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Strand Associates, Inc.®

Southeast Area Combined Sewer Improvements – Route Evaluation

Village of Shorewood

July 6, 2021

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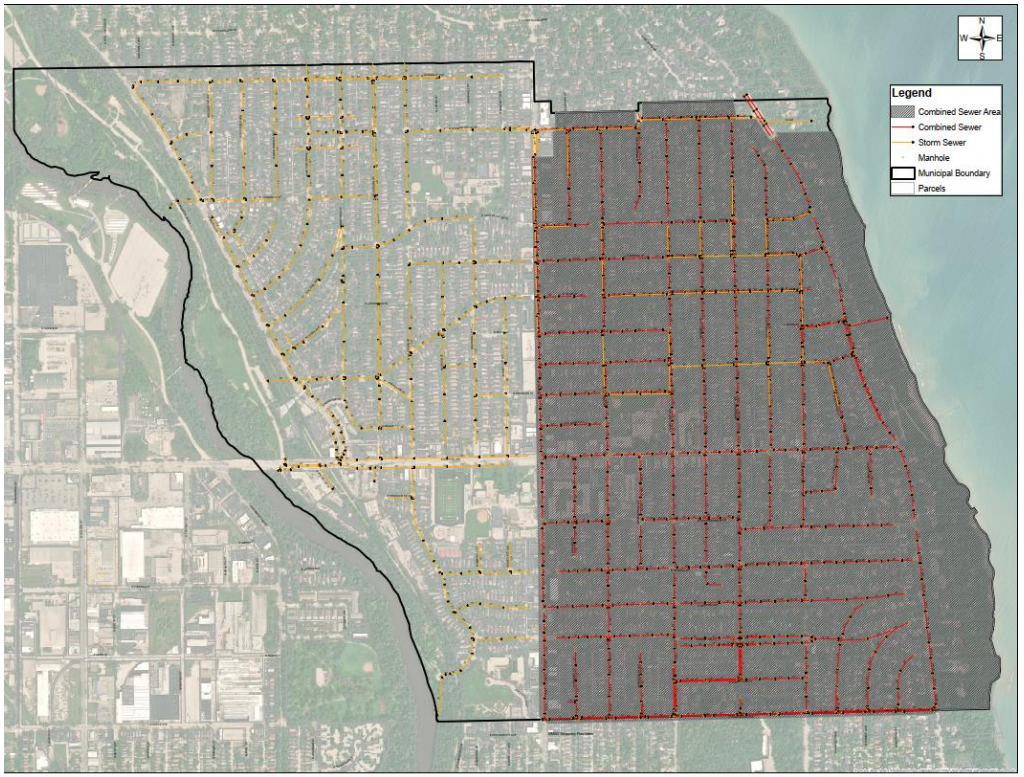
Presentation Outline

- Project Background
- Combined Sewer Alternatives Evaluation
- Opinion of Probable Construction Costs
- Schedule/Phasing



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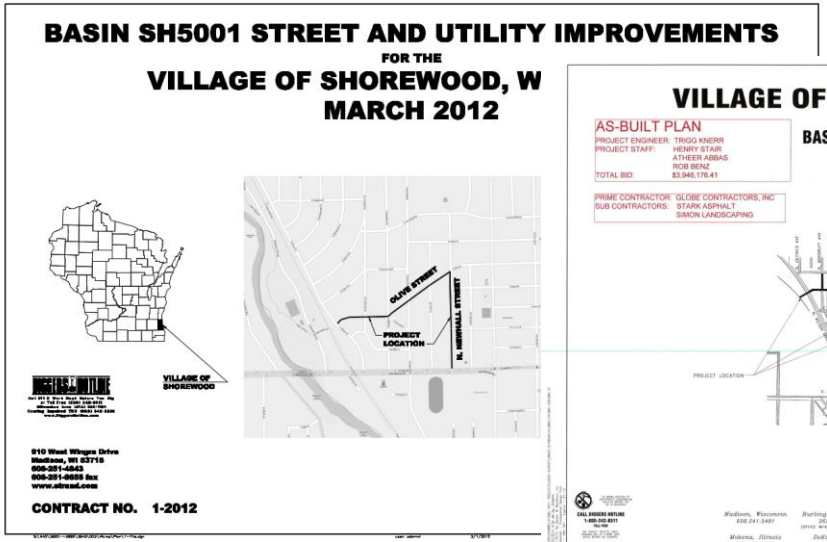
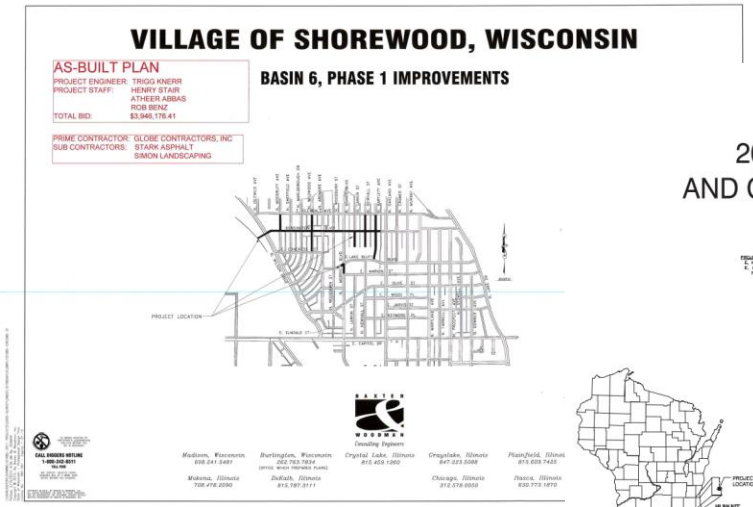
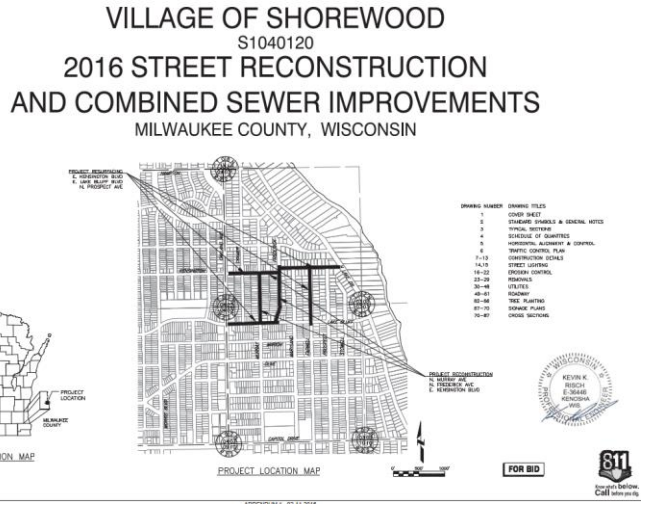
Project Background

