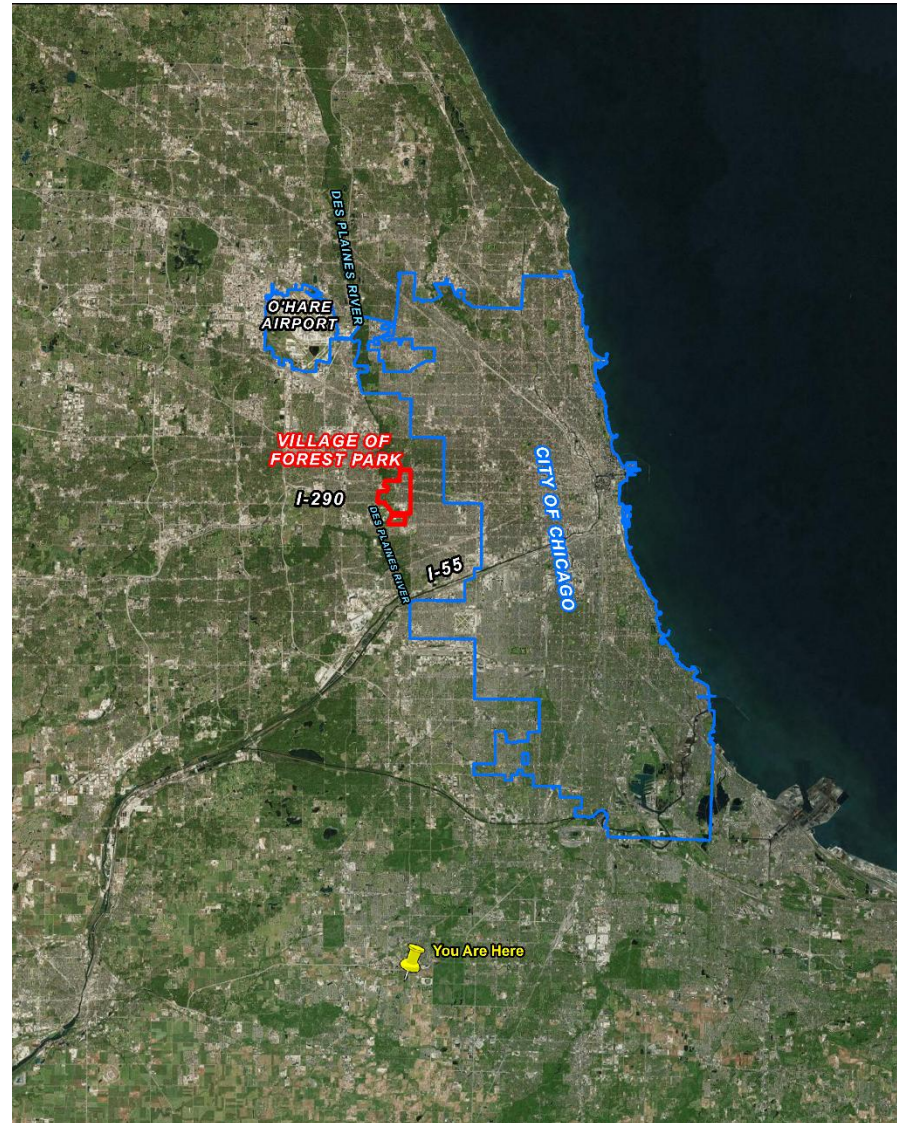


Village of Forest Park

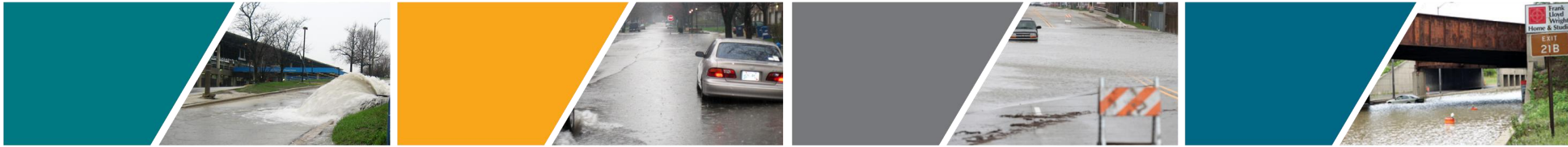
Sewer Separation Evaluation



Village of Forest Park - Location



Sewer Separation Evaluation



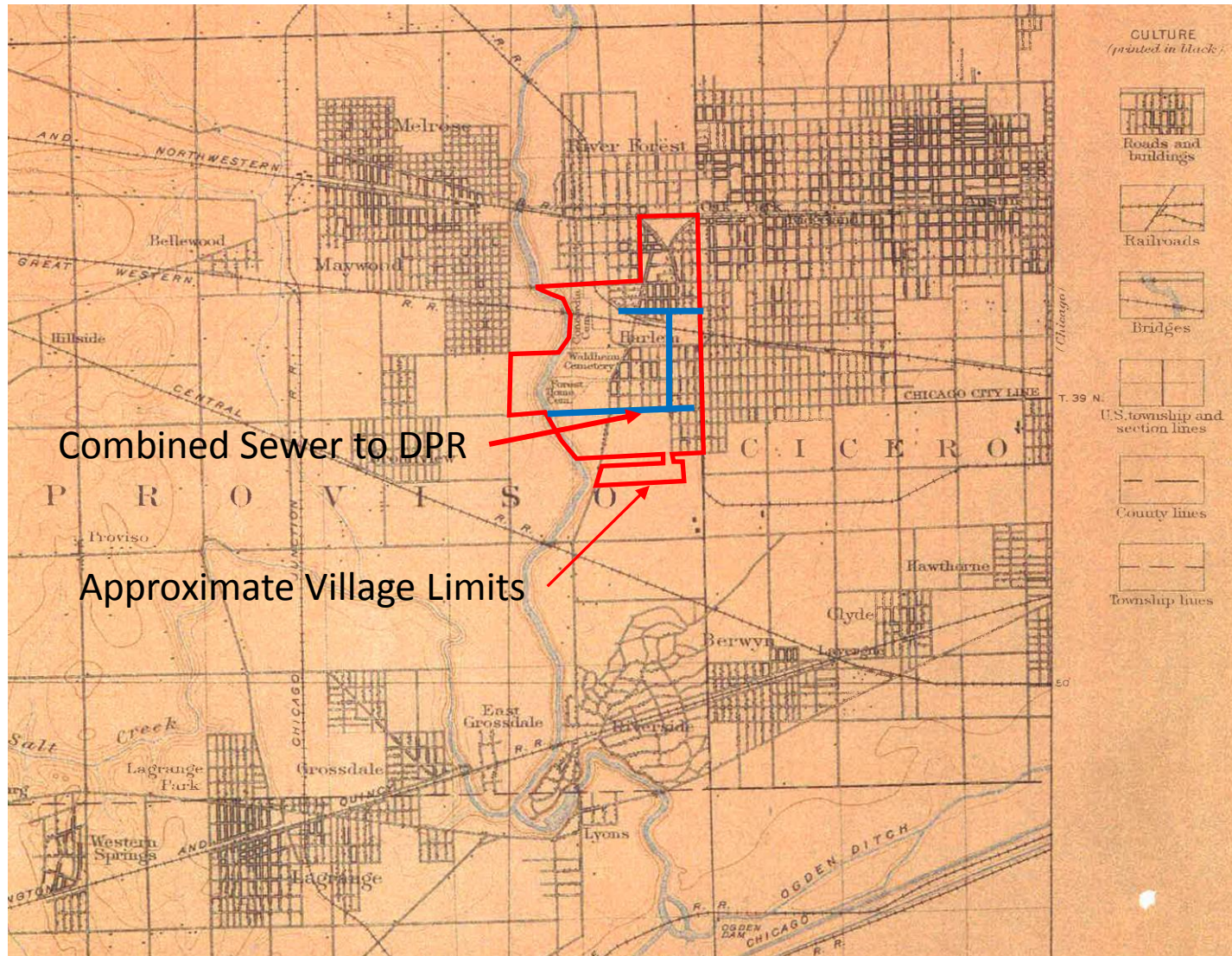
Study Background

The Village of Forest Park hired Christopher B. Burke Engineering, Ltd. (CBBEL) to **study the existing sewer system and to investigate a potential sewer separation plan.**

