

## HAMLET OF ROLLA SEWER COLLECTION SYSTEM CONDITION ASSESSMENT





## HAMLET OF ROLLA SEWER COLLECTION SYSTEM CONDITION ASSESSMENT NOVEMBER 2021 FINAL REPORT

RECORD OF ISSUES AND REVISIONS							
R	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED		
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### TABLE OF CONTENT

1. INTRODUCTION 3
1.1 SCOPE OF WORK
1.2 DESCRIPTION OF FACILITIES
1.3 REPORT LIMITATIONS
2.0 ASSESSMENT RESULTS
2.1 MANHOLES 6
2.1.1 Operation and Maintenance (O&M)
2.1.2 Structural and Physical Condition
2.1.3 Manhole Repairs Recommendations
2.2 PIPELINES 9
2.2.1 Operation and Maintenance (O&M)9
2.2.2 Structural and Physical Condition
2.2.3 Infiltration
2.2.3    Infiltration
2.2.3    Infiltration
2.2.3    Infiltration    10      2.2.4    Surcharges    11      2.2.5 Pipes Corrective actions Recommendations    11      Hydraulic and/or Special cleaning    11
2.2.3    Infiltration    10      2.2.4    Surcharges    11      2.2.5    Pipes Corrective actions Recommendations    11      Hydraulic and/or Special cleaning    11      Pipes Repair Recommendations    12



## LIST OF FIGURES

Figure 1:Manhole inspection in Rolla Hamlet	4
Figure 2 : Manhole	6
Figure 3 : Recommendations costs by Timeframe	. 16

### LIST OF TABLES

Table 1. Hamlet of Rolla Sewer Collection System	3
Table 2. Hamlet of Rolla Sewer Manholes O&M Grade	6
Table 3. Hamlet of Rolla Sewer Manholes Physical Grade	7
Table 4. Hamlet of Rolla Manhole Repair Recommendations	8
Table 5. Hamlet of Rolla Sewer Pipes 0&M Grade	9
Table 6. Summary of main defects	10
Table 7. Hamlet of Rolla Sewer Pipes 0&M Grade	10
Table 8. Summary of main defects	10
Table 9. Summary of main defects	11
Table 10. Hamlet of Rolla Pipes repairs Recommendations	12
Table 11 : Summary table of recommendations	14



## 1. INTRODUCTION

#### 1.1 SCOPE OF WORK

Simo Management Inc. (Simo) was selected by Peace River Regional District (PRRD) to undertake a non-destructive and non- invasive field condition assessment and an overall operational structural evaluation of the Hamlet of Rolla Sewer Collection System to determine the remaining service life, and repair/replacement costs of any identified deficiencies.

This report summarizes the results found from the condition assessment of the Hamlet of Rolla Sewer Collection System. Assets reviewed include manholes and sewer lines as described in table 1.

Final recommendations are available in section 3.0.

#### 1.2 DESCRIPTION OF FACILITIES

The Rolla Sewer Collection System consists of a gravity collection system within the Hamlet Rolla Community, a lift station immediately upstream of the lagoons, a 1.0 hectare aerated lagoon and blower system, a 1.0 hectare storage lagoon, and an outfall to Rolla Creek.

The Rolla sewer treatment facility system was initially constructed in 1977. It was composed of a lift station, aerobic stabilization pond, and an effluent outfall which discharges into Rolla Creek. In 2002, a second lagoon was added including a fine bubble diffuser aeration system in the original lagoon.

The Rolla sewer collection system within the scope of this report includes:

Table 1. Hamlet of Rolla Sewer Collection System

INFRASTRUCTURE	DESCRIPTION
MANHOLES	33 Manholes and three cleanouts
SEWER LINES	3.5km collection pipeline of 200 mm SDR 35; 0.1km collection pipeline of 150 mm SDR 35; 1.25km collection pipeline of 200 mm SDR 35



#### 1.3 REPORT LIMITATIONS

The objective of this report is to supply a common sign of the current physical state of the sewer collection system. The following assumptions were considered:

- Estimated Useful Life is based on a sensible degree of continuous maintenance.
- Timeframes given for undertaking work represent our opinion on when to budget for the work. Variations of our estimate could happen in the case failure of the item, or the optimum repair/replacement process.
- Costs of replacement is based on our knowledge and experience but is subject to change depending on labor market, resources availability and projects peculiar constraints.
- We focused our recommendations on short to medium term action plans (1 to 5 years).
  We recommend re-assessments for longer term issues.
- Where measures where not used for assessing the condition of the assets, a knowledgebased evaluation was conducted using the available data from the district and interview with its operator.
- We used a condition-based similarity model to estimate remaining lifetime and not a statistical degradation model.

## 2.0 ASSESSMENT RESULTS

Between August 26th and August 28th, our team conducted a series of inspections at The Hamlet of Rolla Collection System with the assistance of Peace River Regional District operator.

Our crew employed a high-resolution Zoom Camera to check the pipes, valves, shut-offs, and cleanouts for wall structural integrity and sewage leaks.

