CITY OF DETROIT

Water and Sewerage Department

Sewer Rehabilitation Project Planning Document

February 2024

Mike Duggan, Mayor

Gary Brown
Director

Michael Einheuser
Chairperson
Board of Water Commissioners

City of Detroit

Mike Duggan, Mayor

Detroit City Council

Mary Sheffield, President

James Tate, President Pro Tem

Angel Whitfield-Calloway

Scott Benson

Latisha Johnson

Gabriela Santiago-Romero

Fred Durhal III

Mary Waters

Coleman A. Young II

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Project Definition and Overview

The Detroit Water and Sewerage Department (DWSD) is assessing and evaluating the condition of its collection system throughout the City of Detroit. Collection system assets scheduled for assessment include pipes, manholes, and catch basins. This assessment effort is targeted, focusing on selected sewer assets identified as high risk that would not normally be inspected within the next several years in accordance with DWSD's neighborhood-based strategy.

The primary criteria utilized to determine the rehabilitation or replacement of sewer assets is the structural integrity of the assets based upon the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP) ratings. The sewer interventions mentioned in this project planning document are on combined sewers and these sewers will remain combined sewers at the conclusion of these project.

Work planned for Fiscal Year 2025 through Fiscal Year 2028 capital expenditure is derived from the assessments/evaluations performed in various City of Detroit neighborhoods. This project contains work within Detroit City Council Districts 1, 2, 4, 5, 6, and 7. It is anticipated that construction will commence in February 2026 and be completed by June 2028.

Project Status

Closed-Circuit Television (CCTV) and manhole inspections are currently being performed by an inspection company through an existing DWSD contract. 18% of CCTV inspections have been completed in the project area in addition to 174 manhole inspections. Some preliminary intervention recommendations have been provided to DWSD by its engineering consultant, AECOM. The available CCTV data collected to-date in the last 6 months for the project area indicates that 50% of all CCTV captured contains defects eligible for funding. This is higher than past DWSD condition assessments, however, these have high risk values. As the total footage is 338,000 feet in the project and the average cost per foot of rehabilitations was available based upon analyzed historical data, it was possible to extrapolate estimated repairs and costs from the available data.

Loan-Eligible Repairs

Typically, only repairs to address defects that had a NASSCO structural rating of either Significant (Grade 4) or Most Significant (Grade 5) are eligible for funding using a loan from Michigan's Department of Environment, Great Lakes, and Energy (EGLE) State Revolving Fund (SRF). However, DWSD has identified some additional repairs for defects with a structural rating of Moderate (Grade 3) which are also eligible for loan funding. EGLE has previously approved loan funding for this category of repair. For NASSCO Grade 4 and 5 as well as Grade 3 with Extenuating Circumstances, 37,584 feet of sewer collection main repair ranging in size from 8-inch through 156-inch in diameter and 65 manhole repairs appear to meet these criteria. This work includes interventions such as cured-in-place lining (CIPP), trenchless point repairs, external point repairs, full section replacements, pointing of brick sewers, structural spray lining, benching and channel reconstruction, and cementitious lining of manholes but does not include any type of specialized cleaning. The total estimated cost of these repairs is approximately $17,079,000.

Secondly, due to the progressing nature of the inspections, DWSD can forecast the cost to rehabilitate pipes currently being inspected. Based on the rate of eligible defects found per inspected foot, DWSD was able to extrapolate the cost of repairs for the entire project area. Based on these facts, DWSD anticipates the loan eligible cost for these uninspected small diameter assets ranging between 6-inches and 34-inches to be approximately $24,821,000.

Taken as a whole, these two cases make up the total cost of eligible repairs of this project to be $41,900,000.

Study Area and Project Zone

The locations of the proposed project are provided in the map below (Figure 1). This project zone is based on assets that have been selected to be assessed through DWSD's Risk Analysis process. The risk model leverages existing data with level of service objectives to assign a risk value to each sewer segment. The risk associated with each segment is then used to guide condition assessment. Risk value is a product of the Likelihood of Failure (LOF) and Consequence of Failure (COF). LOF is a product of several different factors, including modeled NASSCO PACP scores, nearby demolitions, and nearby cave-ins.

In the current study area, a "low hanging fruit" methodology was used, where very high-risk assets that lie outside of neighborhoods anticipated to be assessed within the next several years are selected. For example, if the schedule for typical neighborhood-based assessment are A, B, and C for the next 5 years, and a single suspected high-risk asset lies in D, then under this methodology, the selected high-risk asset in D would be assessed.

Location

This project area includes assets in the following neighborhoods:

- Aviation Sub
- Barton-McFarland
- Belmont
- Bentler-Pickford
- Cadillac Community
- Carbon Works
- College Park
- Conner Creek Industrial
- Crary/St Mary's
- East Village
- Evergreen Lahser 7/8
- Evergreen-Outer Drive
- Fiskhorn
- Five Points
- Franklin Park
- Garden View
- Grand River-I96
- Grand River-St Mary's
- Grandmont
- Grandmont #1
- Greenfield-Grand River
- Harmony Village
- Hubbell-Lyndon
- Hubbell-Puritan
- Joy Community
- Joy-Schaefer
- Mack Avenue
- Marina District
- O'Hair Park
- Plymouth-Hubbell
- Plymouth-I96
- Rouge Park
- Schoolcraft-I96
- Southfield Plymouth
- State Fair
- Warren Ave Community
- Warrendale
- Waterworks Park
- We Care Community
- Weatherby
- Westwood Park
- Winship

Population

The population projections presented in the 2015 Water Master Plan Update report prepared by CDM/Smith for DWSD indicate a forecasted decline in population for the City of Detroit. The City of Detroit population is expected to decrease from 713,777 (2010 Census) to 613,709 by the year 2035. Per the U.S. Census website, the estimated population of Detroit is 620,376, as of July 1, 2022. The report also indicates a forecasted decline in the overall population in the DWSD service area in the suburban communities.