The objectives of the study were to:

- Evaluate the existing sewer system which consists of both relief storm sewers and combined sewers.
- **Develop a separation plan that would:**
 - Discharge stormwater directly to the Des Plaines River
 - **Reduce the risk of future street flooding and sewer backups into homes**
 - Reduce the frequency of combined sewer overflows (CSOs) to the Des Plaines River
 - Reduce the amount of stormwater treated at the MWRD sewage treatment plant

Village Sewer System

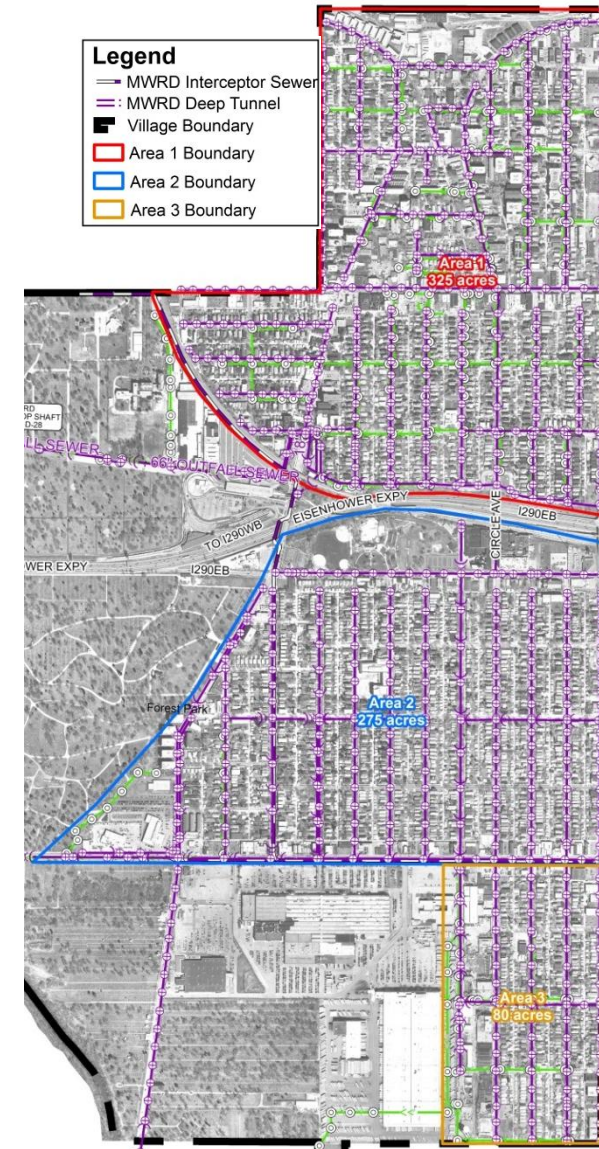


- Map is from 1902 and shows that Forest Park was already developed
- Forest Park was originally built with a combined sewer system, which is designed to convey both domestic sewage and stormwater runoff to the Des Plaines River
- Circa 1918, MWRD build interceptors to convey water to treatment plants

Overview of Village Sewer System

Village Area = 1,500 acres

- Area 1 (North Area) = 325 acres
 - Combined Sewer serves approximately 215 acres
 - Separate Storm Sewer serves approximately 110 acres
- Area 2 (Middle Area) = 275 acres
 - All Combined Sewer
- Area 3 (South Area) = 80 acres
 - Combined Sewer serves approximately 68 acres
 - Separate Storm Sewer serves approximately 12 acres
- Unstudied areas = 820 acres
 - Cemeteries, I-290 corridor, retail center along south side of Roosevelt Road



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Sewer Separation Evaluation

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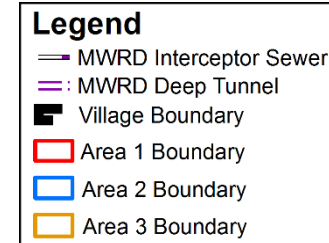
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Village of Forest Park Drainage Problems

Sewer backup into basements

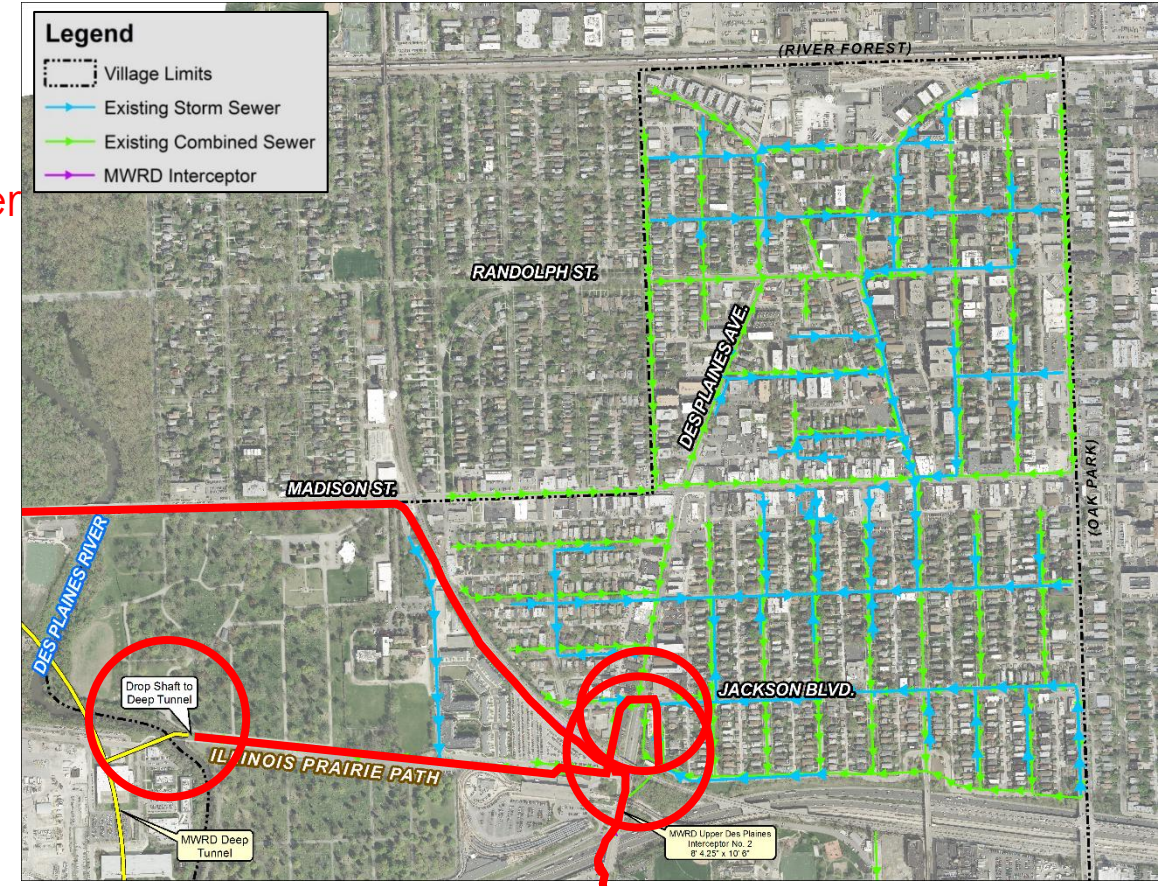
- **Houses are hydraulically connected to combined sewer**
- When combined sewers reach capacity, a combination of **domestic sewage and stormwater can surcharge into basements**