A number of manholes were buried, necessitating the use of an excavator to dig them out.

Following the inspection of the pipes and manholes, PACP/MACP certified viewers reviewed and graded the inspection videos. This report and appendices include listings of defects encountered during inspections, according to PACP/MACP terminology.



Figure 1:Manhole inspection in Rolla Hamlet



The following information is provided:

- Observed manhole defects categorized according to physical condition and operation and maintenance (O&M) grades from MACP v 7.
- Pipe defects categorized according to internal structural condition and O&M grades from PACP v 7.
- > Infiltration/inflow sources observed at each manhole and pipe by type of defect
- Manholes and pipes requiring hydraulic and/or special cleaning (grease, roots, incrustations, debris, etc.)
- > Manholes and sections requiring repairs
- > Printed photos of major defects observed during the inspection of pipes

This report also includes color-coded maps illustrating:

- > Manholes and pipes inspected
- > Manholes and pipes O&M Condition
- > Manholes and pipes structural Condition
- > Pipes required hydraulic and/or special cleaning

The condition assessment is designed to provide prioritized lists of defects intended to assist the district in the development of a proactive operations and maintenance program, and to define where capital improvement spending may be required. Compared to classical CCTV inspection, this allows to narrowing the scope of flushing activities by identifying the pipes and manholes in excellent condition (not requiring cleaning) and those that have a very poor physical condition and requires repairs instead of cleaning.

All our camera inspections of manholes and pipes were carried out at ground level. The information contained in this report such as diameters, type of pipe, section lengths, etc. was taken directly from the files furnished by the District and were complemented by measurements performed by our field crews.

Table 2.	Hamlet	of Rolla	Summar	v ins	pections
			,		

Site	Hamlet Rolla
Type of the collection system:	Sanitary
Total number of sections inspected:	43
Number of manholes inspected :	36
Date of Survey:	August 26th to 28th

SIMO

The zoom inspection was carried out in the Hamlet in order to assess the sanitary sewer condition. Therefore, 36 manholes and 43 pipes were inspected. The inspected manholes and pipes inventories are presented respectively in Appendix 1 and Appendix 2.

The attached report summarizes our findings of the O&M and structural condition, as well as infiltration/inflow (I/I) found in The Hamlet. We have also summarized our recommendations for cleaning, CCTV-inspection, and manhole intervention. The following paragraphs contain the details of all these items.

#### 2.1 MANHOLES

To determine a maintenance priority list, the manholes were graded according to their O&M, Structural and Physical defects. To do so, a grade from 1 to 5 was assigned (according to MACP v 7) to each identified defect.

#### 2.1.1 Operation and Maintenance (O&M)

From an operation and maintenance standpoint, the inspection results confirmed that the inspected manholes are in good condition. Only 2 manholes (6%) have grades 4 and 5 0&M deficiencies.

A breakdown of the percentage of the manholes falling under each of the five (5) O&M defects is provided in the following tables.



Figure 2 : Manhole

Manholes							
O&M grade	5	4	3	2	1	Total	
Number of manholes	1	1	1	25	8	36	
%	2.7%	2.7%	2.7%	69.7%	22%	100%	

#### Table 2. Hamlet of Rolla Sewer Manholes O&M Grade



#### 2.1.2 Structural and Physical Condition

In order to determine intervention priorities, the manholes inspected by Simo's camera were graded in accordance with MACP coding procedures. Grade from 1 to 5 are allocated to each defect.

From a structural standpoint, the inspection confirmed that 17% (6) of the manholes are not in good condition (physical condition grade of 4 or 5). Nevertheless, the vast majority of the manholes inspected are in excellent condition, 80% (29 Mh ) of them was found with no significant deficiencies.

A breakdown of the percentage of the pipe and manholes falling under each of the five (5) structural and physical condition categories is provided in the following tables:

#### Table 3. Hamlet of Rolla Sewer Manholes Physical Grade

Manholes						
Physical condition grade	5	4	3	2	1	Total
Number of manholes	6	0	1	2	27	36
%	16.9%	0%	2.7%	5.4%	75%	100%

#### 2.1.3 Manhole Repairs Recommendations

As blocked collection systems can have serious repercussions, manholes and sections with O&M grades of 4 and 5 justify immediate maintenance to eliminate further consequences. In addition, all manholes and sections graded 3 should be scheduled for maintenance in a near future to avoid the amplification of blockage risks.

Manholes with physical condition grade 5-4 require a special attention and we recommend repairing any defects found and to reassess their physical condition in a near future to monitor the manholes' deterioration. Most of them have defect located near the surface. These manholes must be repaired in the near future to eliminate the risk of surface settlement or mining of the soil and further structural deterioration

All manholes grade 3 require a second inspection in medium-term (5 to 10 years).