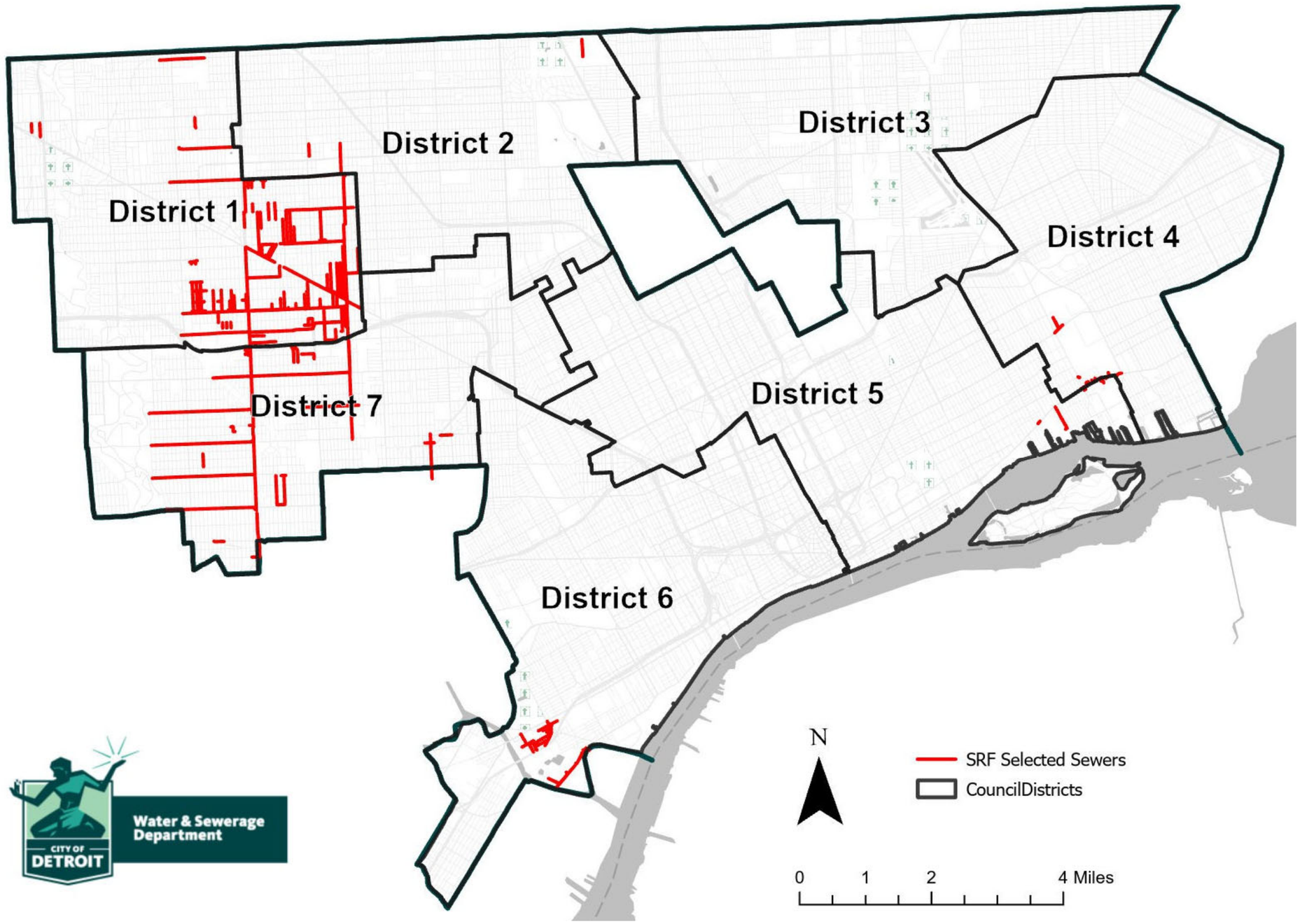

Figure 1 – Project Area

Existing Facilities

The collection system managed by DWSD consists of approximately 2,819 miles of pipe, of which nearly 15 percent have been rehabilitated or reconstructed by lining. 2,424 miles of Detroit's sewers were constructed prior to the 1940s. This infrastructure has an average age of 95 years. Cementitious material represents the largest portion of inventory. The number of reports for sinkholes and cave-ins associated with defects in the sewer infrastructure has averaged about 200 per year over the last 5 years. The structural condition of this infrastructure requires significant rehabilitation to prevent even more costly repairs and claims due to possible collapses.

There are approximately 64 miles of pipe in the Project neighborhoods in total ranging in size from 6-inch to 180-inch. This planning document includes discussion for rehabilitation of 29 miles of pipe. Of these 29 miles, pipe material can include brick, cast iron, CIPP lined, concrete, crock, Polyvinyl Chloride (PVC), reinforced concrete, steel, and vitrified clay. Additionally, some pipe material is unknown as DWSD has no reliable record of installation or inspection. Figure 2 identifies assumed pipe mileage by material type in the project. Project pipe material mileage was derived using information available from inspections and as-built information. This information has varying levels of confidence based on the source of the information. Once condition assessment is complete, the pipe material mileage may be adjusted.