Street Flooding

- During severe rainfall events, combined sewers do not have sufficient capacity and **stormwater surcharges into the street**

Area 1 Sewer System Background – 325 acres

- 12-inch to 18-inch combined sewers convey domestic sewage to MWRD Upper Des Plaines Interceptor No. 2 at southwest corner of Area 1.
- During dry weather, the flows are conveyed south through the Upper Des Plaines No. 2 Interceptor sewer to the MWRD Stickney Water Reclamation Plant.
- During storm periods, a portion of the captured combined sewer flows in excess of the Upper Des Plaines No. 2 Interceptor sewer capacity will be diverted to the Deep Tunnel through a 66-inch combined sewer to the drop shaft (DS D-28) located near the Des Plaines River at the Illinois Prairie Path.
- Once the Deep Tunnel has reached capacity, excess combined sewer flow will be discharged to the Des Plaines River at the Illinois Prairie Path.
- 12-inch to 66-inch separate storm sewers convey stormwater to the 66-inch combined sewer at the intersection of Jackson Boulevard and Lathrop Avenue.



Area 1 Combined Sewer Overflow (CSO)

Drop Shaft at Illinois Prairie Path

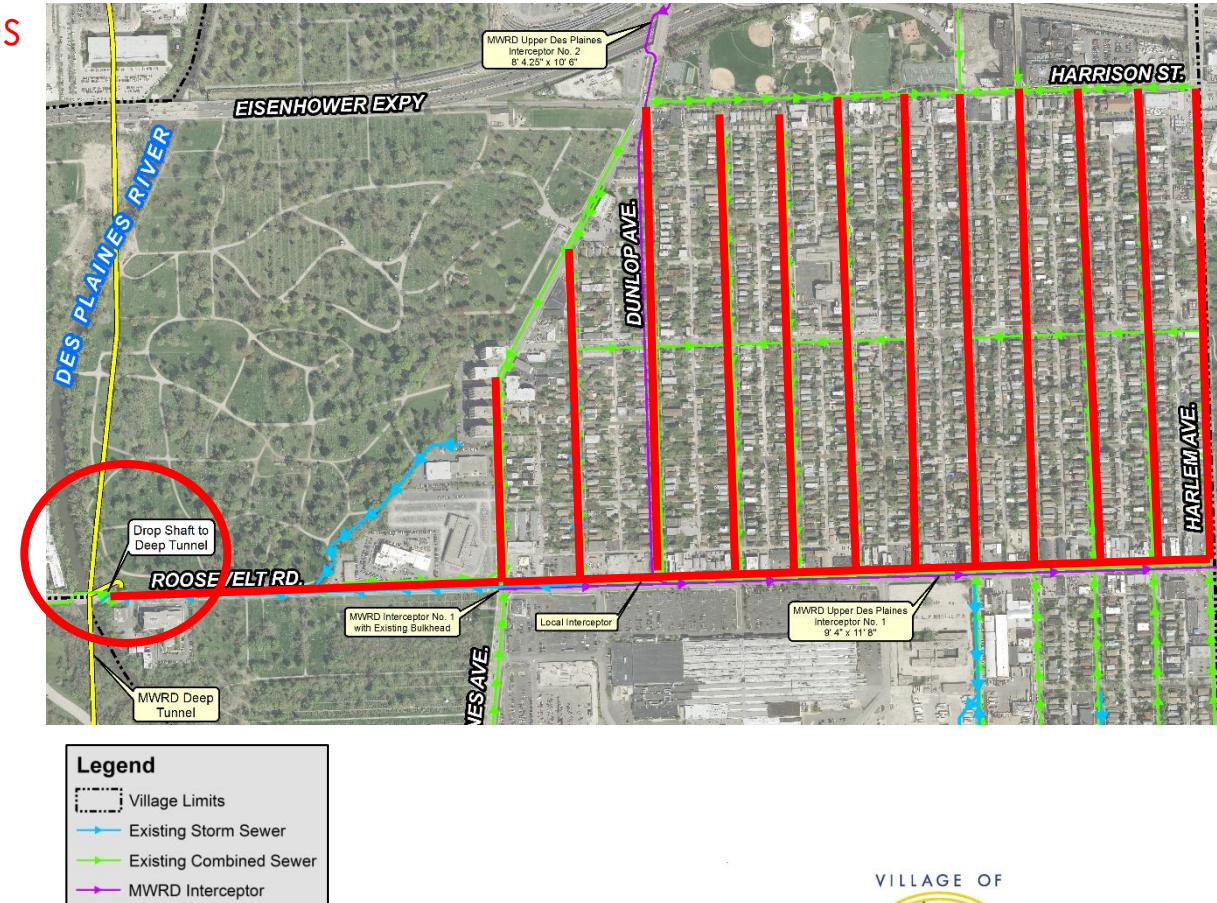


66-inch CSO Outlet at Illinois Prairie Path



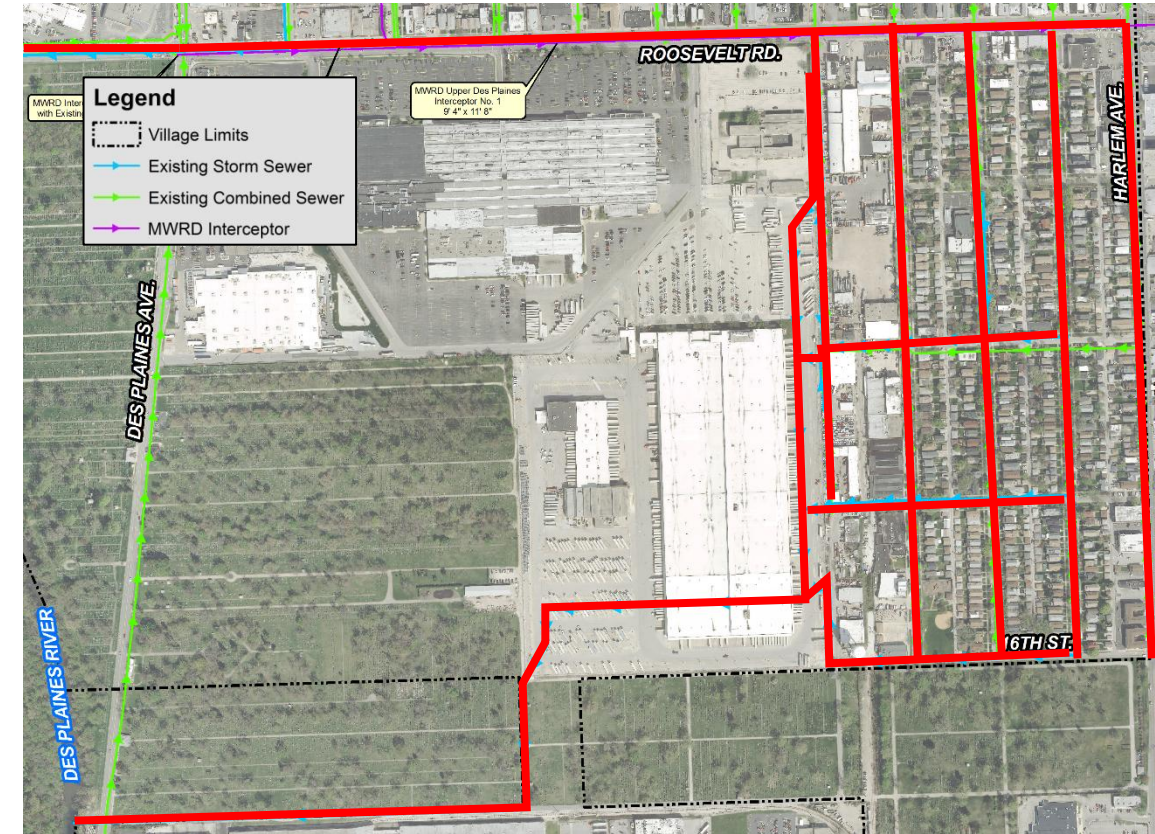
Area 2 Sewer System Background – 275 acres