- Project Goal – Increase the Level of Protection Against Basement Backups in the Southeast Area of the Combined Sewer System
- Improvements completed in 2012 in Basin 1 – Separate Area.
- Improvements completed in 2012 and 2014 in Basin 6 – Separate Area.
- Improvements completed in 2016 in the Northeast Combined Sewer Area







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Project Background

- Comprehensive Facilities Plan Completed in 2011
- Advanced Facilities Plan Completed in 2012
- Edgewood Interceptor MIS Planning Report in 2016 – Clark Dietz
- Combined Sewer Service Area Environmental Assessment Report in 2017
- Combined Sewer Service Area Solutions Planning – Executive Summary 2017, 2018, Amendment 2019
- Edgewood Interceptor is being completed by MMSD in 2021/2022
- Partial Separation was Evaluated by Others and Not Pursued due to WDNR Permitting

Map of Past Basement Backups Based on Village GIS System

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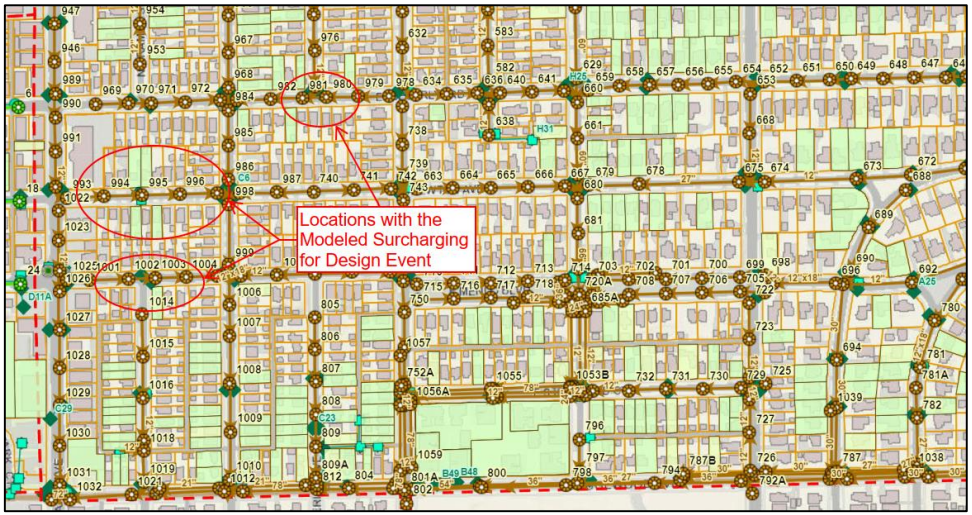
Project Background (Design Criteria)

- XPSWMM Computer Model Developed by Others and Updated by MMSD for the Edgewood Interceptor Project
- Design Storm – Convey the NOAA Atlas 14, 10-year, 1-hour recurrence interval event. (1.91-inches in 1-hour)
  - Edgewood Interceptor is Designed for this Event
  - Modeling Does Not Show Basement Backups in the Southeast Area, i.e., water levels in combined sewers are at least 6-feet below the road surface)
  - Modeled Backups are Shown in the Southwest Combined Sewer Area
- **Basement Backups Will Occur in the Project Area During Storm Events Greater than the Design Storm Event**