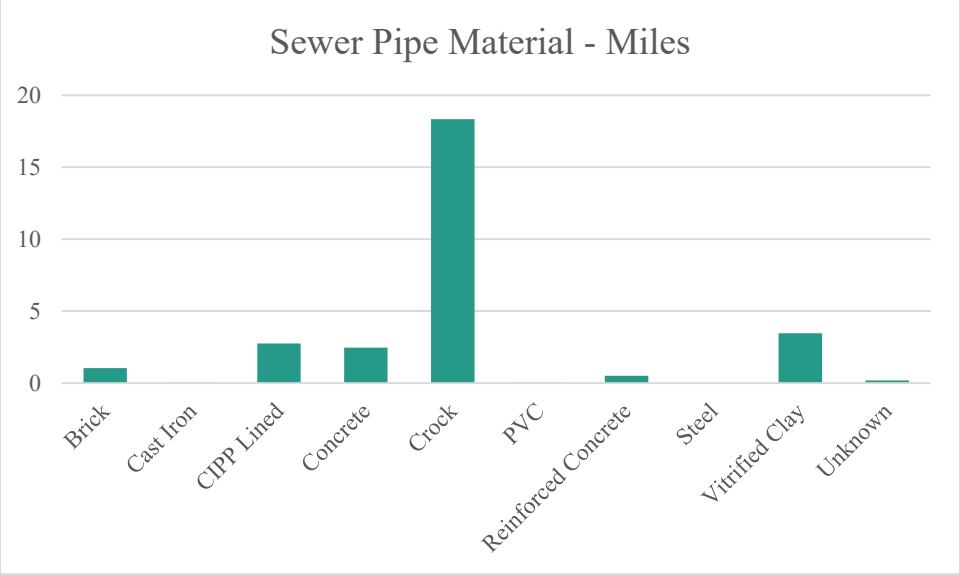

Figure 2 – Pipe Mileage by Material

Project Need

As a result of the CCTV and manhole inspection performed to-date, multiple defects requiring intervention have been identified. The primary structural defects encountered are fractures (spiral, hinge, longitudinal and circumferential), holes, continuous cracks, voids, and deformation. Some of the defects have a NASSCO structural rating of either Significant (Grade 4) or Most Significant (Grade 5). Additionally, some defects are Moderate (Grade 3) with conditions that enhance the eligibility of the defect and associated repair. To avoid sinkholes, back-ups in buildings and disruption to customers, it is recommended that interventions be made to prevent asset failure. Furthermore, based on the average age of the infrastructure at 95 years, the observed condition, and the risk to public health, it is felt that the selected pipes and manholes are defensible candidates for intervention.

Case 1 – Inspected DWSD Assets with NASSCO Structural Defects

Eighteen percent (18%) of the pipes televised to date have surveys adequate to assess condition. Of these pipes, 71% have defects requiring intervention. These defects are categorized as NASSCO structural rating of Grade 3 with extenuating circumstances, Grade 4, or Grade 5. An example of one of these (a deformation with a Grade 5 structural rating) is shown in Figure 3. A significant crack in a manhole is shown in Figure 4.

Some defects have a NASSCO structural rating of Moderate (Grade 3) but qualify as fundable based upon the eligibility types shown in Table 1 below. EGLE has previously accepted these repairs as fundable with these same definitions and process of identification. These repairs are included in Appendix D.

Table 1 – NASSCO Grade 3 Defects with Additional Eligibility Criteria Definition

Eligibility Type	Definition
Contiguous	A repair between two repairs that score either a 4 or 5 NASSCO grade AND the defect has a NASSCO score of 3.
Downstream Criticality	Downstream of a repair that scores either a 4 or 5 NASSCO grade AND the defect has a NASSCO score of 3.
Extreme Age	Pipe was installed prior to 1920 AND the defect has a NASSCO score of 3.
High Consequence of Failure	Pipe has a high consequence of Failure AND the defect has a NASSCO score of 3.
Large	Large diameter (30” or larger) critical assets AND the defect has a NASSCO score of 3.