- 12-inch to 15-inch laterals and an 18-inch to 48-inch mainline combined sewers convey domestic sewage from north to south to a local interceptor sewer in Roosevelt Road which varies from 18-inches to 66-inches.
- During dry weather, the flows are conveyed west through the local interceptor, to MWRD Interceptor No. 1 in Roosevelt Road. From there the flows are conveyed south to the MWRD Stickney Water Reclamation Plant.
- During storm periods, a portion of the captured combined sewer flows in excess of the capacity of Interceptor No. 1 will be diverted at Des Plaines Avenue to the Deep Tunnel through the drop shaft located near the Des Plaines River at Roosevelt Road.
- Once the Deep Tunnel has reached capacity, excess combined sewer flow will be discharged to the Des Plaines River at Roosevelt Road.

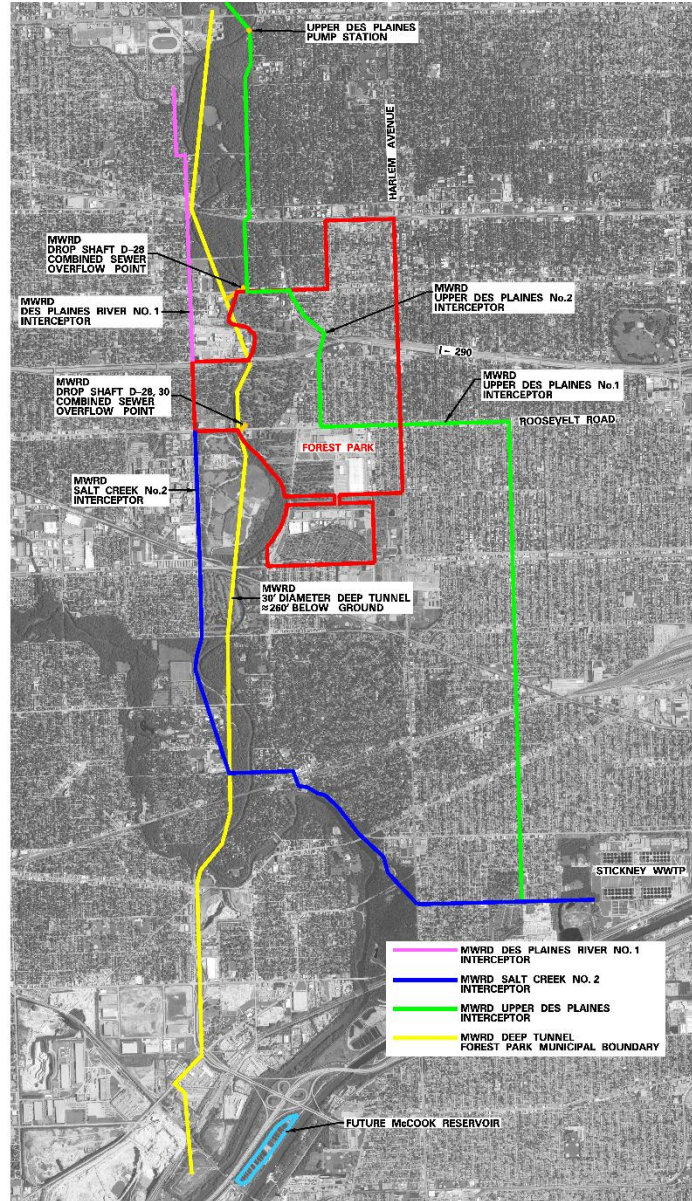


Area 3 Sewer System Background – 80 acres

- 12-inch to 15-inch combined sewers convey domestic sewage from south to north to a local interceptor sewer in Roosevelt Road which varies from 18-inches to 66-inches.
- During dry weather, the flows are conveyed west through the local interceptor, to MWRD Interceptor No. 1 in Roosevelt Road. From there the flows are conveyed south to the MWRD Stickney Water Reclamation Plant.
- During storm periods, a portion of the captured combined sewer flows in excess of the capacity of Interceptor No. 1 will be diverted to the Deep Tunnel through the drop shaft located near the Des Plaines River at Roosevelt Road.
- Once the Deep Tunnel has reached capacity, excess combined sewer flow will be discharged to the Des Plaines River at Roosevelt Road.
- 12-inch to 72-inch separate storm sewers convey stormwater to the Des Plaines River west of the intersection of Des Plaines Avenue and Greenburg Road.



Overview of MWRD Interceptor and TARP System



Communities within the TARP Service Area

Upper Des Plaines Interceptor

- Chicago
- Des Plaines
- Elmwood Park
- Franklin Park
- Harwood Heights (Sanitary)
- Maywood
- Melrose Park
- Norridge
- Northlake (Sanitary)
- Oak Park
- Park Ridge
- River Grove
- River Forest
- Rosemont (Sanitary)
- Schiller Park

Salt Creek Interceptor

- Bellwood
- Broadview
- Westchester

Sewer Separation Evaluation

Combined Sewer Overflow (CSO) Information

Illinois Prairie Path CSO (DS D-28)

<u>Year</u>	<u># CSO</u>	<u>Duration (hours)</u>
2008	2	19.1
2009	11	51.9
2010	12	69.5
2011	5	21.8
2012	3	12.2
2013	9	26.4
2014	6	15.2
2015	3	10.5

* Data Provided by MWRDGC

Combined Sewer Overflow (CSO) Information

Roosevelt Road CSO (DS D-28,30)

<u>Year</u>	<u># CSO</u>	<u>Duration (hours)</u>
2008	2	2.3
2009	2	2.7
2010	8	66.5
2011	1	6.3
2012	0	0
2013	0	0
2014	6	17.3
2015	0	0

