Winnipeg | Water and Waste
Eaux et déchets

January 25, 2024

Our File No.: 020-17-08-11-00
020-17-08-11-0N
020-17-06-01-00
Your File No.: 1071.10, 53.1, 1069.10

Environment and Climate Change
Environmental Stewardship Division
Environmental Compliance and Enforcement
Box 36 14 Fultz Blvd
Winnipeg, MB R3Y 0L6

Attention: Yvonne Hawryliuk, MSc, Acting Director

RE: Environment Act Licence No.: 2684 RRR; 2669 E RR; and 2716 RR Annual Reporting - River Crossing Monitoring Plan

Please find enclosed two copies of our annual river crossing monitoring, condition assessment and rehabilitation activities for the 2023 calendar year.

If you have any questions, please contact Susan Lambert, P.Eng., Field Service Operations Engineer, Wastewater Services Division, at 204-986-2304 or slambert@winnipeg.ca.

Sincerely,

[redacted]

Chris Carroll
Manager Wastewater Services Division

Attachment

CWC/kh

c: Siobhan Burland Ross, M. Eng., P. Eng., Environment and Climate (email)
Nada Sureshkumar, MSc, Environment and Climate and Parks (email)
Tim W. Shanks, M. Eng., P. Eng., Water and Waste Department (email)
Susan Lambert, P.Eng., Water and Waste Department (email)
Andrew McMillan, P.Eng., Water and Waste Department (email)
Cynthia Wiebe, P.Eng., Water and Waste Department (email)
Stacy Cournoyer, P.Eng., Water and Waste Department (email)
Bronwyn Jones, P.Eng., Water and Waste Department (email)

WASTEWATER SERVICES DIVISION
109-1199 Pacific Avenue, Winnipeg, Manitoba R3E 3S8
Certified under ISO 14001:2015 standards
T. | Tél. : 204-986-7550

DIVISION DES EAUX USÉES
1199, avenue Pacific, Porte 109, Winnipeg (Manitoba) R3E 3S8
Certifié en vertu des normes ISO 14001:2015
F. | Fax : 204-986-7193
winnipeg.ca

Water and Waste Department • Service des eaux et des déchets

River Crossing Monitoring
Annual Report for 2023 Calendar Year

Environment Act Licence No.: **2684 RRR**
2669 E RR
2716 RR

January 25, 2024

Your File No.: 1071.10, 53.1, 1069.10
Our File Nos.: 020-17-08-11-00
020-17-08-11-0N
020-17-06-01-00

1.0 2023 Summary

The following is a summary of the inspection and rehabilitation work carried out on various river crossings in 2023:

- Whellams Lane River Crossing – A project to line both the 500mm and 800mm siphons with CIPP is underway. A construction contract has been awarded and completion is expected in early 2024.
- Frasers Grove Park River Crossing – A construction project to replace the 350mm HDPE force-main was completed in the fall of 2023.
- Munroe Avenue River Crossing - A Project for CIPP lining of the 300mm siphon is underway and will be completed in early 2024.
- We conducted a CCTV inspection of the West Perimeter Force Main Crossing in conjunction with a low head leakage test.
- We conducted the low head leakage test on the 700mm Fort Garry Bridge river crossing and partial CCTV inspections of both the 700mm and 800mm pipes. These inspections indicated a failure of the 700mm pipe and that the 800mm pipe was in poor condition. Emergency by-pass piping on the bridge deck is scheduled to be complete by March 2024 and a project for the permanent replacement of these pipes is in the planning stages and project completion is expected in mid/late 2025. Currently all flow has been directed to the 800mm pipe.
- New Southwest River Crossing – The purpose for the new crossing is to relieve the Fort Garry Bridge river crossing as well as to provide redundancy in the collection system. The preliminary design for the new river crossing is now complete and a project for detailed design is planned for 2024.

2.0 Inspection Program Background

As stated in Environment Act Licences No.: 2684 RRR; 2669 E RR; and 2716 RR, an annual report must be submitted for the ongoing monitoring of new and existing pipes that transport wastewater via river crossings in the City of Winnipeg.