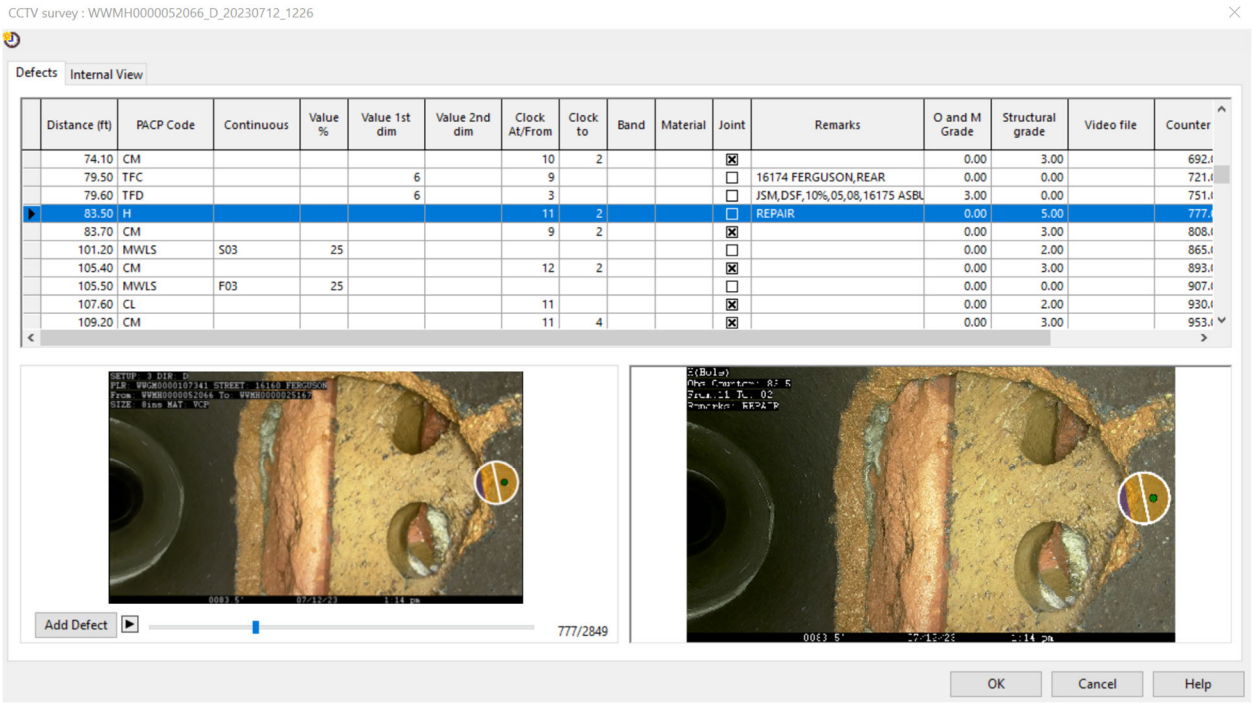

Figure 3 – Sample CCTV Data from a Pipe in the Project Area

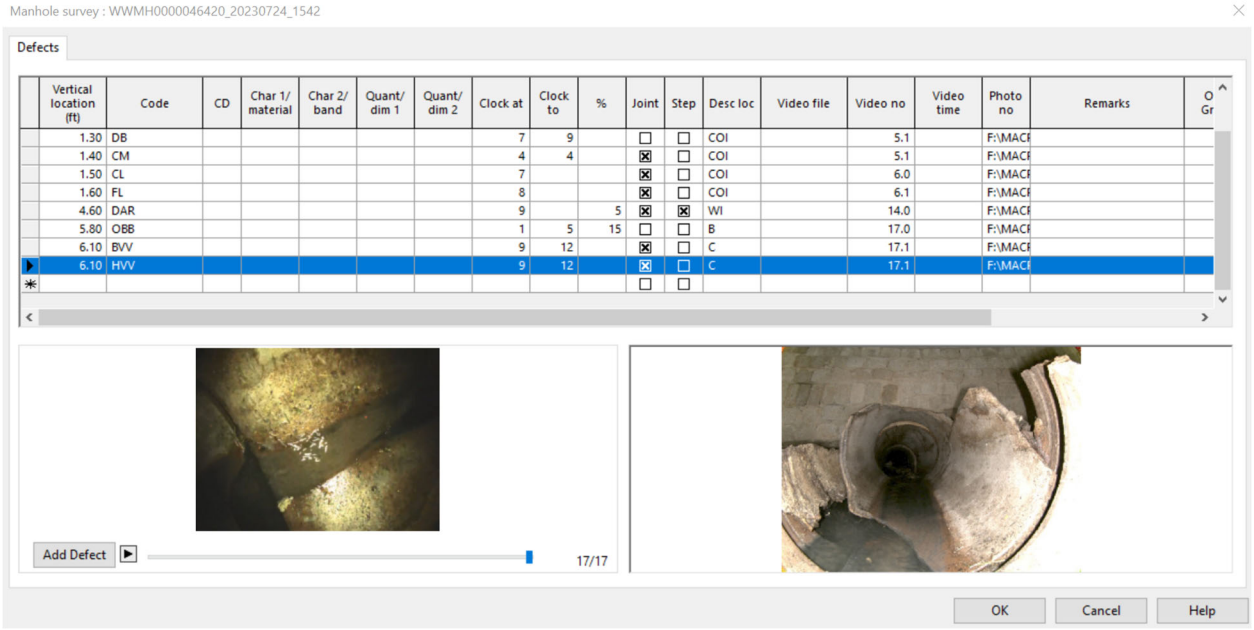

Figure 4 – Sample Manhole Defect from a Manhole in the Project Area

Case 2 – Extrapolated Eligible Structural Defects Using Project-Specific Inspection Trends

DWSD is continuing to perform condition assessment work on these assets that were selected using DWSD's Risk Analysis process. In that condition assessment project, the sewers with the highest overall risk value (not the highest risk-value neighborhoods) were selected. For these pipes, DWSD's COF score can be as high as 7.69 out of 10, and LOF score can be as high as 6.2 out of 10. A full listing of COF and LOF scores are included using EGLE's submission template in Appendix D.

The inspection of small-diameter pipes (less than 36 inches) in the project is currently 39% complete. The currently available PACP data available indicates an average percentage of CCTV with repairs eligible for funding as 70% as shown in Table 2. This is reasonable as the pipes selected have a high-risk value. Additionally, these assets are similar in age, materials, and conditions as the assessed assets. Since there is a large amount of existing data to support this extrapolation, DWSD is requesting SRF loans for rehabilitation of only these small diameter pipes.

The inspection of large-diameter pipes (more than or equal to 36 inches) in the project is currently 4% complete. The currently available PACP data indicates an average percentage of CCTV with repairs eligible for funding as 35% as shown in Table 2. These pipes will also generally have a higher COF, as the diameter of the pipe is a key consideration. A larger diameter pipe will serve a larger area with a larger number of customers and a larger amount of total upstream mileage.

Table 2 – Extrapolation of Eligible Defects Broken Down by Small/Large Diameter

Category	Total Accepted CCTV Footage (LF)	CCTV Footage with Eligible Defects (LF)	Percentage Eligible Defects
Completed Inspections:			
Total Small Diameter (<36")	53,421	37,517	70%
Total Large Diameter (>=36")	8,504	2,940	35%
When Inspections Complete:			
Total Project Area Small Diameter	147,729	103,410	70%
Total Project Area Large Diameter	190,156	66,554	35%

Alternatives Analysis

There are three options for addressing the problems associated with aged sewer mains. DWSD has the following three options to address old, damaged, and underperforming assets: continue to conduct repairs on an ad-hoc and as-needed basis, target a plan of replacement and/or rehabilitation, or replace using industry standard open-cut replacement. As a part of targeted rehabilitation, cured-in-place pipe (CIPP) lining of a majority of sewer main will be incorporated.