* Data Provided by MWRDGC

Computer Modeling of Study Areas

Hydraulic Model

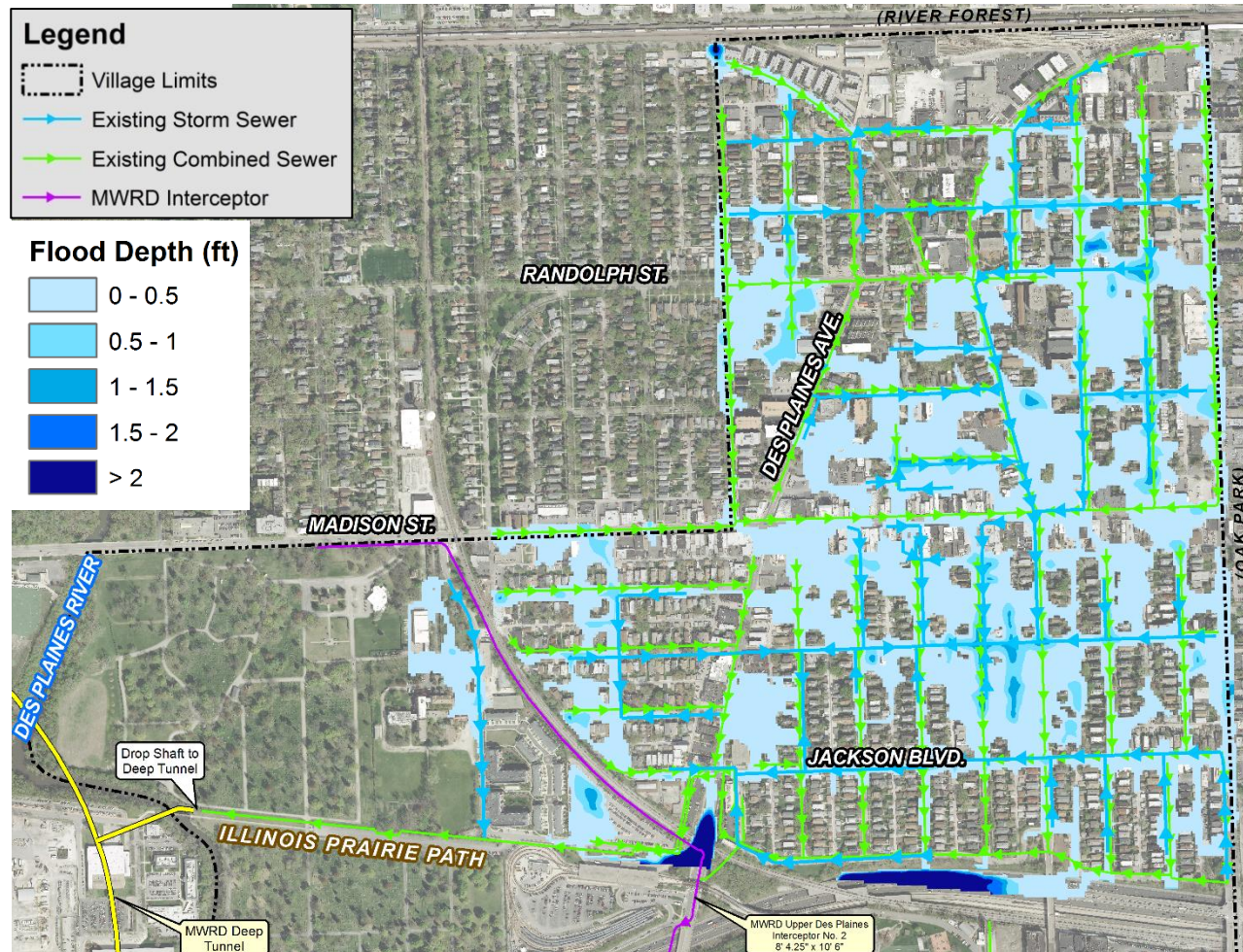
Input existing drainage features.

- Storm and combined sewers:
 - Length
 - Invert and rim elevations
 - Diameter
 - Pipe material

Simulated stormwater runoff from storm events through drainage system using US EPA-based XP-SWMM 2D computer model.

- **Overland Flooding determined using 2D feature of XP-SWMM, which uses topographic survey to determine flooding limits**
- Quantified level of protection for flood problem areas
- **Determined effectiveness of proposed drainage improvements**

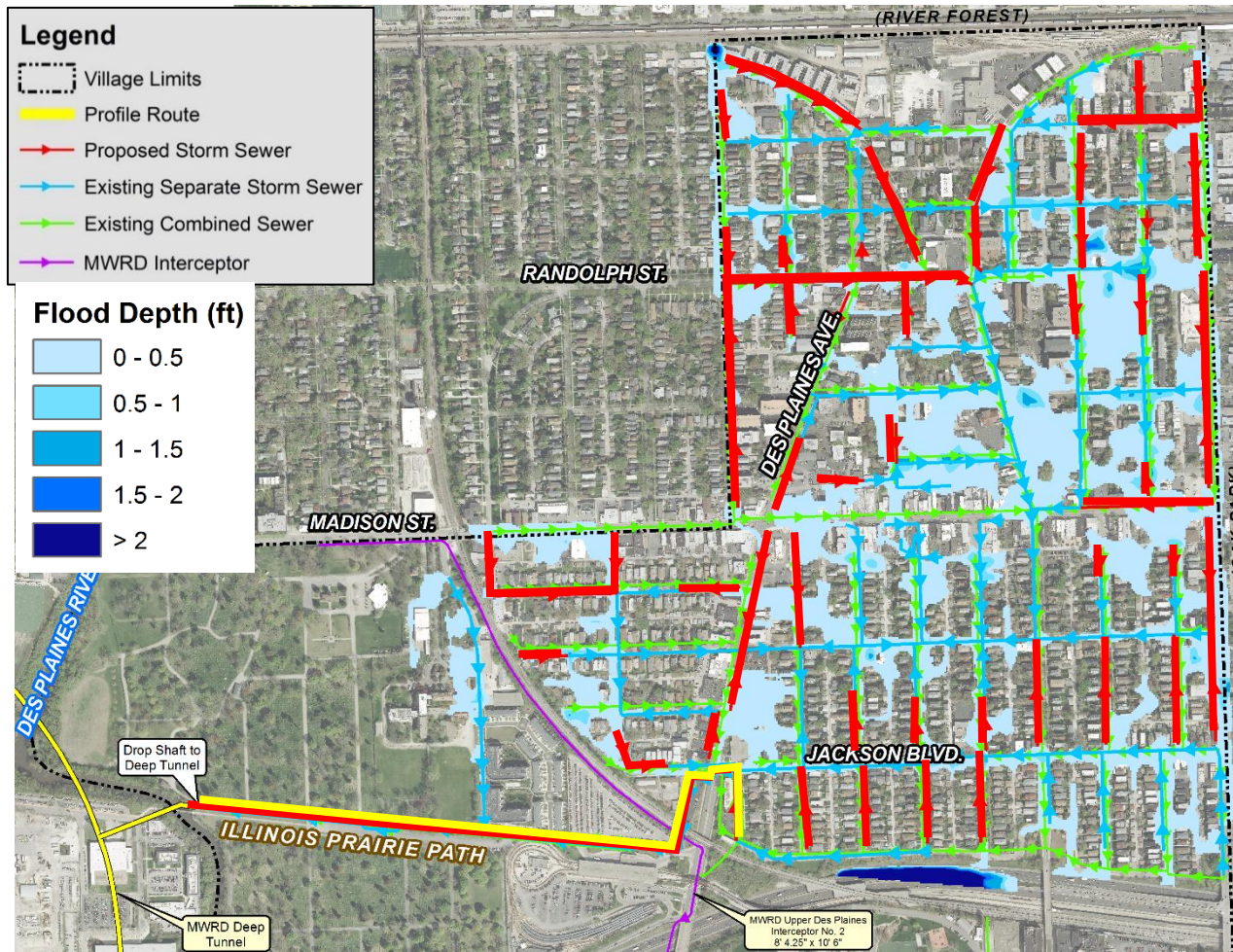
Existing Street Flooding in Area 1: 10-Year Storm Event