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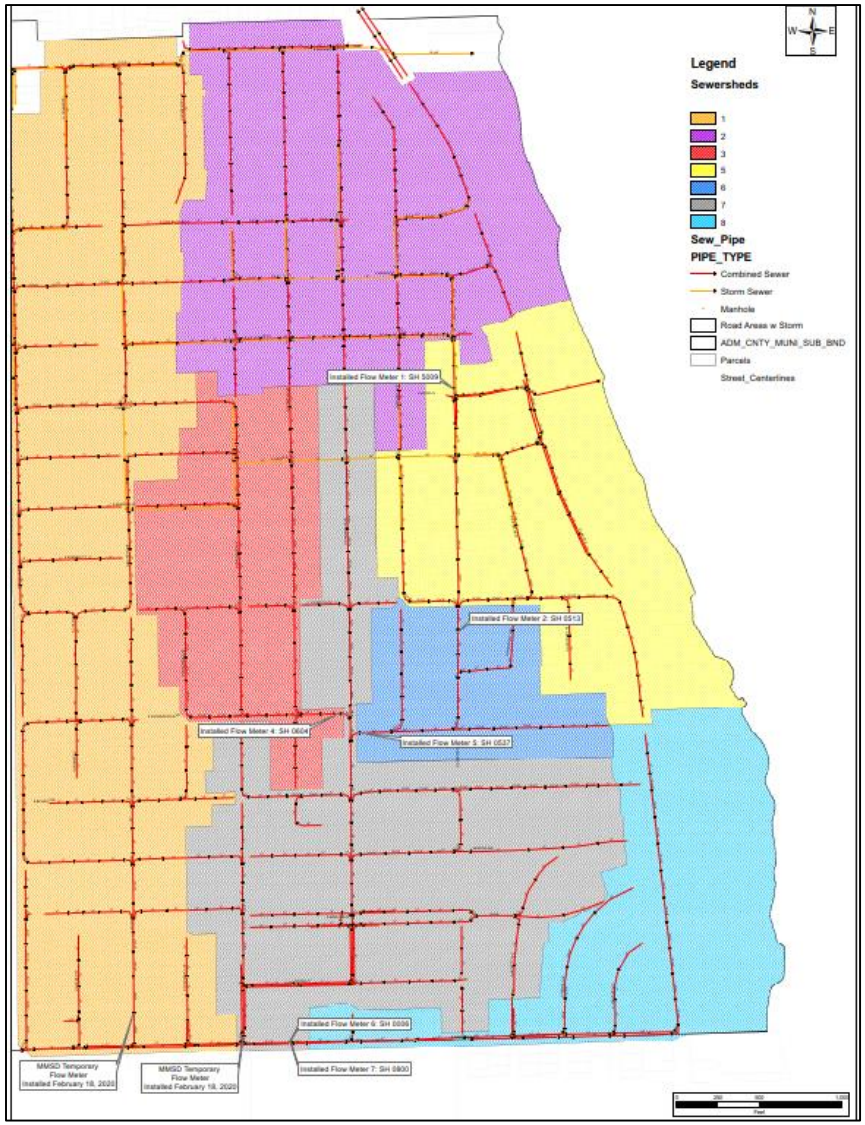
Project Background (Flow Metering)

- Flow Metering
  - Six Meters Installed in August and September 2020 by MMSD
  - Meters Installed to Validate Model Results and Distribution of Flow
  - Limited Wet Weather Since Meter Installation
  - Modeled Flow is Relatively Consistent with Metered Flow from Smaller Events on a Percentage Basis



Combined Sewer Route Analysis

- 2019 Proposed Route – Clark Dietz, Inc. – Upsize Existing Combined Sewers Along East Shorewood Boulevard and North Prospect Avenue. Add Relief Sewer from North Prospect Avenue to East Edgewood Avenue.
- Alternative No. 1 – Relief Sewer Along North Downer Avenue
- Alternative No. 2 – Similar to 2019 Proposed Route but Route Relief Sewer Along Menlo versus Stratford
- Alternative No. 3 – Similar to Alternative No. 1 but Route Relief Sewer Along Menlo versus Stratford

Combined Sewer – Always has flow

Relief Sewer – Only has flow during rain events

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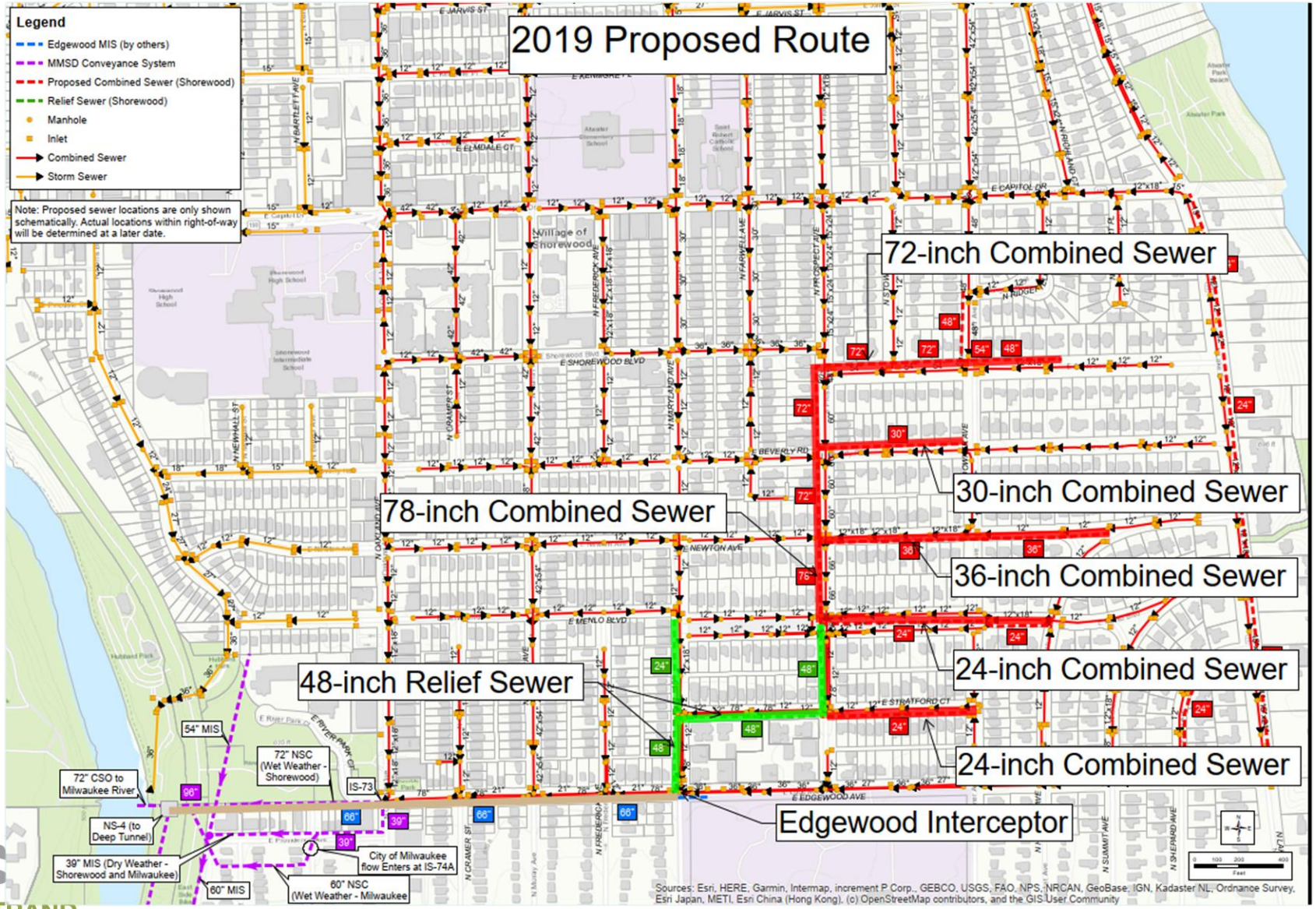
Combined Sewer Route Analysis – 2019 Proposed Route