Alternative 1 – Repair of Existing Sewer Mains

Sewer main repair is conducted throughout the system, particularly in those areas where problems have not escalated to the point which would warrant replacement. Nevertheless, sewer main repairs are time consuming, costly, constitute a drain on DWSD resources needed to carry out the repairs, and pose a potential increase in public health risk. Sewer main repairs can require shutting off sewer service to multiple customers while the defect is repaired and returned to service. Repair activities cannot be pre-scheduled, and field crews must respond on an "as needed" basis at any time of year. As typically only point repairs are performed during emergency repairs, other locations along the same pipe may also be at risk of failure but are not repaired. Hence this alternative should not be considered as a viable alternative.

Alternative 2 – Sewer Main Selected Replacement and/or Rehabilitation

Sewer main replacement/rehabilitation of aged sewer main pipes is based on the criteria described under **Project Need**. The replacement pipe is sized to meet the service area needs, which may in some cases result in an increase of pipe size, depending on the changes in flow, customer base, including commercial, business, and residential demographics. Rehabilitation of aged sewer mains also provides for the use of CIPP lining, which is considered superior because it has an expected useful life greater than that of damaged vitrified clay pipe and deteriorated concrete pipe and can be installed by trenchless means.

In addition to full replacement and full rehabilitation through CIPP lining, both external and trenchless point repairs are recommended as appropriate if the defects are localized and the remainder of the pipe is in generally good condition.

Alternative 3 – Sewer Main Replacement Only

Full sewer main replacement of aged sewer main pipes is based on the criteria described under Project Need. The replacement pipe is sized to meet the service area needs, which may in some cases result in an increase of pipe size, depending on the changes in flow, customer base, including commercial, business, and residential demographics. This methodology suggests standard open-cut replacement of mains and not rehabilitation of the mains using trenchless methodologies such as CIPP lining. Alternative 3 may be considered extreme but represents a viable alternative.

Selected Alternative

Based upon the alternative that can be most easily implemented with the least disruption to the utility and the rate payers, and the cost analysis that will be discussed below, **Alternative 2 – Sewer Main Selected Replacement and/or Rehabilitation** is the recommended alternative.

Proposed Project

Cost Summary – Alternative 2 – Sewer Main Selected Replacement and/or Rehabilitation

Case 1 – Inspected DWSD Assets with NASSCO Structural Defects

From the assessments/evaluations on these selected assets, AECOM has recommended to DWSD the rehabilitation or replacement of approximately 37,585 feet of sewer collection mains ranging in size from 6-inch through 180-inch in diameter in addition to 65 manhole repairs. This work includes interventions such as cured-in-place lining (CIPP), trenchless point repairs, external point repairs, full section replacements, pointing of brick sewers, structural spray lining, benching and channel reconstruction, and cementitious lining of manholes.

The total estimated cost of these repairs is approximately $17,078,974. Maps of each proposed improvement for the project are included in Appendix D. As design is commencing on this project and hydraulic modeling results are being reviewed, it is possible that some upsizing of pipes may be recommended that would increase these costs. Rehabilitation and replacement cost estimates have been developed, based on previous work completed to date. The pre-design total capital cost estimates and costs with contingencies for pipes and manholes as shown in Table 3.

Table 3 – Cost Summary – Case 1, Alternative 2 – Total Loan Eligible Project Interventions

Intervention	Type	Asset	Quantity (EA)	Length (LF)	Estimated Cost
External Point Repair	Structural	Pipe		400	$861,540
CIPP Lining	Structural	Pipe		30,306	$6,798,911
TPR-Rehabilitation	Structural	Pipe		37	$107,491
TPR-Liner	Structural	Pipe		31	$67,445
Full Segment Replacement	Structural	Pipe		6,810	$4,847,377
Manhole Replacement	Structural	Manhole	4		$68,120
Chimney Replacement	Structural	Manhole	32		$108,992
General and/or Spot Repairs	Structural	Manhole	22		$33,510
Benching and Channel Reconstruction	Structural	Manhole	1		$2,000
Structural Spray Lining	Structural	Manhole	6		$43,230
Total Intervention Cost					$12,938,616
10% Contingency					$1,293,862
Sub-total					$14,232,478
20% Design Contingency					$2,846,496
Total				37,585	$17,078,974

Case 2 – Extrapolated Eligible Structural Defects Using Project-Specific Inspection Trends

The inspection of small-diameter pipes (less than 36 inches) in the project is currently over 39% complete. The current available PACP data indicates an average percentage of CCTV with repairs eligible for funding as 70% as shown in Table 4.

For these small diameter pipes, the total rehabilitation cost in Case 1 was about $10,614,919 for 53,241 feet of inspected pipe and manholes. This means for every foot of pipe inspected, $199 worth of eligible repairs is expected to be found in DWSD's system for pipes of this diameter and similar risk category. See Table 4 below.

The remaining length of inspection of the small diameter of selected assets is 94,489. Based on the previously calculated Unit Repair Cost for Inspection, this results for the entire project a total cost of $18,838,785.

Table 4 – Case 2, Alternative 2 – Calculation of Cost per Inspected Foot

Description	Quantity of CCTV	No. of Pipes	Total Footage (LF)	Hit-Rate	Repair Cost Case 1 Alternative 2	Unit Repair Cost per Inspected LF
CCTV Inspections	223	205	53,241			
CCTV Inspections with Repairs Eligible for SRF	143	128	37,517	70%	$10,614,919	$199

As Table 5 shows, the available data indicates that the cost per foot to repair the Grade 4 or 5 and eligible Grade 3 defects for Case 1 is estimated to be approximately $344.25 per foot. This includes manhole repair costs. These repairs are for pipes with diameters of 6 inches to 125 inches.

In Case 2 the diameters range from between 6 inches to 180 inches based on DWSD as-built data and records. As the total footage is 94,489 feet in Case 2 and the cost per foot is available based upon the analyzed data in Case 1, it is possible to extrapolate estimated repairs and costs from the available data. As some pipes are smaller in diameter from Case 1, the cost per foot decreased to $284.29. Hence, for an estimated 66,142 feet of repairs with diameter ranging between 6-inches and 34-inches the cost can be extrapolated as shown in Table 6. Cost with contingencies can be found in Table 7.