Two main issues causing flood problems in Area 1:

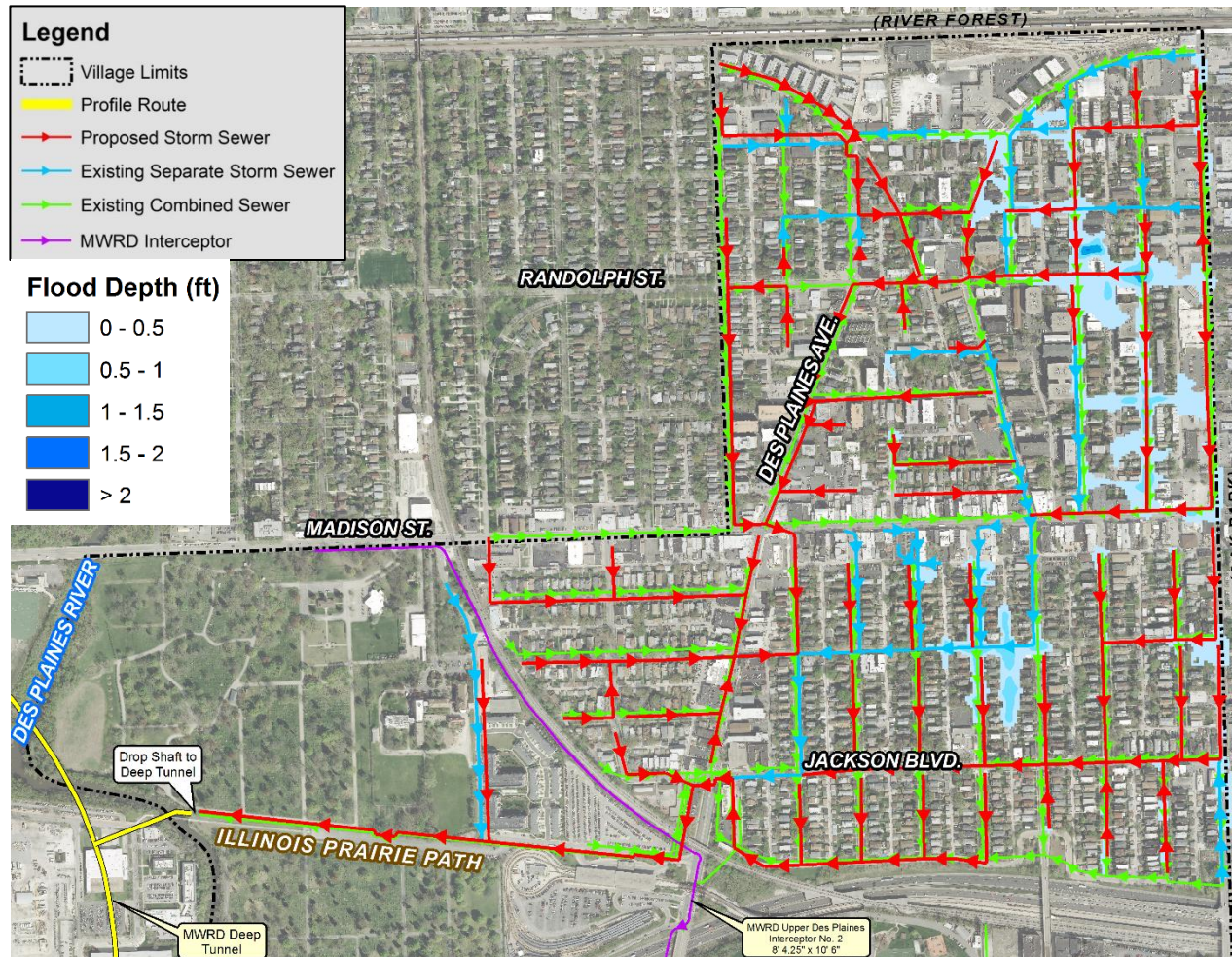
- (1) Area is Not Fully Separated –**
Combined sewers drain portions of Area 1, leading to sewer backups in basements during heavy rainfall events.
- (2) Inadequate Pipe Capacity –**
Storm sewer and combined sewer too small to convey even a 1-year storm event without street flooding.

Street Flooding in Area 1 – Alternative 1: 10-Year Storm



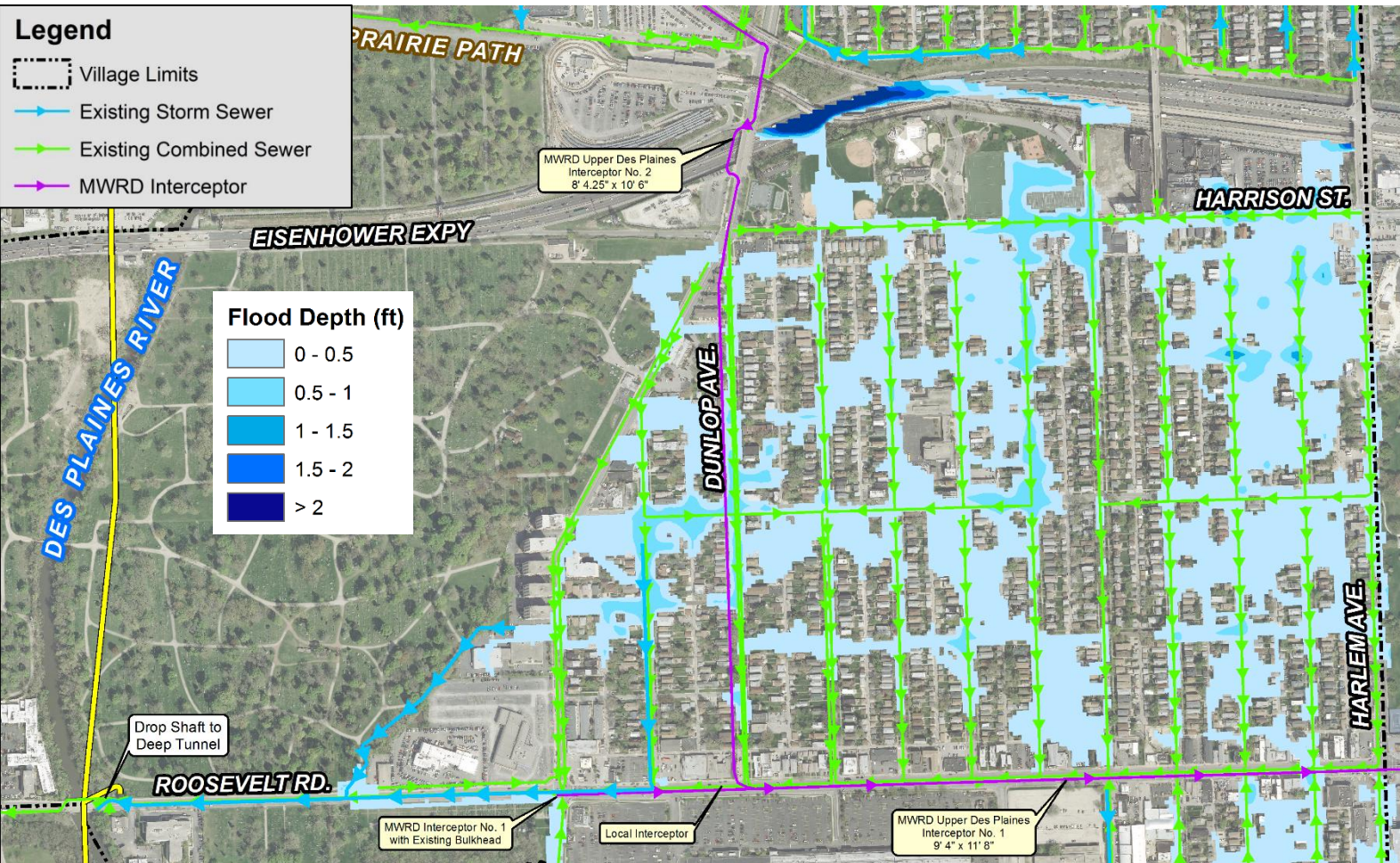
- Convert existing 66" combined sewer in the Illinois Prairie Path to storm sewer and use as the outfall to Des Plaines River for stormwater
- Install new sanitary sewer in Illinois Prairie Path to convey wastewater from MWRD Interceptor No. 2 to deep tunnel when the Interceptor is full
- New storm sewer, ranging from 12-inch to 36-inch, as needed to completely separate sanitary sewer and storm sewer throughout Area 1
- Estimate Project Cost \$12,600,000