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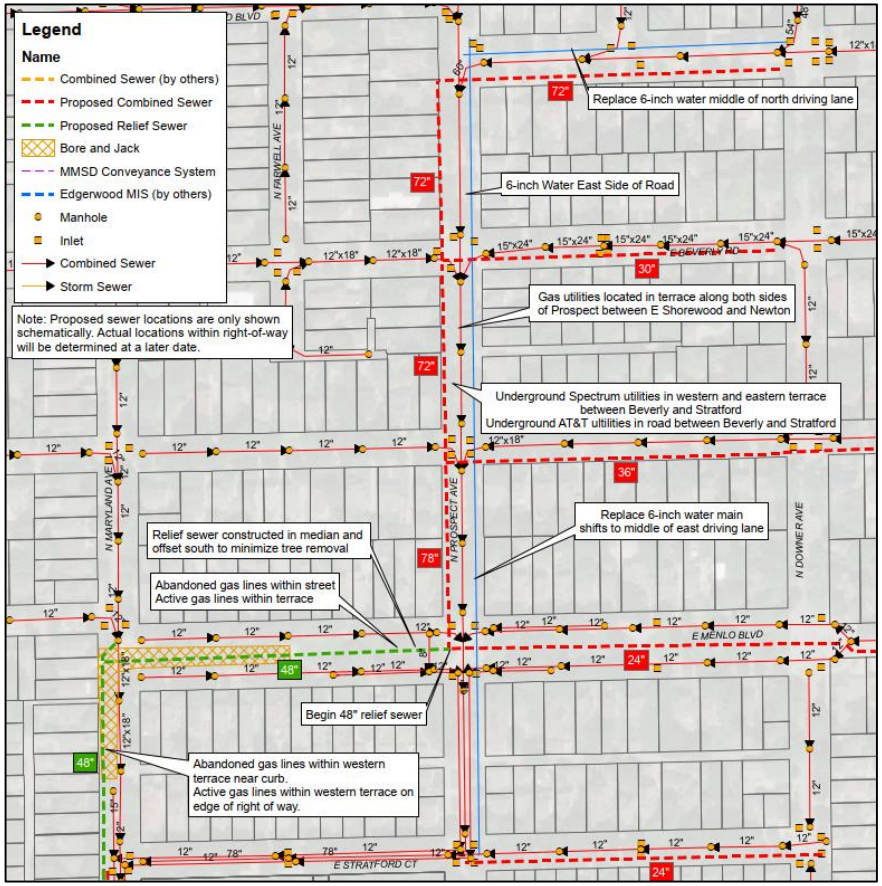
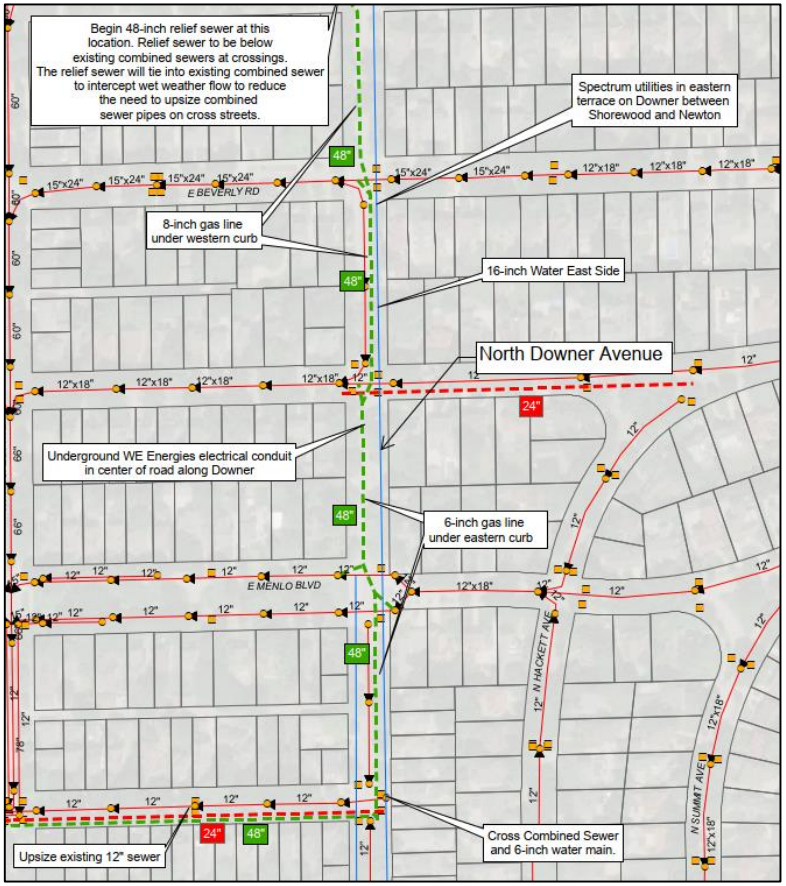
Combined Sewer Route Analysis – Utility Impacts Review