To best manage the City's river crossing assets, the City has implemented an analytical risk management approach that assesses the consequence and the probability of failure for each asset. The consequence is determined by assessing the impact should a failure occur while the probability of a failure is best determined by evaluating the condition of an asset.

Asset condition assessments inform us of the condition of the river crossing pipes so we can compare the risk rating of all the crossings and make better informed renewal decisions.

2.1 Assessing Risk

An initial desktop risk review was undertaken to assist in planning the River Crossing Inspection and Monitoring program. The High Risk River Crossing inspection program began in 2012. The first round of inspections was completed in 2023 with all crossings that met the minimum age for inspection assessed. The results of these inspections provides valuable insight into the physical condition of the pipe. This information, in conjunction with analytical data such as riverbank classification, material type, crossing type, pipe age, etc., will allow the City to undertake a more comprehensive risk assessment.

2.2 Next Steps

The river crossing monitoring plan is a living document and will be continuously updated with new information as it becomes available from ongoing inspections or as new assets are added to the City's river crossing inventory.

In 2024, the City will use the compiled information to develop a more robust risk-based framework for managing river crossing assets. This includes identifying crossings of higher risk, and reviewing potential emergency response plans. This information will enable risk-based decision making to prioritize future inspections as well as rehabilitation/renewal works to ensure adequate capital funding is in place.

3.0 River Crossing Inventory

The River Crossing Inspection and Monitoring Plan contains asset information on the critical wastewater river crossings within the city. Assets crossing all rivers and major creeks are considered. The following assets, and their respective watercourse, are included in the monitoring plan:

NEWPCC River Crossings

ASSET NAME	LOCATION/STREET NAME	WATERCOURSE
Ash Street	Wellington Crescent and Ash Street	Assiniboine River
Bridge of the Old Forks	Main Street	Assiniboine River
Frasers Grove Park	Frasers Grove Park to Newton Avenue	Red River
Whellams Lane	Whellams Lane to Kildonan Golf Course	Red River
Munroe Avenue	530 Henderson Highway at Munroe Avenue	Red River
Montcalm Avenue	23 Archibald Street	Red River
Hart Avenue	Hart Avenue and Glenwood Crescent	Red River
Provencher Bridge	Provencher Boulevard	Red River
Norwood Bridge	Main Street	Red River
Archibald Street	Archibald Street, south of Marion Street	Seine River
Rothesay Street	Rothesay Street, south of Bonner Avenue	Bunn's Creek
Portage Avenue	Portage Avenue, east of Empress Street	Omand's Creek
McCrossen Street	McCrossen Street, north of Dublin Avenue	Omand's Creek
St James Street	St James Street, south of Bangor Avenue	Omand's Creek
Border Street	Border Street, north of Dublin Avenue	Omand's Creek
King Edward Street	King Edward Street, north of Dublin Avenue	Omand's Creek
Sargent Avenue	Sargent Avenue, east of Empress Street	Omand's Creek
Wellington Avenue	Wellington Avenue, east of Empress Street	Omand's Creek
Ellice Avenue	Ellice Avenue, east of Empress Street	Omand's Creek
St. Matthews Avenue	St Matthews Avenue, east of Empress Street	Omand's Creek
Stevenson Road	Stevenson Road, west of Caithness Road	Omand's Creek
Sherwin Road	Sherwin Road, north of Dublin Avenue	Omand's Creek
Albany Street	Albany Street, south of Ness Avenue	Truro Creek
Deer Lodge Place	Deer Lodge Place, west of Douglas Park Road	Truro Creek

SEWPCC River Crossings

ASSET NAME	LOCATION/STREET NAME	WATERCOURSE
Fort Garry Bridge	Bishop Grandin	Red River
St. Vital Bridge	Osborne Street	Red River
Crescent Drive	South Drive and Crescent Drive	Red River
Warde Avenue	St. Anne's, north of Warde to Bridgetown Drive	Seine River
Bishop Grandin	Bishop Grandin, east of St. Anne's	Seine River