Table 5 – Cost Summary – Case 2, Alternative 2 – Total Loan Eligible Project Interventions

	Total Televised Footage (LF)	Actual Repair Footage of Just Eligible Structural Interventions (LF)	Diameter range of Repaired Pipes (Inches)	Cost per Foot	Estimated Repair Cost
Case 1	61,745	37,585	6-156	$344.25	$12,938,616
Case 2	94,489	66,142	6-34	$284.29	$18,803,255

Table 6 – Cost Summary – Case 2, Alternative 2 – Total Loan Eligible Project Interventions

Intervention	Estimated Cost
Total Estimated Intervention Cost	$18,803,255
10% Contingency	$1,880,325
Sub-total	$20,683,581
20% Design Contingency	$4,136,716
Total	$24,820,297

The total cost of Alternative 2 for both Cases is shown below in Table 7.

Table 7 – Cost Summary – Alternative 2 – Total Loan Eligible Project Interventions

	Case 1	Case 2	Total
Total Estimated Eligible Intervention Cost	$12,938,616	$18,803,255	$31,741,872
10% Contingency	$1,293,862	$1,880,326	$3,174,187
Sub-total	$14,232,478	$20,683,581	$34,916,059
20% Design Contingency	$2,846,496	$4,136,716	$6,983,212
Total	$17,078,974	$24,820,297	$41,899,271

Cost Summary – Alternative 3 – Full Replacement

Case 1 – Inspected DWSD Assets with NASSCO Structural Defects

To illustrate the expected increase in cost if full replacement (Alternative 3) is assumed instead of rehabilitation (Alternative 2) of pipes using trenchless methodologies, Table 8 was developed. The CIPP and TPR lining items have been removed and full replacement and EPR quantities have been increased accordingly. As shown, the costs for Alternative 3 are significantly higher than those for Alternative 2.

Table 8 – Cost Summary – Case 1, Alternative 3 – Total Loan Eligible Project Interventions

Intervention	Type	Asset	Count	Length	Estimated Cost
External Point Repair	Structural	Pipe		468	$1,008,002
Full Segment Replacement	Structural	Pipe		37,117	$26,389,917
Manhole Replacement	Structural	Manhole	4		$68,120
Chimney Replacement	Structural	Manhole	32		$108,992
General and/or Spot Repairs	Structural	Manhole	22		$33,510
Benching and Channel Reconstruction	Structural	Manhole	1		$2,000
Structural Spray Lining	Structural	Manhole	6		$43,230
Total Intervention Cost					$27,653,771
10% Contingency					$2,765,377
Sub-total					$30,419,148
20% Design Contingency					$6,083,830
Total				37,585	$36,502,977

Case 2 – Extrapolated Eligible Structural Defects Using Project-Specific Inspection Trends

Case 2 will also be analyzed for full replacement (Alternative 3) for the sake of completeness and use in the monetary evaluation below. The increase in cost in Case 1 between Alternative 2 and Alternative 3 is 213%. Using this same percentage increase applied to Case 2 Alternative 2 results in the cost for Alternative 3, which will have a similar type of work since it belongs in the same risk category. The results are presented in Table 9 below.

Table 9 – Cost Summary – Case 2, Alternative 3 – Total Loan Eligible Project Interventions

Intervention	Estimated Cost
Total Intervention Cost	$40,306,771
10% Contingency	$4,030,677
Sub-total	$44,337,448
20% Design Contingency	$8,867,490
Total	$53,204,938

Monetary Evaluation of Alternative 2 and 3

A monetary evaluation of the feasible alternatives, Alternatives 2 and 3 was prepared using EGLE guidelines for SRF project planning, including the present worth formulas and discount interest rate of 1.0%. Under this analysis, the useful life is assumed to be 50 years for pipelines. The salvage value of pipes at the end of the 20 or 30-year planning period was computed based on straight-line depreciation over the useful life of the item. Therefore, the salvage value of the pipes at the end of the 20 or 30-year planning period is estimated to be 60% or 40%, respectively, of the initial cost.

The present worth of salvage value was then computed by multiplying the salvage at the end of the 20 or 30 years by the conversion factor 0.8195 or 0.7419, respectively, based on the following formula:
$PW = F \times 1/(1 + i)^n$,

Where:
PW = Present Worth (Salvage)
F = Future Value (Salvage)
i = Discount Interest Rate (1.0%)
n = Number of Years (20 or 30)
$1/(1 + i)^n$ = Conversion Factor

Interest during the construction period was computed using the formula:
$I = i \times 0.5 \times P \times C$

Where:
I = Interest Value
i = Discount Interest Rate (1.0%)
P = Period of Construction in Years (assumed to be two years)
C = Capital Cost of the Project

For each of Alternatives 2 and 3, the total Present Worth was computed from the estimated cost (including construction, engineering, and administrative costs), salvage value, and interest during construction. This equates to the amount which would be needed at the start of the project to cover design and construction costs over the 20 or 30-year planning period if interest were to accrue at the discount rate of 1.0% annually.
The Present Worth of each alternative was then converted to an Equivalent Annual Cost, which is the amount which would be paid uniformly over a 20 or 30-year period based on the Present Worth value. This amount was obtained by the using the following formula:
$A = PW \times [(i(1 + i)^n)/((1 + i)^n - 1)]$

Where:
A = Equivalent Annual Cost
PW = Present Worth
i = Discount Interest Rate (1.0%)
n = Number of Years (20 or 30)
$[(i(1 + i)^n)/((1 + i)^n - 1)]$ = Capital Recovery Factor of 0.0554 (20-year) or 0.0387 (30-year)

The cost-effective analysis and present worth determination for Alternatives 2 and 3 for the project is presented in Table 10. From the equivalent annual cost below, Alternative 2 minimizes the impact to the users more than does Alternative 3.