Street Flooding in Area 1 – Alternative 2: 10-Year Storm



- New 96" stormwater outfall in the Illinois Prairie Path to Des Plaines River
- Enlarge existing storm sewer system with storm sewer ranging from 12-inch to 66-inch to provide greater level-of-protection than existing storm sewer and to completely separate sanitary and storm
- Estimated Project Cost \$34,700,000

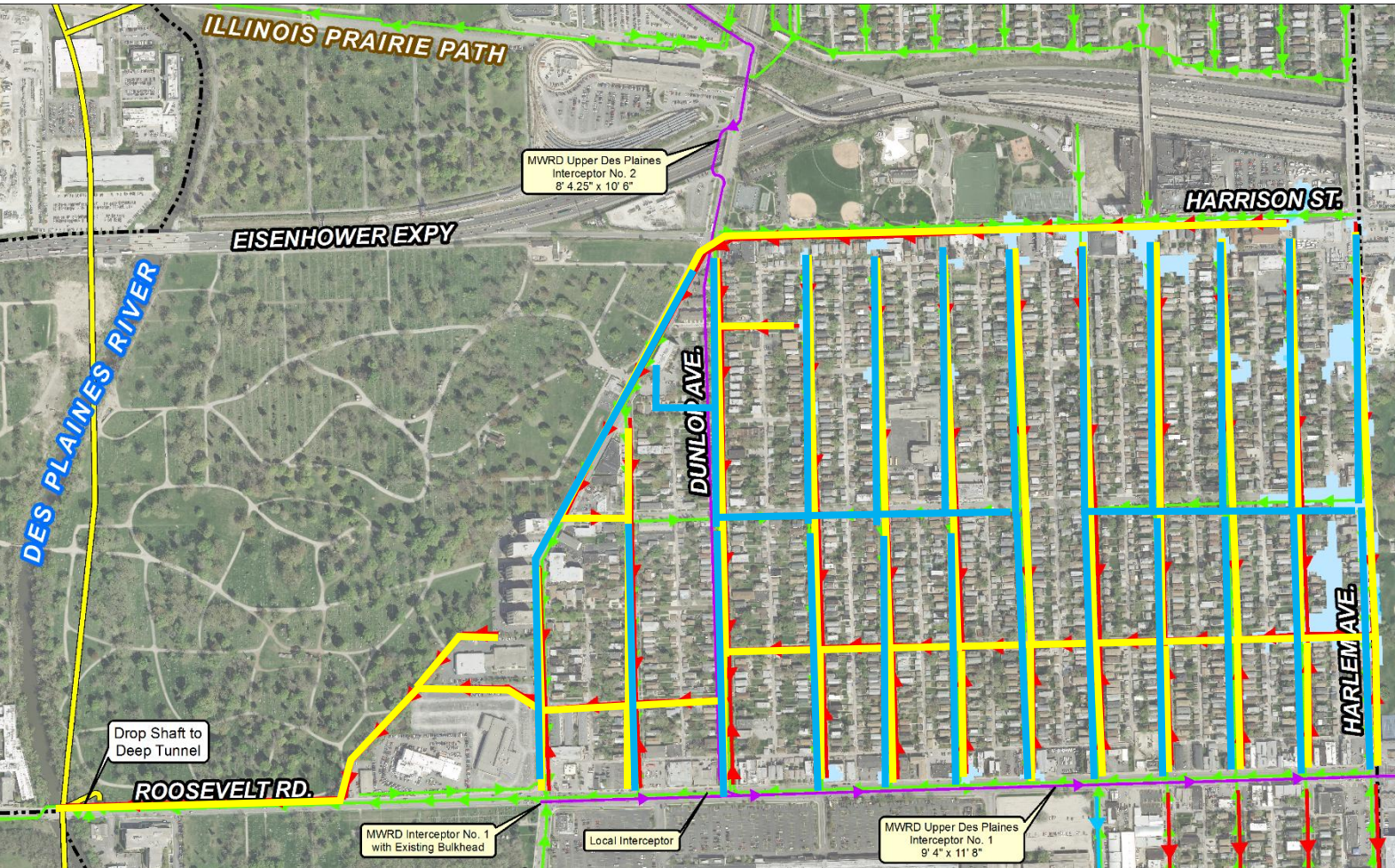
Existing Street Flooding in Area 2: 10-Year Storm Event



Two main issues causing flood problems in Area 1:

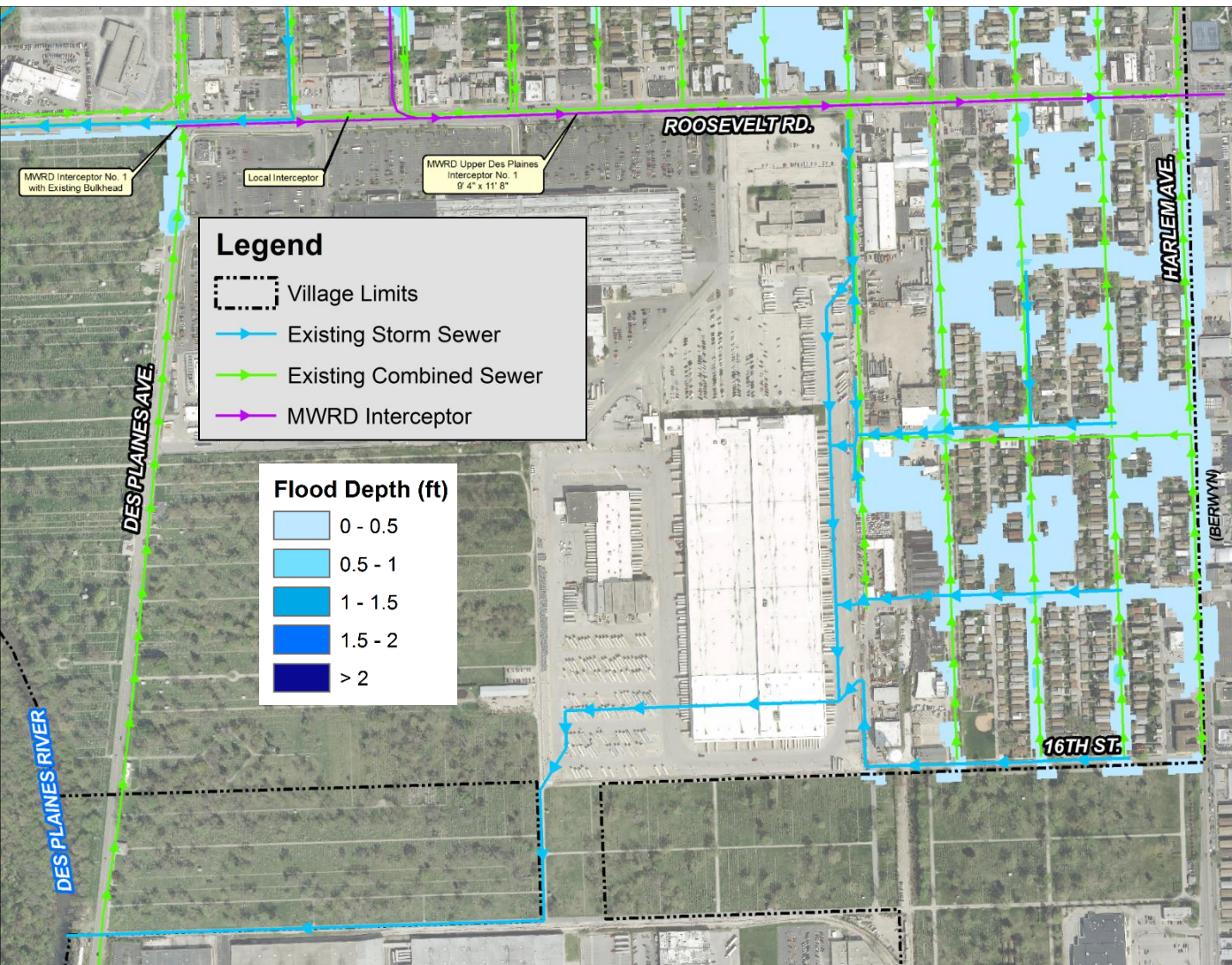
- (1) Area is Not Fully Separated –**
Combined sewers drain the entire drainage area, leading to sewer backups in basements during heavy rainfall events.
- (2) Inadequate Pipe Capacity –**
Combined sewer too small to convey even a 1-year storm event without street flooding.