WEWPCC River Crossings

ASSET NAME	LOCATION/STREET NAME	WATERCOURSE
West Perimeter Bridge	Perimeter Highway and Oxbowbend Road	Assiniboine River
Community Row	Assiniboine Avenue, west of Carroll Road	Assiniboine River
Assiniboine Park Zoo	Assiniboine Park Zoo to Conway Street	Assiniboine River
Heritage Park	Northwest of Ness Ave and Valleyview Dr	Sturgeon Creek
Windham Road	Windham Road and Assiniboine Crescent	Sturgeon Creek

4.0 Available Monitoring Technologies

No single solution exists for developing a monitoring plan for all the river crossings. Due to their unique natures, each crossing must be evaluated independently based on possible failure modes to develop a practical and cost-effective plan to mitigate the risk of pipe failure. Factors to be considered include: pipe material and age, construction/installation method, geodetic elevation, location relative to the riverbank, condition of the riverbank, and other environmental concerns.

Current condition assessment technologies available differ depending on crossing type and material of construction. The following inspection methods or technologies have been employed in the City's River Crossing Monitoring Program. Current available technologies are described below; this section will be updated as new technologies become available to ensure the monitoring plan remains consistent with industry best practices.

(a) CCTV Monitoring

Closed-circuit television (CCTV) is a cost-effective means of monitoring gravity crossings. A video camera is sent through the sewer, recording the visual condition of the asset, along its entire length. Any cracks, deformations or failures in these pipes will result in river water flowing into the pipeline due to the difference in hydraulic head; this is easily discerned from the video inspection.

(b) SONAR Inspection

River bottom and internal SONAR inspections can identify "ovality", or pipe deformation, major structural defects as well as debris levels in the sewer. River bottom scans show the general position of the pipe on the river bed and any major shifting or scouring around the pipeline.

(c) Remote Field Eddy Current Inspection

Remote Field Eddy Current (RFEC) inspections are currently being evaluated by the City. This technology is purported to provide accurate assessments of the location and extent of corrosion for steel and cast iron pipelines.

(d) Material Testing

Samples are taken from pipelines to determine various physical properties that can indicate deterioration or fit for purpose. This type of analysis has been performed on plastic pipes where other inspection technologies are not suitable.

(e) Acoustic Leak Detection

Free swimming recording devises or tethered drogues are sent through the active pipeline to discern locations of acoustic anomalies that may indicate leaks in a pipeline.

(f) Pressure Testing

A low-pressure column of water is connected to the pipeline to determine the rate of water loss, if any, which would indicate a leak.

(g) Ultrasonic Thickness Testing

A handheld ultrasonic meter is used to measure the pipe wall thickness at predetermined locations to determine if internal corrosion or abrasion is occurring.

5.0 Inspections, Monitoring and Rehabilitation Work

Table 1 summarizes condition assessments, monitoring activities by operations staff and rehabilitation activities carried out in 2023 for river crossings within the City of Winnipeg.

Table 1 – 2023 Condition Assessments, Rehabilitation Work and Monitoring Activities on City of Winnipeg River Crossings