#### Table 4. Hamlet of Rolla Manhole Repair Recommendations

Recommendations						
ltem	Repairs	Next Year	1-3 years	5- 10 years	Estimated Replacement Cost	Estimate Remaining Service Life
SMH-05					\$15,000.00	28.00
SMH-06					\$15,000.00	28.00
SMH-07					\$15,000.00	28.00
SMH-08					\$15,000.00	28.00
SMH-09					\$15,000.00	28.00
SMH-10					\$15,000.00	28.00
SMH-11					\$15,000.00	28.00
SMH-12					\$15,000.00	28.00
SMH-13					\$15,000.00	28.00
SMH-14					\$15,000.00	28.00
SMH-15	Special Cleaning	\$750			\$15,000.00	28.00
SMH-16					\$15,000.00	28.00
SMH-17					\$15,000.00	28.00
SMH-18	Hydraulic cleaning and Inspection	\$500		\$800	\$15,000.00	28.00
SMH-19					\$15,000.00	28.00
SMH-20					\$15,000.00	28.00
	Extending the height of the frame by manhole cover adjustment ring and broken frame replacement (if necessary). Injection grouting at wall interior		\$3,500			
SMH-21	joints.				\$15,000.00	15.00
SMH-ZIA					\$15,000.00	28.00
			¢1 500		<b>ຈ</b> າວ,ບບບ.ບບ	21.00
CML 22	Frame coal installation	\$500	φι,ουυ		¢15 000 00	15.00
					\$15,000.00	21.00
SMIT-24 SMIL-25					\$15,000.00	21.00
	Extending the height of the frame by manhole cover adjustment ring and grouting in hole		\$3,500		\$15,000.00	15.00
SMH_27	grouting in note				\$15,000.00	1/, 00
SMH_28					\$15,000.00	28.00
SMH-29	Frame seal installation and cutting roots.		\$1,500		\$15,000.00	15.00



	Frame seal installation, and coating or lining wall		\$3,500			
SMH-30	interior.				\$15,000.00	15.00
SMH-31					\$15,000.00	28.00
SMH-32					\$15,000.00	28.00
SMH-32A					\$15,000.00	28.00
SMH-32B					\$15,000.00	28.00
SMH-33					\$15,000.00	28.00
SMH-34	Frame seal installation.		\$1,500		\$15,000.00	15.00
SMH-35					\$15,000.00	28.00
SMH-36					\$15,000.00	28.00
SMH-37					\$15,000.00	28.00
TOTAL		\$1,750	\$15,000.00	\$800	\$540,000.00	

### 2.2 PIPELINES

To determine a maintenance and repair priority list, pipes were graded according to their defects. To do so, a grade from 1 to 5 was assigned (according to PACP v 7) to each identified defect.

Normally, two (2) views of the pipes are taken; one from the upstream manhole and the other from downstream manhole. In some cases, sections were accessible only from one end. In these cases, only one (1) view of the pipe was captured. 34 sections were inspected with 2 view and 9 with only one.

#### 2.2.1 Operation and Maintenance (O&M)

Regarding operation and maintenance condition of pipes sections, the inspected part of the network is in good condition, only 5 pipes (13%) present deficiencies (Grade 4 and 5).

Table 5. Hamlet	of Rolla Sewe	r Pipes O&I	M Grade
		1	

Pipes						
O&M grade	5	4	3	2	1	Total
Number of pipes	3	2	13	14	11	43
%	7%	5%	30%	32%	26%	100%



#### Table 6. Summary of main defects

Class of Defect	Section Number	Details
	PCO-03	Deposits->Settled->Fine > 30%
	SP-22	Deposits->Settled->Fine > 30%
Significant 0&M	SP-32	Deposits->Settled->Fine > 30%
	SP-21A	Deposits->Settled->Fine > 20% & <= 30%
	SP-36	Deposits->Settled->Fine > 20% & <= 30%

#### 2.2.2 Structural and Physical Condition

Table 7.	Hamlet	of Rolla	Sewer	Pipes	O&M	Grade
				-		

Pipes							
O&M grade	5	4	3	2	1	Total	
Number of pipes	1	0	1	10	31	43	
%	2%	0%	2%	23%	73%	100%	

#### 2.2.3 Infiltration

One of the main goals of this inspection program was to assess the water tightness of the sanitary sewer system. For this reason, special attention was required to help in locating manholes and pipes with high risk of any water ingress. Information related to cover condition, frame condition, pipe seal condition, potential for runoff and rim to grade heights were collected during the inspection by our field crews. All data collected is available in the PACP/MACP database provided with this report.

Table 8.	Summar	у о	f main	de	fects

Class of Defect	Section Number	Details
Infiltration	SP-36	O&M Defects->Infiltration->Dripper



#### 2.2.4 Surcharges

Only one section was seen with a surcharge. Surcharges indicate a higher-than-expected level of water within the pipes. In these cases, all this surcharge correlates with obstructed manholes MH-15. CCTV inspection was conducted conclusion are available in the repair recommendations and in the appendix.

Table 9. Summary of main defects

Class of Defect	Section Number	Details
Surcharge	SP-15	Surcharged/Debris

#### 2.2.5 Pipes Corrective actions Recommendations

#### Hydraulic and/or Special cleaning

As blocked collection systems can have serious repercussions, manholes and sections with O&M grades of 4 and 5 justify immediate maintenance to eliminate further consequences, except for SP-32., which was clean for CCTV inspection.