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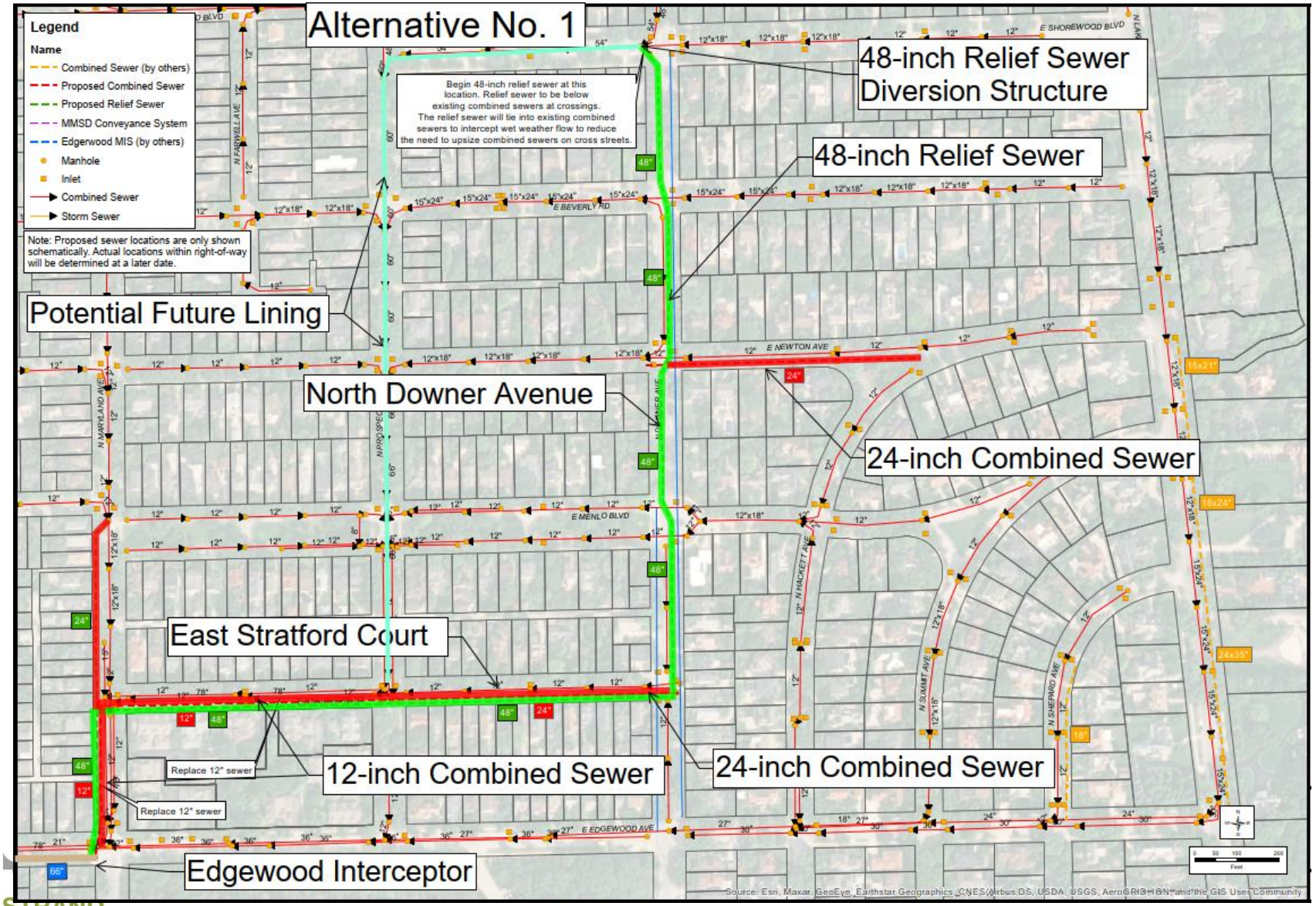