Description:	Possible Failure Modes:	Inspection & Rehabilitation Work Summary:	Operations Monitoring Program:
Ash Street (Assiniboine River Crossing)			
• Two 300mm diameter High Density Polyethylene (HDPE) force mains installed in 2003. Pipes were installed through riverbank and riverbed using horizontal directional drilling (HDD).	• debris accumulation • failure of isolation valve • mechanical stress caused by slope instability and pressure fluctuations	• HDPE pipe installed in 2003. Initial inspection when pipe is approximately 30 years old (2033). Follow-up inspection rate to be determined by the findings of the inspection.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Bridge of the Old Forks (Assiniboine River Crossing)			
• 500mm and 600mm diameter steel force mains installed in 1996. Pipes suspended inside northbound span of the Bridge of the Old Forks.	• corrosion • freezing • mechanical stress caused by pressure fluctuations • failure of isolation valves	• Conduct detailed examination of steel piping using magnetic flux leakage or RFEC technology when pipe is approximately 25 years old (2021). Follow-up inspection rate to be determined by the findings of the inspection. • 2022: Steel force mains were inspected in targeted locations using electromagnetic (EM) bracelet probe and ultrasonic testing (UT) in November 2022. Follow-up inspection rate to be determined by the findings of the inspection. A final report with recommendations to be provided in 2024	• Weekly (March-November) and monthly (December-February) visual inspections have been conducted by Wastewater Services staff. There was no visual evidence of the pipe leaking under bridge structure. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Frasers Grove Park (Red River Crossing)			
• 350mm diameter steel force main installed in 1959. Pipe installed through riverbank and riverbed in shallow trench • Existing HDPE (1979) was abandoned in 2023 • 375 HDPE force-main installed in 2023. Pipe installed through bedrock outside of the riverbank failure zone.	• mechanical stress caused by slope instability, floating of pipe, pressure fluctuations • debris accumulation • corrosion (steel force main) • Slow crack growth (HDPE)	• 2014: 350mm steel pipe was inspected using RFEC technology in fall. Results show that the pipe has an estimated remaining service life of 132 years. Re-inspect using RFEC technology in approximately 20 years (2034). • 2014: At time of RFEC inspection, a sample of the 350mm HDPE pipe was removed for material testing to determine the quality of plastic. • 2017: Material testing results show that the risk for brittle failures is increasing as the pipe becomes increasingly less ductile over time. Brittle failures are associated with slow crack growth (SCG), and SONAR inspections will allow us to assess the risk failure due to SCG. • 2018: Acoustic leak detection testing on both pipes did not identify any leaks on either asset. • 2018: SONAR inspection on 350mm HDPE pipe completed in 2018. Preliminary results indicate pipe is nearing the end of its lifespan.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation.

Description:	Possible Failure Modes:	Inspection & Rehabilitation Work Summary:	Operations Monitoring Program:
		• 2019: Condition assessment has indicated that this pipe should be rehabilitated by 2025. • 2019: Toe armoring required in 5-10-year forecast (2028). • 2019: CIPP internal point repair installed in the 350mm HDPE force main at a potential leak location identified during 2018 condition assessment work. This location is not located under the river and no leakage to the river was observed or believed to have occurred. • 2020: A Request for Proposal for engineering services for the rehabilitation or replacement of two 350mm diameter force mains crossing the Red River is currently being prepared. • Preliminary design for the replacement of the 350mm HDPE force main has been completed. Expected project completion date is summer 2023. • 2022: A contract for Detailed Design and Contract Administration for replacement of 350mm HDPE force main has been awarded, construction tender advertised and construction to be completed by Summer 2023. • 2023: Construction of new river crossing was completed in late 2023	
Whellams Lane (Red River Crossing)			
• 500mm and 800mm diameter steel siphons installed in 1970. Pipes were laid on the riverbed and held in place with concrete anchor blocks. • New 1200mm third pipe crossing has been completed including isolation valves on the east and west side.	• mechanical stress caused by slope instability, floating of pipe • debris accumulation • degradation due to environmental stresses • corrosion	• 2013: Both pipes inspected in fall using SONAR technology. Inspection showed 500mm has significant debris. • 2014: River bottom SONAR scan was completed in winter. Scan showed pipes are supported by the river bottom and banks along the length of the crossing. • 2014: 500mm and 800mm steel pipes were inspected using RFEC technology in fall. Results show that the 800mm pipe has an estimated remaining service life of 13 years and the 500mm pipe has 10 years. Rehabilitation of both pipes recommended in the 5-10 year forecast (2022). • 2019: Construction of a 1200mm third pipe crossing has been substantially completed. • •2023: Slope regrading and armoring is planned to be completed in 2025.2021: Flow monitoring equipment for leak detection installed.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Isolation valves on the 500mm and 800mm diameter steel siphons are inoperable. There are no plans to repair the valves. Should the crossing require isolation in the future, other reliable and effective isolation methods will be used. • Isolation valves on the new 1200mm siphon was exercised quarterly in 2023.