In general, hydraulic cleaning is recommended for pipes with silt and gravel debris and special cleaning should be performed in pipes with encrustation, roots, hard debris, grease, intruding connections, joint gasket visible and penetration of foreign objects. A CCTV camera should always work in conjunction with specialized pipe cleaning equipment to supervise and guide all these operations.

List of Pipes to Clean :

- > SP-36
- > SP-21A
- > SP-22
- > PCO-03



#### Pipes Repair Recommendations <u>Table 10. Hamlet of Rolla Pipes repairs Recommendations</u>

Recommendations						
ltem	Remediation Description	Next Year	1-3 years	5-10 years	Estimated Cost Of replacement	Estimate Remaining Service Life
SP-05	Inspection			\$800	\$130,676.00	60.00
SP-06					\$130,532.00	80.00
SP-07					\$140,564.00	80.00
SP-08					\$139,904.00	80.00
SP-09					\$139,280.00	80.00
SP-10	Inspection			\$800	\$139,964.00	80.00
SP-11					\$141,056.00	80.00
SP-12					\$138,824.00	80.00
SP-13					\$140,204.00	60.00
SP-14					\$139,880.00	80.00
SP-15	Replace pipe total length is recommended. It is suggested to do hydraulic studies prior to carrying out the recommended works.		\$150,000		\$142,700.00	80.00
SP-16					\$106,340.00	80.00
SP-17					\$105,968.00	80.00
SP-18					\$119,624.00	80.00
SP-19	Inspection			\$800	\$123,908.00	80.00
SP-20					\$75,164.00	60.00
SP-21					\$134,936.00	60.00
SP-21A	Hydraulic Cleaning	\$300			\$56,780.00	80.00
SP-21B	Inspection			\$200	\$19,376.00	60.00

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SP-22	Hydraulic Cleaning	\$500			\$132,032.00	80.00
SP-23					\$117,764.00	60.00
SP-24					\$97,844.00	80.00
SP-25	Inspection			\$800	\$96,188.00	80.00
SP-25-a					\$14,708.00	80.00
SP-26					\$113,324.00	60.00
SP-27					\$94,904.00	80.00
SP-28	Inspection			\$800	\$100,412.00	80.00
SP-29					\$130,652.00	80.00
SP-30				\$800	\$108,056.00	80.00
SP-31				\$800	\$121,712.00	40.00
SP-32	Hydraulic Cleaning	\$500			\$145,772.00	80.00
SP-32A					\$85,892.00	80.00
SP-32B	Inspection			\$500	\$86,072.00	80.00
SP-33					\$145,076.00	80.00
SP-334					\$2,012.00	80.00
SP_34					\$118,052.00	60.00
SP_35					\$89,612.00	80.00
SP-36	Special Cleaning	\$750			\$118,904.00	80.00
SP_37					\$148,292.00	80.00
SP_v1					\$43,808.00	60.00
	Inspection			\$300	\$42,164.00	60.00
					\$19,088.00	60.00
PC0-03	Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to		\$35,000		\$13,712.00	5.00

	carrying out the recommended					
	works.					
		\$2.050	\$185,000	\$6,600	\$4 451 732	
TOTAL		Ψ2,000	φ100,000	Ψ0,000	Ψ <sup>-1</sup> ,-101,702	

### 3.0 RECOMMANDATIONS SUMMARY

The costs estimated include study, permits, excavation, road work and material. This is based on the best of our knowledge and subject to changes based on geographic availability of resources. These costs should be used as guideline to provision and prioritize and accurate estimates, request for quote should be launched at the time of the repairs.

#### Table 11 : Summary table of recommendations

Recommendations						
ltem	Repairs	Next Year	1-3 years	5- 10 years	Estimated Replacement Cost	Estimate Remaining Service Life
SMH-15	Special Cleaning	\$750			\$15,000.00	28.00
SMH-18	Hydraulic cleaning and Inspection	\$500		\$800	\$15,000.00	28.00
SMH-21	Extending the height of the frame by manhole cover adjustment ring and broken frame replacement (if necessary). Injection grouting at wall interior joints.		\$3,500		\$15,000.00	15.00
SMH-23	Hydraulic cleaning Frame seal installation.	\$500	\$1,500		\$15,000.00	15.00
SMH-26	Extending the height of the frame by manhole cover adjustment ring and grouting in hole		\$3,500		\$15,000.00	15.00
SMH-29	Frame seal installation and cutting roots.		\$1,500		\$15,000.00	15.00
SMH-30	Frame seal installation, and coating or lining wall interior.		\$3,500		\$15,000.00	15.00
SMH-34	Frame seal installation.		\$1,500		\$15,000.00	15.00
SP-05	Inspection			\$800	\$130,676.00	60.00
SP-10	Inspection			\$800	\$139,964.00	80.00
SP-15	Replace pipe total length is recommended. It is suggested to do hydraulic studies prior to carrying out the recommended works.		\$150,000		\$142,700.00	80.00