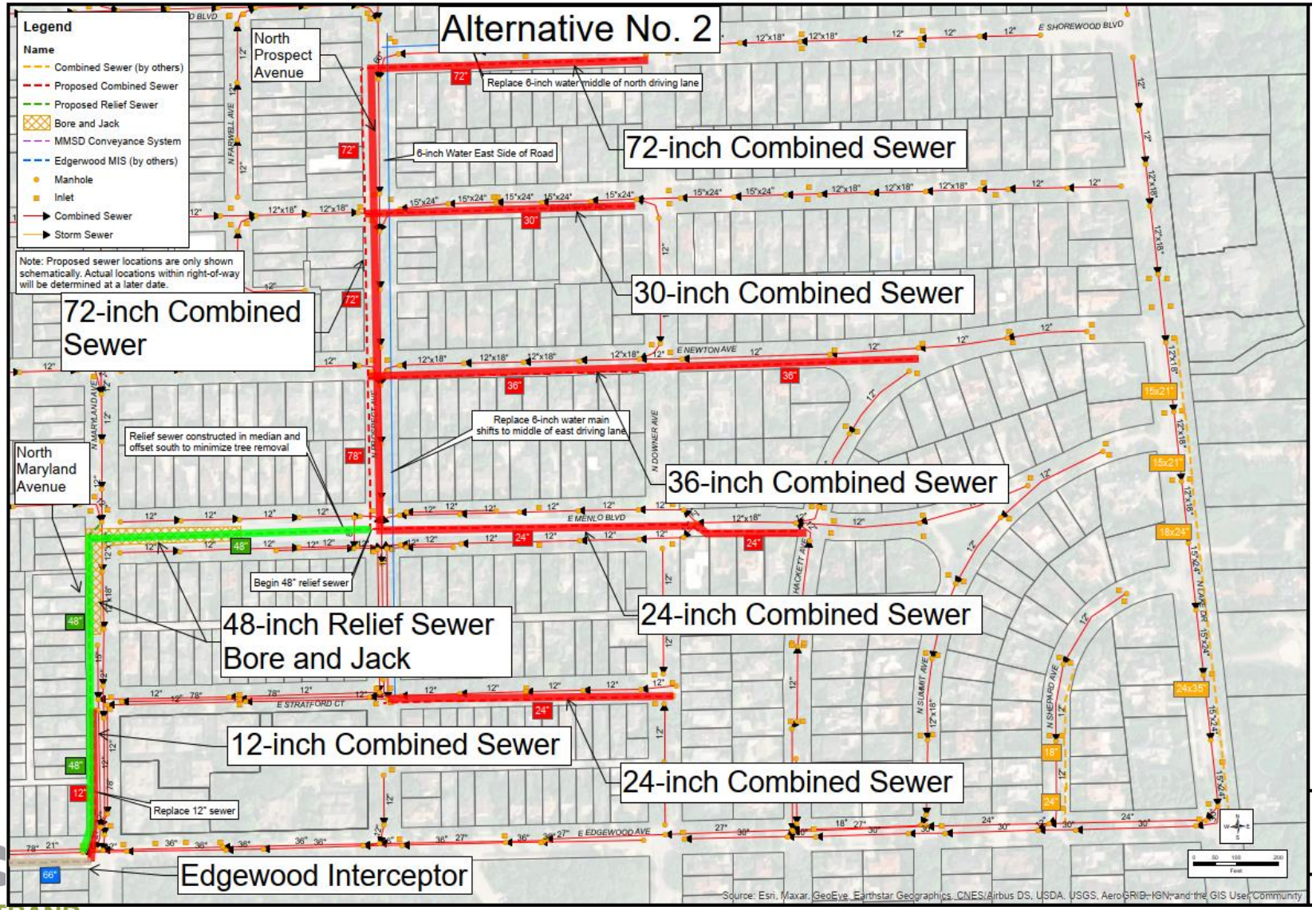
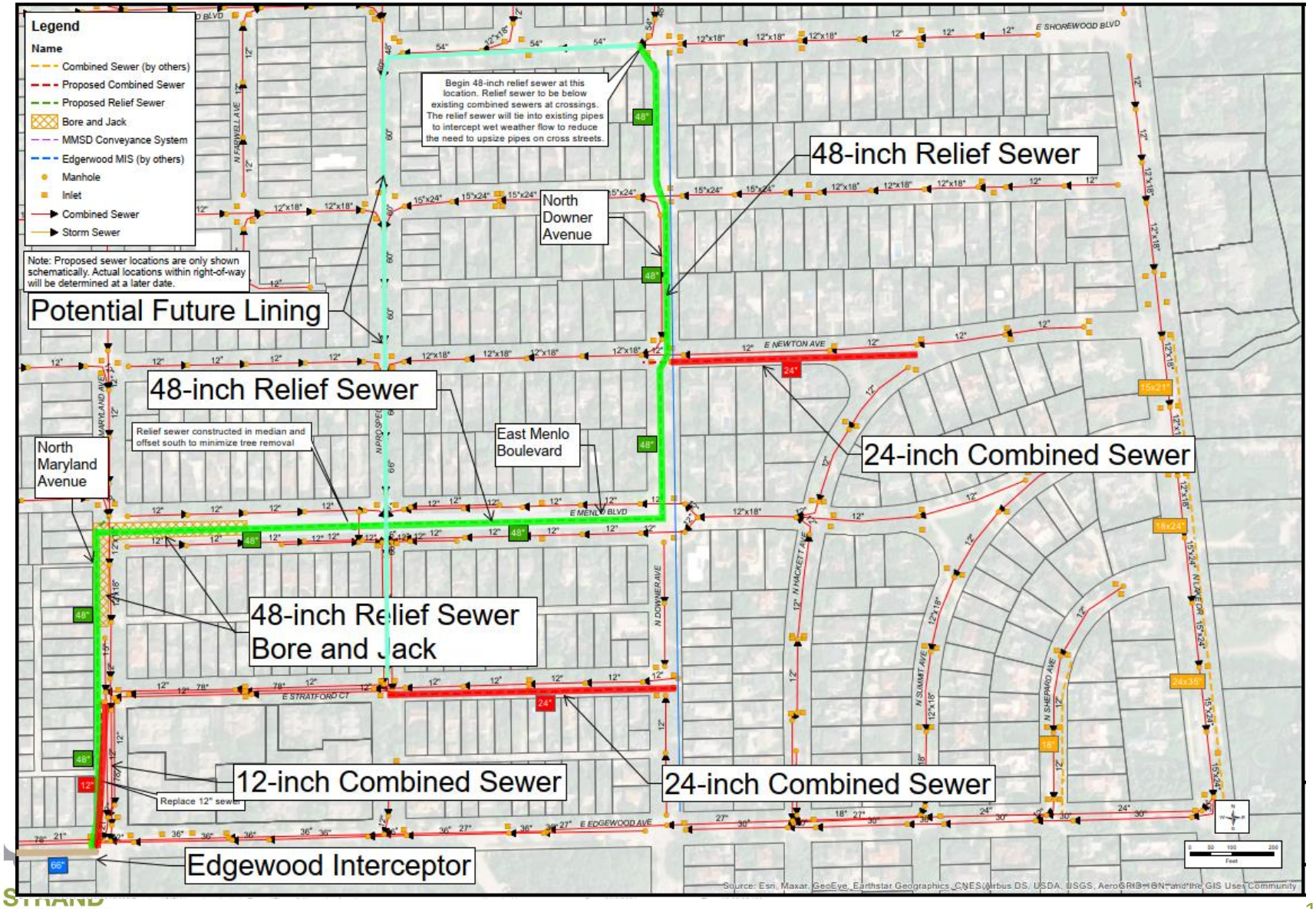
Combined Sewer Route Analysis – Alternative No. 1