Description:	Possible Failure Modes:	Inspection & Rehabilitation Work Summary:	Operations Monitoring Program:
		• 2022: an RFP for Detailed Design and Contract Administration for rehabilitation of 500mm and 800mm by CIPP Lining has been awarded, a construction tender advertised in July 2022 with construction to be completed in early 2023. • 2024: Due to delays, contractor is now scheduled to complete the work in January-February 2024.	
Munroe Avenue (Red River Crossing)			
• 300mm and 450mm diameter steel inverted siphons installed in 1964. Pipes installed in a concrete filled trench.	• mechanical stress caused by slope instability, floating of pipe, pressure fluctuations • debris accumulation • failure of isolation valve • corrosion	• 2012: 300mm inspected using RFEC in fall. Results show that the pipe has an estimated remaining service life of 16 years. Rehabilitation of pipe recommended in the 10-15 year forecast. Re-inspect in approximately 10 years (2022). • 2014: 450mm inspected using RFEC in fall. Results show that the pipe has an estimated remaining service life of 55 years. Re-inspect using RFEC technology in approximately 20 years (2034). • 2016: External point repair rehabilitation on the 300mm pipe completed in winter. • 2020: Site investigation and geotechnical slope stability analysis indicates west bank of the river will require slope stabilization. Geotechnical work required in 5-10-year forecast (2023). • 2022: an RFP for Detailed Design and Contract Administration for rehabilitation of 300mm siphon by CIPP Lining has been awarded, a construction tender advertised in June 2022 with construction to be completed in early 2023. • 2024: Due to delays, contractor is now scheduled to complete the work in January-February 2024.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Isolation valves on the 300mm and 450mm diameter steel inverted siphons are inoperable. There are no plans to repair the valves. Should the crossing require isolation in the future, other reliable and effective isolation methods will be used.
Montcalm Avenue (Red River Crossing)			
• Two 600mm diameter HDPE force mains installed in 2004. Pipes installed through riverbank and riverbed using HDD.	• debris accumulation • failure of isolation valve • mechanical stress caused by slope instability and pressure fluctuations	• HDPE pipe installed in 2004. Initial inspection when pipe is approximately 30 years old (2034). Follow-up inspection rate to be determined by the findings of the inspection.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation.

Hart Avenue (Red River Crossing)			
• Two 300mm diameter HDPE force mains installed in 2007. Pipes installed through riverbank and riverbed using HDD.	• debris accumulation • failure of isolation valve • mechanical stress caused by slope instability and pressure fluctuations	• HDPE pipe installed in 2007. Initial inspection when pipe is approximately 30 years old (2037). Follow-up inspection rate to be determined by the findings of the inspection.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Provencher Bridge (Red River Crossing)			
• Two 300mm diameter steel force mains installed in 2005. Pipes suspended inside eastbound span of the Provencher Bridge.	• mechanical stress caused by pressure fluctuations • corrosion • freezing	• Steel pipes installed in 2005. Detailed examination of steel piping using magnetic flux leakage or RFEC technology when pipe is approximately 20 years old (2021). Follow-up inspection frequency to be determined by the findings of the inspection. • 2021: Visual inspections of pipe hanger supports were completed in 2021. Findings and recommendations will be given in an inspection report, expected to be delivered in early 2022. • 2022: Steel force mains were inspected in targeted locations using electromagnetic (EM) bracelet probe and ultrasonic testing (UT) in November 2022. Follow-up inspection frequency to be determined by the findings of the inspection. Final report with recommendations to be provided in 2024.	• Weekly (March-November) and monthly (December-February) visual inspections have been conducted by Wastewater Services staff. There was no visual evidence of pipe leaking under bridge structure. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Norwood Bridge (Red River Crossing)			
• 500mm diameter steel force main installed in 1997. Pipe suspended inside northbound span of Norwood Bridge.	• mechanical stress caused by pressure fluctuations • corrosion • freezing	• Steel pipe installed in 1997. Detailed examination of steel piping using magnetic flux leakage or RFEC technology when pipe is approximately 25 years old (2021). Follow-up inspection frequency to be determined by the findings of the inspection. • 2022: Steel force mains were inspected in targeted locations using electromagnetic (EM) bracelet probe and ultrasonic testing (UT) in November 2022. Follow-up inspection frequency to be determined by the findings of the inspection. Final report with recommendations to be provided in 2024.	• Weekly (March-November) and monthly (December-February) visual inspections have been conducted by Wastewater Services staff. There was no visual evidence of pipe leaking under bridge structure. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Archibald Street (Seine River Crossing)			
• 900mm diameter concrete gravity sewer installed in 1958.	• degradation due to environmental stresses	• 2011: Asset inspected by CCTV in fall. The sewer main was given a structural performance grade	• Low risk gravity flow asset, monitoring by Operations is not required.