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Inspection			\$800	\$123,908.00	80.00
Hydraulic Cleaning	\$300			\$56,780.00	80.00
Inspection			\$200	\$19,376.00	60.00
Hydraulic Cleaning	\$500			\$132,032.00	80.00
Inspection			\$800	\$96,188.00	80.00
Inspection			\$800	\$100,412.00	80.00
			\$800	\$108,056.00	80.00
			\$800	\$121,712.00	40.00
Hydraulic Cleaning	\$500			\$145,772.00	80.00
Inspection			\$500	\$86,072.00	80.00
Special Cleaning	\$750			\$118,904.00	80.00
Inspection			\$300	\$42,164.00	60.00
Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.		\$35,000		\$13,712.00	5.00
TOTAL	\$3,800.00	\$200,000.00	\$7,400.00	\$1,698,428.00	
	Inspection Hydraulic Cleaning Inspection Hydraulic Cleaning Inspection Hydraulic Cleaning Hydraulic Cleaning Inspection Special Cleaning Inspection Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works. TOTAL	InspectionHydraulic Cleaning\$300InspectionHydraulic Cleaning\$500InspectionInspectionHydraulic Cleaning\$500InspectionHydraulic Cleaning\$500InspectionSpecial Cleaning\$750InspectionReplacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.\$3,800.00	InspectionInspectionHydraulic Cleaning\$300InspectionInspectionHydraulic Cleaning\$500InspectionInspectionInspectionInspectionInspectionInspectionHydraulic Cleaning\$500InspectionInspectionSpecial Cleaning\$750InspectionInspectionReplacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new\$35,000manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.\$3,800.00TOTAL\$3,800.00\$200,000.00	Inspection\$800Hydraulic Cleaning\$300Inspection\$200Hydraulic Cleaning\$500Inspection\$800Inspection\$800Inspection\$800Inspection\$800Inspection\$800Inspection\$800Inspection\$800Inspection\$800Inspection\$800Hydraulic Cleaning\$500Inspection\$500Inspection\$500Special Cleaning\$750Inspection\$300Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new\$35,000manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.\$3,800.00TOTAL\$3,800.00\$200,000.00	Inspection      \$800      \$123,908.00        Hydraulic Cleaning      \$300      \$56,780.00        Inspection      \$200      \$19,376.00        Hydraulic Cleaning      \$500      \$132,032.00        Inspection      \$800      \$96,188.00        Inspection      \$800      \$96,188.00        Inspection      \$800      \$100,412.00        Inspection      \$800      \$108,056.00        Hydraulic Cleaning      \$500      \$123,772.00        Hydraulic Cleaning      \$500      \$145,772.00        Hydraulic Cleaning      \$500      \$145,772.00        Inspection      \$500      \$145,772.00        Inspection      \$500      \$145,772.00        Inspection      \$500      \$145,772.00        Inspection      \$300      \$142,164.00        Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.      \$33,800.00      \$200,000.00      \$7,400.00      \$1,698,428.00