Table 10 – Cost Effective Analysis/Present Worth Determination – Project Loan Eligible

	Project Alternative 2 **Rehabilitation/Limited Section Replacement for Loan Eligible Repairs**	**Project Alternative 3** **Full Replacement for Loan Eligible Repairs**	**Comments**
Initial Cost	$41,900,000	$89,708,000	
O&M Costs	$0	$0	
Replacement Costs	$0	$0	
Salvage Value for 50-Year Life	$15,608,597	$33,418,044	20-Year Analysis
Salvage Value for 50-Year Life	$9,420,173	$20,168,612	30-Year Analysis
Interest During Construction	$419,000	$1,345,620	2-Year Construction Period
Total Present Worth	$26,710,403	$57,187,036	20-Year Analysis
Total Present Worth	$33,108,327	$70,885,008	30-Year Analysis
Equivalent Annual Cost	**$1,480,165**	**$3,169,036**	20-Year Analysis
Equivalent Annual Cost	**$1,282,885**	**$2,746,660**	30-Year Analysis

Total Cost and Loan-Eligible Cost for Project, Alternative 2
From Table 7 above, the combined total loan eligible cost for Alternative 2 for the project is $41,900,000, rounded to the nearest thousand dollars.

Alternative 2 is recommended and DWSD anticipates paying for the entire project Alternative 2 with SRF loan for the loan eligible portion.

User Cost

Repayment of the SRF loan through annual debt retirement payments will impact the residential customer rates resulting in increased user costs. The annualized equivalent costs for the loan eligible portions of the project come to $1,490,165 under a 20-year analysis and $1,282,885 under a 30-year analysis.

This impact to customer rates is generally determined by dividing the additional expenses among the users in the service area as summarized in Table 11. The annualized cost of the loan eligible portion of the project was calculated using the capital recovery factor 0.0554 (20-year) or 0.0387 (30-year) following formula:
$A = PW \times [(i(1 + i)n)/((1 + i)n – 1)]$

Where:
A = Equivalent Annual Cost
PW = Present Worth
i = Interest Rate through SRF Loan (1.0%)
n = Number of Years (20 or 30)
$[(i(1 + i)n)/((1 + i)n – 1)]$ = Capital Recovery Factor

Table 11 – Loan Eligible User Cost Impact for Alternative 2 (Sewer Rehabilitation/Limited Replacement)

Item	Sewer Rehabilitation/Limited Replacement	
	20-Year Analysis	**30-Year Analysis**
Total Cost of Project	$41,900,000	$41,900,000
Annualized Cost of Project (Assuming SRF interest rate 1.0%)	$1,491,775	$1,282,885
Number of User Accounts (households) in City of Detroit	178,791	
Average Sewage Disposal Based upon Water Consumption per Household (industry average)	7,333 gallons/month (approx. 980 ft^3/month)	
Current DWSD Sewage Disposal Rate	$5.712 per 100 ft^3	
Current Estimated Monthly DWSD Sewage Disposal Rate per Household	$55.98	
Current Estimated Annual DWSD Sewage Disposal Rate per Household	$671.73	
Estimated Increase in Cost per Household (Year 1)	$8.34	$7.18
Proposed Estimated Annual DWSD Sewage Disposal Rate per Household (Year 1)	$680.07	$678.91
Proposed Percent Increase in Cost per Household per Year	1.24%	1.07%

Non-Monetary Evaluation of Alternative 2 and 3

The result of constructing either Alternative 2 or 3 will provide the end user with the same level of service. Constructing Alternative 2 (Rehabilitation/Limited Replacement) can achieve that level of service more efficiently and with the least disruption to the user, natural or cultural features and the environment by the extensive use of trenchless technologies for much of the piping work. Rehabilitating manholes will also be less disruptive as opposed to excavations required for replacement. By use of trenchless technologies, restoration of the visible landscape is also minimized. It is also anticipated that Alternative 2 can be constructed in a shorter period than Alternative 3.

Disadvantaged Community Status

The SRF program includes provisions for qualifying the applicant community as a disadvantaged community. The benefits for communities with a population of 10,000 or more that quality for the disadvantaged community status consist of:

- Award of 50 additional priority points.
- Possible extension of the loan term to 30 years or the useful life of the components funded, whichever is earlier. The estimated useful life of the sewer rehabilitation/limited replacement is 50 years. DWSD is aware that the SRF program offers both 20- and 30-year loan terms and will evaluate which term is the most appropriate for DWSD and its customers.

EGLE requires submittal of a Disadvantaged Community Status Determination Worksheet to determine if the community qualifies for this status. A completed worksheet will be included in the final plan.

Environmental Preview / Review

The environmental setting for the proposed project is within the city limits and will be done in local urban neighborhoods. There is minimal environmental impact as most work will occur within the public right-of-way, where multiple utilities and infrastructure already exist. This work includes interventions such as cured-in-place lining (CIPP), trenchless point repairs, external point repairs, full section replacements, pointing of brick sewers, and cementitious lining of manholes and specialized cleaning. Trenchless technologies will be used extensively on much of this project. The proposed project will not detrimentally affect the water quality of the area, air quality, wetlands, endangered species, wild and scenic rivers, or unique agricultural lands.

The anticipated environmental impacts resulting from implementing the recommendations of this project planning document include beneficial and adverse; short and long-term; and irreversible and irretrievable. The following is a brief discussion of the anticipated environmental impacts of the selected alternative.