Combined Sewer Route Analysis – Alternative No. 2



Combined Sewer Route Analysis – Alternative No. 3



Combined Sewer Route Analysis
Opinion of Probable Construction Costs

	Opinion of Probable Construction Cost
2019 Proposed Layout (Clark Dietz)	$20,900,000
Alternative No. 1 (Relief Sewer Along Downer and Stratford)	$13,500,000 (Includes combined sewer lining 54-inch, 60-inch and 66-inch)
Alternative No. 2 (Base Alternative but Relief Sewer Along Menlo and Maryland)	$20,700,000
Alternative No. 3 (Relief Sewer Along Downer and Menlo)	$14,100,000 (Includes combined sewer lining 54-inch, 60-inch and 66-inch
*All costs include watermain replacement in all locations with new sewer **All costs include contingency for green infrastructure	

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Combined Sewer Route Analysis - Summary

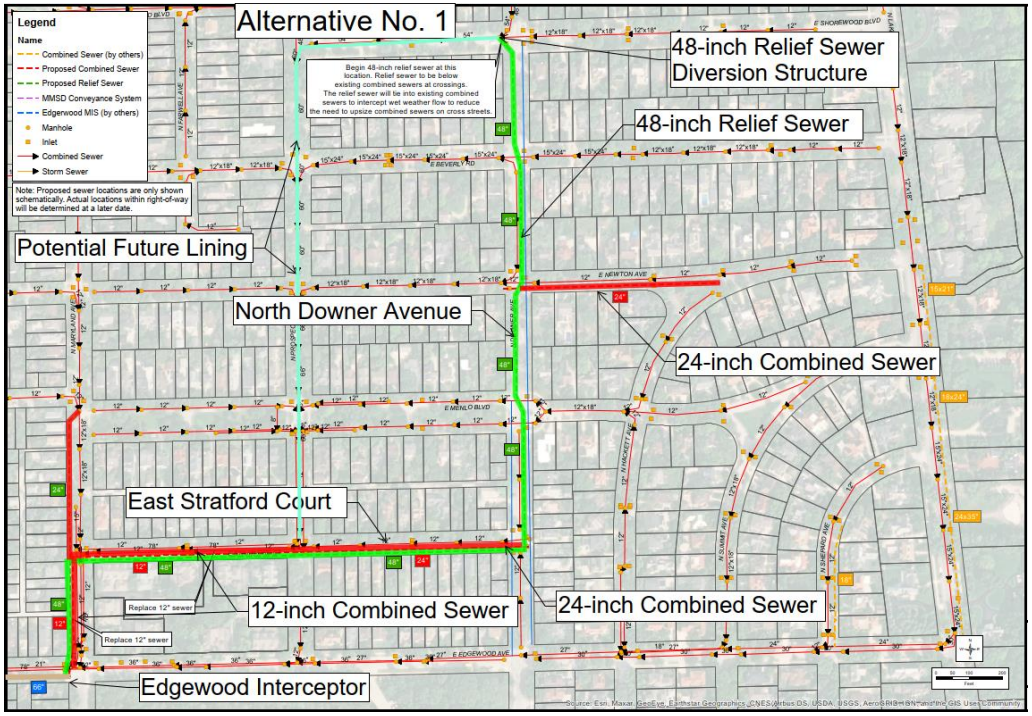
	Advantages	Disadvantages
2019 Proposed Layout	• Replaces more existing/aged combined sewer • Reconstructs more roads (less future road projects required)	• Higher costs • Significant bypass pumping • North Prospect is 24-feet wide resulting in loss of trees from the excavation • Tunneling planned • Doesn't reconstruct North Downer which is in poor condition
Alternative No. 1	• Lower costs • Minimal bypass pumping • Easier construction since North Downer is 40-feet wide • Fewer tree impacts • No tunneling or boring • Reconstructs North Downer which is in poor condition	• 16-inch transmission water main on east side of North Downer • Does not replace existing combined sewer on North Prospect. Future lining is recommended. • Additional sewer infrastructure installed (on-going maintenance impact)