SHAD

**EXPENDITURES FORECAST** 



Figure 3 : Recommendations costs by Timeframe



## **APPENDIX 1** LIST OF PIPES



Number	Start Date of inspection	Completion Date of inspection	Node Upstream	Node Downstream	Start Node	Street Name	SG	OMG	Network Type	Dimension 1 mm Shape	Material	Length m	Hydraulic Cleaning	Special Cleaning	CCTV Inspection Required
SP-32	2021-08-26 17:05	2021-08-26 17:33	SMH-32	SMH-31	SMH-31 / SMH-32	405	3	5 :	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	119,808	н	-	CCTV
PCO-03	2021-08-27 19:14	-	CO-03	SMH-19	SMH-19	400	5	5 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	9,757	н	-	CCTV
SP-32B	2021-08-26 18:12	2021-08-26 18:30	SMH-32B	SMH-32A	SMH-32A / SMH-32B	405	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	70,062	Н	S	-
SP-32A	2021-08-26 17:34	2021-08-26 18:09	SMH-32A	SMH-32	SMH-32 / SMH-32A	405	1	2 :	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	69,906	-	-	-
SP-35	2021-08-26 15:28	2021-08-26 16:29	SMH-35	SMH-34	SMH-35 / SMH-34	404	2	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	73,012	-	-	-
SP-34	2021-08-26 16:16	2021-08-26 17:01	SMH-34	SMH-31	SMH-34 / SMH-31	404	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	96,709	-	-	-
SP-33	2021-08-26 17:07	2021-08-27 17:05	SMH-33	SMH-31	SMH-31 / SMH-33	405	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	119,226	-	-	-
SP-31	2021-08-26 16:57	2021-08-27 17:44	SMH-31	SMH-30	SMH-31 / SMH-30	405	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	99,756	Н	-	-
SP-30	2021-08-26 14:15	2021-08-27 17:43	SMH-30	SMH-29	SMH-29 / SMH-30	Sweetwater Rd	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	88,379	Н	-	-
SP-28	2021-08-26 13:30	2021-08-26 13:50	SMH-28	SMH-27	SMH-28 / SMH-27	Sweetwater Rd / 403	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	82,014	н	-	-
SP-27	2021-08-26 12:59	2021-08-26 13:46	SMH-27	SMH-26	SMH-26 / SMH-27	Sweetwater Rd / 403	2	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	77,422	Н	-	-
SP-37	2021-08-26 14:38	2021-08-26 14:59	SMH-37	SMH-36	SMH-36 / SMH-37	Sweetwater Rd / 407	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	121,913	-	-	-
SP-36	2021-08-26 14:11	2021-08-26 14:33	SMH-36	SMH-29	SMH-29 / SMH-36	Sweetwater Rd	1	4 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	97,421	Н	S	-
SP-29	2021-08-26 12:57	2021-08-26 14:09	SMH-29	SMH-26	SMH-26 / SMH-29	Sweetwater Rd	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	107,209	-	-	-
PCO-01	2021-08-26 15:03	-	CO-01	SMH-37	SMH-37	407	2	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	33,471	н	-	-
SP-26	2021-08-26 12:28	2021-08-26 12:53	SMH-26	SMH-22	SMH-22 / SMH-26	Sweetwater Rd	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	92,771	-	-	-
SP-25	2021-08-28 11:21	2021-08-28 11:42	SMH-25	SMH-24	SMH-25 / SMH-24	Rolla Rd	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	78,486	н	-	-
SP-24	2021-08-26 12:33	2021-08-28 11:39	SMH-24	SMH-22	SMH-22 / SMH-24	Sweetwater Rd	2	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	79,865	-	-	-
SP-23	2021-08-26 11:58	2021-08-26 12:29	SMH-23	SMH-22	SMH-23 / SMH-22	Sweetwater Rd	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	96,467	-	-	-
SP-22	2021-08-26 12:26	2021-08-28 11:58	SMH-22	SMH-17	SMH-22 / SMH-17	Sweetwater Rd	2	5 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	108,362	н	-	-
SP-21	2021-08-27 18:02	2021-08-27 18:53	SMH-21	SMH-20	SMH-21 / SMH-20	407	2	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	110,780	н	-	-
SP-20	2021-08-27 18:51	2021-08-27 19:15	SMH-20	SMH-19	SMH-20 / SMH-19	405	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	60,970	-	-	-
SP-19	2021-08-27 19:12	2021-08-27 19:42	SMH-19	SMH-18	SMH-19 / SMH-18	400	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	101,589	Н	-	-
SP-18	2021-08-27 19:42	2021-08-28 11:57	SMH-18	SMH-17	SMH-18 / SMH-17	400 / Rolla Rd	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	98,017	-	-	-
SP-21A	2021-08-27 18:07	2021-08-27 18:24	SMH-21A	SMH-21	SMH-21 / SMH-21A	407	2	4 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	45,654	Н	-	-
PCO-02	2021-08-27 18:08	-	CO-02	SMH-21	SMH-21	407	2	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	14,242	-	-	-
SP-17	2021-08-28 11:55	2021-08-28 12:15	SMH-17	SMH-16	SMH-17 / SMH-16	Rolla Rd	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	86,640	-	-	-
SP-16	2021-08-28 12:12	2021-08-28 12:31	SMH-16	SMH-15	SMH-16 / SMH-15	Rolla Rd	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	86,947	-	-	-
SP-15	2021-08-27 16:09	-	SMH-15	SMH-14	SMH-14	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	117,250	-	-	-
SP-14	2021-08-27 15:45	2021-08-27 16:07	SMH-14	SMH-13	SMH-13 / SMH-14	Canola Field	2	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	114,903	-	-	-
SP-13	2021-08-27 15:15	2021-08-27 15:43	SMH-13	SMH-12	SMH-12 / SMH-13	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	115,168	-	-	-
SP-12	2021-08-27 14:51	2021-08-27 15:11	SMH-12	SMH-11	SMH-11 / SMH-12	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	114,018	-	-	-
SP-11	2021-08-27 14:18	2021-08-27 14:48	SMH-11	SMH-10	SMH-10 / SMH-11	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	115,879	-	-	-
SP-10	2021-08-27 13:46	2021-08-27 14:16	SMH-10	SMH-09	SMH-09 / SMH-10	Canola Field	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	114,967	Н	-	-
SP-09	2021-08-27 13:13	2021-08-27 13:43	SMH-09	SMH-08	SMH-08 / SMH-09	Canola Field	1	2 :	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	114,404	-	-	-
SP-08	2021-08-27 12:38	2021-08-27 13:10	SMH-08	SMH-07	SMH-07 / SMH-08	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	114,920	-	-	-
SP-07	2021-08-27 12:11	2021-08-27 12:36	SMH-07	SMH-06	SMH-06 / SMH-07	Canola Field	1	1 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	115,472	-	-	-
SP-06	2021-08-27 11:46	2021-08-27 12:08	SMH-06	SMH-05	SMH-05 / SMH-06	Canola Field	2	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	107,109	H	-	-
SP-05	2021-08-27 11:41	-	SMH-05	LITT_ST-01	SMIH-05	Canola Field	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	107,228	-	5	-
SP-X1	2021-08-26 14:35	-	SMH-36	SMH-036_NA	SMIH-36	Sweetwater Rd	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	34,839	-	-	-
5P-33A	2021-08-27 17:09	-	SMH-33A	SIVIH-33	SIVIH-33A	403	1	2 5	Sanitary Sewage Pipe	200 Circular	Polyvinyi Chloride	0.007	-	-	-
5P-21B	2021-08-27 18:26	-	SMH-21A	SIVIH-21A_NA	SIVIH-21A	407	1	3 5	Sanitary Sewage Pipe	200 Circular	Polyvinyi Chioride	14,477	н	-	-
sp-25-a	2021-08-28 11:23	-	SMH-25	SIVIH-25_NA	SIVIH-25	Kolla Kū	1	2 :	Sanitary Sewage Pipe	200 Circular	Polyvinyl Chloride	10,585	-	-	-