Street Flooding in Area 2 – Alternative 1: 10-Year Storm



- New 84" stormwater outfall to Des Plaines River
- New storm sewers, ranging from 12-inch to 48-inch, as needed to completely separate sanitary sewer and storm sewer throughout Area
- Combined sewers become sanitary sewer in north-south streets
- Continue to use the local interceptor and Interceptor No. 1 in Roosevelt Road to convey wastewater
- Estimate Project Cost \$ 30,600,000

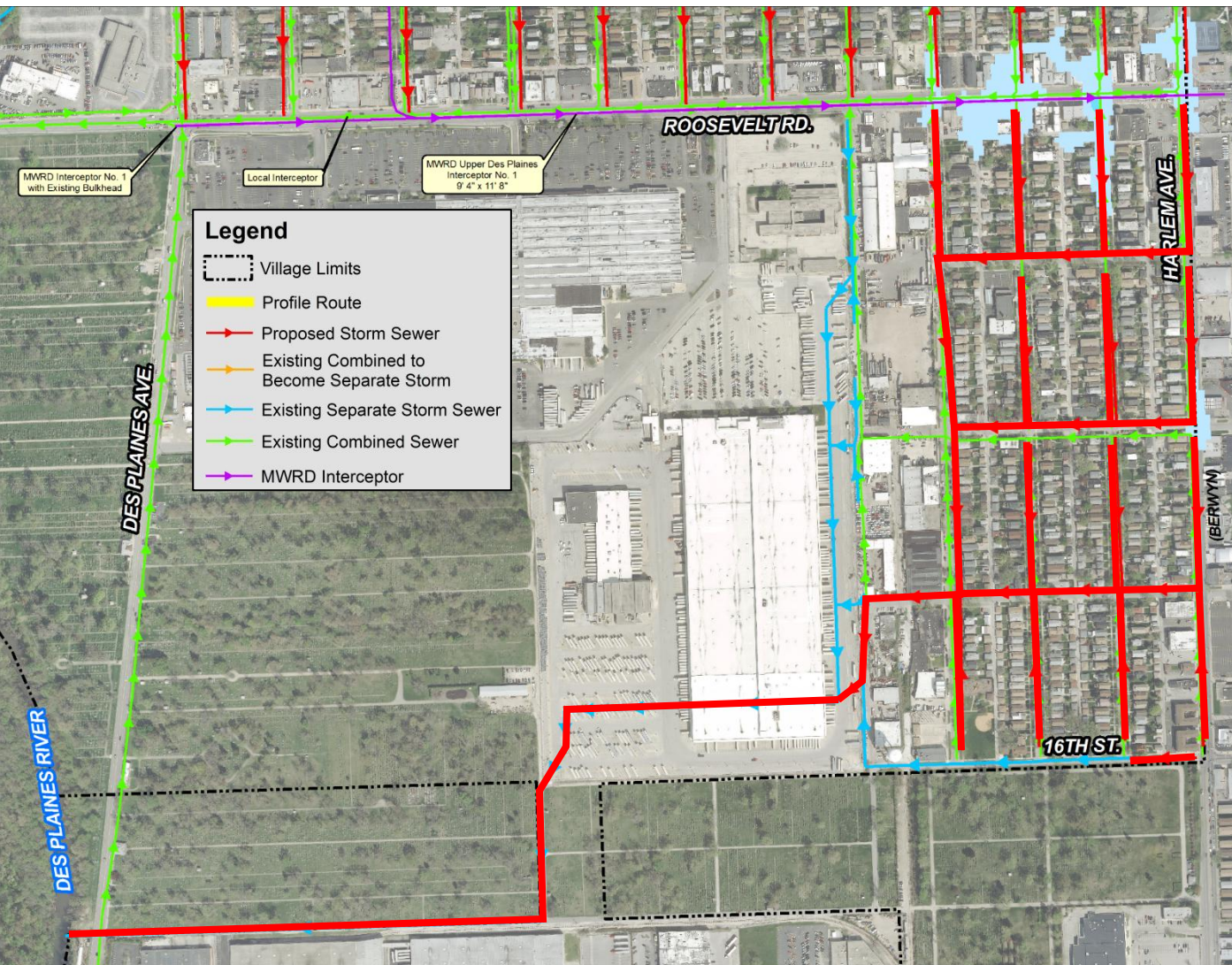
Existing Street Flooding in Area 3: 10-Year Storm Event



Two main issues causing flood problems in Area 1:

- (1) Area is Not Fully Separated –** Combined sewers drain portions of Area 3, leading to sewer backups in basements during heavy rainfall events.
- (2) Inadequate Pipe Capacity –** Storm sewer and combined sewer too small to convey even a 1-year storm event without street flooding.

Street Flooding in Area 3 – Alternative 1: 10-Year Storm



- Utilize existing 72" outfall to Des Plaines River
- Enlarge existing storm sewer system with storm sewer ranging from 24-inch to 60-inch, to provide 10-year level-of-protection from street flooding, completely separate sanitary and storm
- Combined sewers become sanitary sewer in north-south streets
- Continue to use the local interceptor in Roosevelt Road to convey wastewater to the west
- Estimate Project Cost \$ 9,300,000

Estimated Project Cost

Area 1 (North Area)

- **Alternative 1 = \$12,600,000**

➤ (Separation only)

- **Alternative 2 = \$34,700,000**

➤ (Separation and 10-yr protection from street flooding)

Area 2 (Middle Area)

- **Alternative 1 = \$30,600,000**

Area 3 (South Area)

- **Alternative 1 = \$9,300,000**