Combined Sewer Route Analysis - Summary

	Advantages	Disadvantages
Alternative No. 2	• Replaces more existing/aged combined sewer • Reconstructs more roads (less future road projects required)	• Higher costs • Significant bypass pumping • North Prospect is 24-feet wide resulting in loss of trees from the excavation • Boring required • Doesn't reconstruct North Downer which is in poor condition
Alternative No. 3	• Lower costs • Minimal bypass Pumping • Easier construction since North Downer is 40-feet wide • Fewer tree impacts • Reconstructs North Downer which is in poor condition	• 16-inch transmission watermain on east side of North Downer • Does not replace existing combined sewer on North Prospect. Future lining is recommended. • Additional sewer infrastructure installed (on-going maintenance item) • Boring required

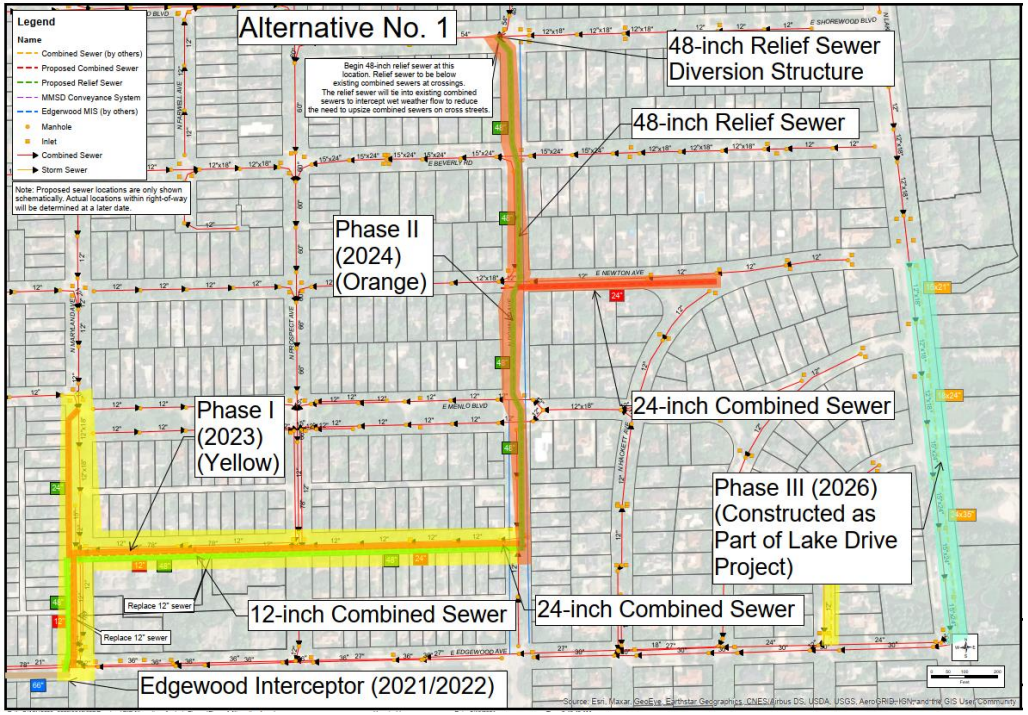
Combined Sewer Route Analysis – Recommended Route

- Alternative No. 1 – Relief Sewer Along North Downer Avenue
  - Lowest cost alternative ($13,500,000)
  - Reconstructs North Downer Avenue which is in poor condition
  - Simplified construction on North Downer Avenue which is 16-feet wider than North Prospect Avenue.
  - Minimal bypass pumping during construction



Combined Sewer Route Analysis – Phasing and Schedule for Recommended Alternative

	Year
Edgewood Interceptor (By MMSD)	2021/ 2022
Phase 1 – Relief Sewer from East Edgewood and North Maryland to East Stratford to North Prospect	2023
Phase 2 – North Prospect to Connection at East Shorewood and North Downer.	2024
Phase 3 – Lake Drive – By WisDOT (provide sewer design information as needed by WisDOT)	2026



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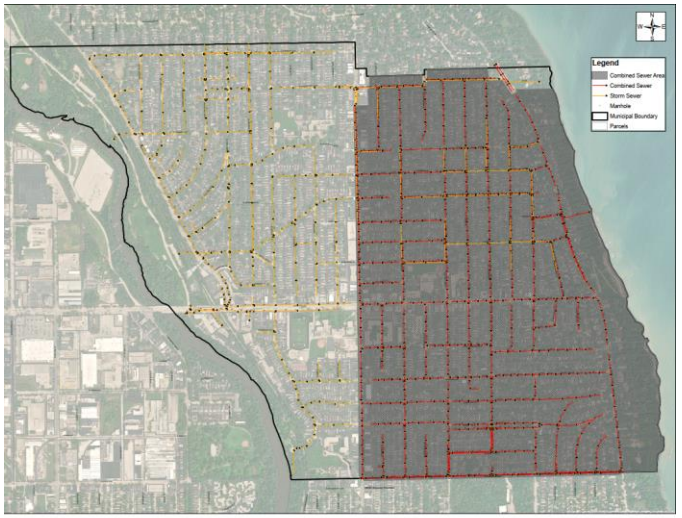
Presentation Summary

- Project Goal – Increase level of Protection Against Basement Backups
- Computer Model Developed to Predict Flows in System
- Limited Flow Metering Data Matches Modeled Flows Well
- Three Alternatives Evaluated
- Construction Costs Range from $13,500,000 to $20,900,000
- Recommended Alternative – Alternative No. 1
- Construction Phase 1 – 2023, Phase 2 - 2024



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