Number	30. Pipe Use	26. Street (Name & Number)	11. Intervention - Date	Node Upstream	Node Downstream	Start Node	Deficiency (Deficiency found)	Operation and maintenance grade	Order #
SP-36	Sanitary Sewage Pi	Sweetwater Rd	2021-08-26	SMH-36	SMH-29	SMH-36	O&M Defects->Infil		4 Zoom2021_Hamlet

Number	Number	30. Pipe Use	26. Street (Name &	11. Intervention	Nodo Unstroom	Node	Start Nodo	Deficiency (Deficiency found)	Extont	Operation and	Order #
	Number		Number)	Date	Noue opsiteant	Downstream	Start Noue	Denciency (Denciency round)	Extent	maintenance grade	Order #
[	PCO-03	Sanitary Sewage Pipe	400	2021-08-27	CO-03	SMH-19	SMH-19	O&M Defects->Deposits->Settled->Fine	> 30%	5	Zoom2021_Hamlet Roll
	SP-32	Sanitary Sewage Pipe	405	5 2021-08-26	5 SMH-32	SMH-31	SMH-31	O&M Defects->Deposits->Settled->Fine	> 30%	5	Zoom2021_Hamlet Roll
	SP-21A	Sanitary Sewage Pipe	407	7 2021-08-27	SMH-21A	SMH-21	SMH-21	O&M Defects->Deposits->Settled->Fine	> 20% & <= 30%	4	Zoom2021_Hamlet Roll
[	SP-36	Sanitary Sewage Pipe	Sweetwater Rd	2021-08-26	5 SMH-36	SMH-29	SMH-29	O&M Defects->Deposits->Settled->Fine	> 20% & <= 30%	4	Zoom2021_Hamlet Roll
	SP-22	Sanitary Sewage Pipe	Sweetwater Rd	2021-08-28	SMH-22	SMH-17	SMH-17	O&M Defects->Deposits->Settled->Fine	> 30%	5	Zoom2021 Hamlet Roll

Number	30. Pipe Use	26. Street (Name & Number)	11. Intervention Date	Node Upstream	Node Downstream	Start Node	Deficiency (Deficiency found)	Extent	Internal structural condition grade	Order #
PCO-03	Sanitary Sewage I	400	) 2021-08-27	CO-03	SMH-19	SMH-19	Structural Defect: N/A		5 Zo	om2021_Hamle

Number	30. Pipe Use	26. Street (Name & Number)	11. Intervention - Date	Node Upstream	Node Downstream	Start Node	21. Inspection Status	Order #
SP-15	Sanitary Sewage Pipe	Rolla Rd	2021-08-28	SMH-15	SMH-14	SMH-15	Surcharged/Debris	Zoom2021_Hamlet Ro