Beneficial and Adverse

The proposed improvements will significantly improve DWSD's capability to operate a reliable sewer collection system, reducing sewer backups into homes, avoiding catastrophic sinkholes from sewer collapses, and increasing efficiency at Detroit WRRF. Implementation of the improvements will also generate construction-related jobs, and local contractors will have an opportunity to bid on contract work. Most of the work to be constructed with this project will be performed by use of trenchless technologies, minimizing disruption to the existing natural and cultural features, and to the end users.

Noise and dust will be generated during construction of the proposed improvements. The contractor will be required to implement efforts to minimize noise, dust, and related temporary construction byproducts. Street congestion and disruption of vehicular movement may occur for short periods of time on the roads where work is actively being done. For work resulting in the need to have open trenches, and spoils from open trenches will be subject to erosion; the contractor will thereby be required to implement a Soil Erosion and Sedimentation Control (SESC) Program as described and regulated under Michigan’s Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act (NREPA). Underground utility service inside the project area may be interrupted occasionally for short periods of time. The aesthetics of the area will be temporarily affected until restoration is complete.

Short and Long Term

The short-term adverse impacts associated with construction activities will be minimal, and will be mitigated, in comparison to the resulting long-term beneficial impacts. Short-term impacts include traffic disruption, dust, noise, and site aesthetics. No adverse long-term impacts are anticipated.

Irreversible and Irretrievable

The impact of the proposed project on irreversible and irretrievable commitment of resources includes materials utilized during construction and fossil fuels utilized to implement project construction.

Other Impacts or Concerns

Direct Impacts

Construction of the proposed project is not expected to have an adverse effect on historical, archaeological, geographic or cultural areas, as the construction activities will occur underground and will require minimal disturbance of the project area soils due to much of the work being performed by use of trenchless technologies. The proposed project will not detrimentally affect the water quality of the area, air quality, wetlands, endangered species, wild and scenic rivers or unique agricultural lands. The construction activities associated with this project will not permanently impact the visible landscape.

User Rates

As discussed above, the impact of financing project Alternative 2 through the SRF loan program is expected to increase by no more than 1.24% the cost of sewer disposal to a typical City of Detroit customer due to the impact of construction cost. However, the actual rate determination will be based on factors that encompass the delivery of comprehensive services by DWSD to its customers. The increase is based on repayment of the SRF loan over a 20-year period.

Indirect Impacts

It is not anticipated that DWSD's proposed improvements to the sewer collection system will alter the ongoing pattern of growth and development in the study area as these neighborhoods are fully developed. Growth patterns in the service area are subject to local use and zoning plans, thus providing further opportunity to minimize indirect impacts.

Cumulative Impacts

Improved reliability, efficiency, and the ability to safely convey storm water and sanitary flows to the WRRF are the primary cumulative beneficial impacts anticipated from the implementation of the proposed project.

Mitigation

Where adverse impacts cannot be avoided, mitigation methods will be implemented. Mitigating measures for the project such as soil erosion control, if required, will be utilized as necessary and in accordance with applicable laws. Details will be further specified in the construction contract documents used for the project.

Mitigation of Short-Term Impacts

Short-term impacts due to construction activities such as noise, dust and minor traffic disruption cannot be avoided. However, efforts will be made to minimize the adverse impacts by use of thorough design and well-planned construction sequencing. Noise from equipment cannot be avoided, but hours of work can be controlled. Dust and soil deposits on the streets can be controlled through watering and construction area sweeping. Construction area footprints will be minimized, and traffic control measures can be utilized. Site restoration will minimize the adverse impacts of construction, and adherence to the Soil Erosion and Sedimentation Act will minimize the impacts due to disturbance of the soil structure, if such disturbance is found to be necessary. Specific techniques will be specified in the construction contract documents.

Mitigation of Long-Term Impacts

Adverse long-term impacts due to the proposed project are not anticipated. The aesthetic impacts of construction within the boundaries of the project area will be mitigated by site restoration.

Mitigation of Indirect Impacts

In general, it is not anticipated that mitigative measures to address indirect impacts will be necessary for the recommended improvements addressed in this project planning document. The proposed improvements are located within the project area, so they do not promote growth in areas not currently served by DWSD. Therefore, indirect impacts are not likely to be a concern for these improvements.

Public Involvement

A public meeting will be scheduled to allow the public the opportunity to generate a better understanding and to address any concerns regarding this plan. As a requirement of the CWSRF funding EGLE guidelines, DWSD will invite the public to gain information and raise any concerns regarding this project planning document.

Public Hearing Advertisement and Notice

A notice will be published no less than 15 days in advance to alert parties interested in this project planning document and request input at a public hearing prior to its adoption. In addition, a notification will be sent to the potentially interested local and federal agencies. This notice includes an invitation to comment.

Public Hearing Transcript

A formal public hearing on the draft project planning document will be held before the DWSD Board of Water Commissioners at 2:00 PM on February 21, 2024, at the Detroit Water Board Building, located at 735 Randolph, Detroit, MI 48226. The public may also attend the meeting virtually. The hearing will include a presentation on the project, as well as an opportunity for public comment.

Public Hearing Comments Received and Answered

Comments from the public during the Public Hearing will be addressed and answered by the project team.

Adoption of the Project Planning Document

Upon approval and certification of resolution by the DWSD Board of Water Commissioners, the GLWA Board of Water Commissioners will certify a resolution at its regular monthly meeting on April 24, 2024, authorizing GLWA to proceed with official filing of the project planning document for purposes of securing low interest loan assistance under the SRF Program. Executed copies of both Boards of Water Commissioners' Resolutions and certifications for the project planning document will be provided with the submission.

Appendices

Appendix A – Submittal Form, Self-Certification Form, Disadvantaged Community Status Determination Worksheet, Board Resolutions, SRF Scoring Form

Appendix B – Public Hearing Notice, Mailing List for Public Hearing, Publication Affidavits, Public Hearing Transcript, Visual Aids, Attendance List

Appendix C – Project Planning Document Correspondence

Appendix D – Lists of Repairs and Inspections