# **APPENDIX 2** LIST OF MANHOLES



Number	Inspection Date	Street Name	PCG	OMG	Network Type	Hydraulic Cleaning	Special Cleaning
SMH-05	2021-08-27 11:28	Canola Field	1		2 Sanitary	-	-
SMH-06	2021-08-27 11:35	Canola Field	1		2 Sanitary	-	-
SMH-07	2021-08-27 11:35	Canola Field	1		1 Sanitary	-	-
SMH-08	2021-08-27 12:14	Canola Field	1		1 Sanitary	-	-
SMH-09	2021-08-27 12:16	Canola Field	1		1 Sanitary	-	-
SMH-10	2021-08-27 12:16	Canola Field	1		2 Sanitary	-	-
SMH-11	2021-08-27 12:54	Canola Field	1		1 Sanitary	-	-
SMH-12	2021-08-27 12:54	Canola Field	1		1 Sanitary	-	-
SMH-13	2021-08-27 12:55	Canola Field	1		1 Sanitary	-	-
SMH-14	2021-08-27 13:43	Canola Field	1		1 Sanitary	-	-
SMH-15	2021-08-28 11:45	Rolla Rd	1		5 Sanitary	-	S
SMH-16	2021-08-28 11:27	Rolla Rd	1		2 Sanitary	-	-
SMH-17	2021-08-28 11:26	Rolla Rd	1		2 Sanitary	-	-
SMH-18	2021-08-27 18:57	400	1		4 Sanitary	Н	-
SMH-19	2021-08-27 17:57	405	1		2 Sanitary	-	-
SMH-20	2021-08-27 17:56	405	1		2 Sanitary	-	-
SMH-21	2021-08-27 17:48	407	5		2 Sanitary	-	-
SMH-21A	2021-08-27 17:46	407	1		2 Sanitary	-	-
SMH-22	2021-08-26 12:00	Sweetwater Rd	2		2 Sanitary	-	-
SMH-23	2021-08-26 11:34	Sweetwater Rd	5		3 Sanitary	Н	-
SMH-24	2021-08-28 11:25	Rolla Rd	2		2 Sanitary	-	-
SMH-25	2021-08-28 11:08	Rolla Rd	1		2 Sanitary	-	-
SMH-26	2021-08-26 12:02	Sweetwater Rd	5		2 Sanitary	-	-
SMH-27	2021-08-26 13:05	403	3		2 Sanitary	-	-
SMH-28	2021-08-26 13:02	403	1		2 Sanitary	-	-
SMH-29	2021-08-26 13:33	Sweetwater Rd	5		2 Sanitary	-	-
SMH-30	2021-08-27 16:57	405	5		2 Sanitary	-	-
SMH-31	2021-08-26 16:44	405	1		2 Sanitary	-	-
SMH-32	2021-08-26 17:10	405	1		2 Sanitary	-	-
SMH-32A	2021-08-26 17:12	406	1		2 Sanitary	-	-
SMH-32B	2021-08-26 17:13	406	1		2 Sanitary	-	-
SMH-33	2021-08-27 16:53	403	1		2 Sanitary	-	-
SMH-34	2021-08-26 16:00	407	5		1 Sanitary	-	-
SMH-35	2021-08-26 15:13	404	1		2 Sanitary	-	-
SMH-36	2021-08-26 13:53	Sweetwater Rd	1		2 Sanitary	-	-
SMH-37	2021-08-26 13:54	407	1		2 Sanitary	-	-



## **APPENDIX 3** CCTV RECOMMANDATIONS





Aqua Data	)	PRRD - Hamlet Date: October 21th. 2021	Rolla - I	Recomm	nendatio	ons						S	1990
Main ID	Date	Location	Start MH	End MH	Pipe	Height (mm)	Length	Surveyed Length	CCTV Video File	Recommendations		Pictures	
SP-32	10/15/2021	45th Street	SMH-32	SMH-31	PVC	200	119,8	100,5	PRRD_Rolla_Sanitary_Oct2021-AMH 'SMH32'-AMH 'SMH31'-45th Street (1).mpg	Survey abandoned by tap break-in/hammer intruding. The total inspected length is 100.5 m for 119.8 m of theoretical length. See the final recommendation below.			BASSIE HALL
SP-32	10/15/2021	45th Street	SMH-31	SMH-32	PVC	200	119,8	18,5	PRRD_Rolla_Sanitary_Oct2021-AMH 'SMH32'-AMH 'SMH.31'-405Street and 404Ave (1).mpg	Completed survey at matching point from other end. Total length surveyed is 119.0 m. Cutting the intruding tap at 18.5 m from upstream manhole SMH-31 is recommended. Pipe in good condition.	Reference 16.2.5. Ref March (March ) Classifierty Ref. (March ) Ref. (Marc	HASSID HERE & HERE HERE & HERE & HERE HERE AND HERE HERE AND HERE HERE AND HERE HERE AND HERE HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE AND HERE	International States
PCO-03	10/15/2021	405 Street and 404 Ave	SMH-19	CO-03	PVC	150	9,8	13,1	PRRD_Rolla_Sanitary_Oct2021-AMH 'CO03'-AMH 'SMH19'-405Street and 400Ave (1).mpg	Water level sag and unable access from cleanout mainline CO-03. Replacing pipe and installing new manhole at 13.0 m from downstream MH SMH-19 is recommended. Replace cleanout mainline by new manhole. It is suggested to do hydraulic studies prior to carrying out the recommended works.	Prive Prive		
SP-15	10/15/2021	Off of Rolla Rd.	SMH-15	SMH-14	PVC	200	117,3	113.6	PRRD_Rolla_Sanitary_Oct2021-AMH 'SMH15'-AMH 'SMH14.'-Off of Rolla Rd (1).mpg	Water level sag and high water mark from upstream manhole to 18.3 m, fracture spiral at 16,1 m and fracture longitudinal and crack multiple at 34.4 m from upstream manhole SMH-15. Replace pipe total length is recommended. It is suggested to do hydraulic studies prior to carrying out the recommended works.	MOD ARK SHORE OVER SHARE SHEET AND INSERTIONS	Hildren (Baral)	1955 DE LO DO S. A Barrier Conf., Conf. Conf. Barrier Conf., Conf. Conf. Do Status Conf., Conf.

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