		(SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 years (2031) to confirm the asset condition.	
Rothesay Street (Bunn's Creek Crossing)			
• 525mm diameter concrete interceptor siphon installed in 1974. Pipe installed through creek bottom.	• debris accumulation • degradation due to environmental stresses	• 2015: Asset inspected by CCTV in fall. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 years (2035) to confirm the asset condition.	• Annual cleaning completed in October 2023. • Low risk gravity flow asset, monitoring by Operations is not required.
Portage Avenue (Omand's Creek Crossing)			
• 600mm diameter PVC interceptor siphon installed in 2022. Pipe installed through creek bottom.	• mechanical stress caused by slope instability, floating of pipe • debris accumulation • corrosion	• 2012: This asset was inspected with SONAR technology in summer. Inspection showed pipe has no restrictions such as debris or tuberculation. Re-inspect in approximately 10 years (2022). • 2014: Pipe considered for RFEC inspection however was removed from the program due to cost and risk of failure associated with inspecting this asset. • 2019: Engineering study underway to replace the existing crossing within the next 2 to 4 years. • 2020: A Request for Proposal for engineering services for the rehabilitation or replacement of the 600mm diameter interceptor sewer crossing Omand's Creek is currently being prepared. • 2022: Construction of new 600mm siphon interceptor was completed in summer 2022.	• Annual cleaning completed in October 2023. • Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer.

McCrossen Street (Omand's Creek Crossing)			
• 1350mm diameter concrete gravity sewer installed in 1964.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 years (2032) to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
St James Street (Omand's Creek Crossing)			
• 450mm diameter concrete gravity sewer. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 years (2032) to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
Border Street (Omand's Creek Crossing)			
• 375mm diameter concrete gravity sewer installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
King Edward Street (Omand's Creek Crossing)			
• 450mm diameter concrete gravity sewer installed in 1959.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.

Sargent Avenue (Omand's Creek Crossing)			
• 750mm diameter concrete gravity sewer installed in 1953. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 1, indicating the sewer is in excellent condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
Wellington Avenue (Omand's Creek Crossing)			
• 750mm diameter concrete gravity sewer installed in 1956. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 3, indicating the sewer is in fair condition. • 2022: CCTV inspection to be completed in December 2022. Assessment to occur shortly after to assign SPG and determine next inspection interval or rehabilitation needs • 2023: CCTV inspection completed. Sewer assigned a structural performance grade (SPG) of 4. Work order for a full segment liner has been added to the 2024 Capital Sewer Rehabilitation program. This rehabilitation work is expected to be completed in 2025.	• Low risk gravity flow asset, monitoring by Operations is not required.
Ellice Avenue (Omand's Creek Crossing)			
• 750mm diameter concrete gravity sewer installed in 1953. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2003: Asset inspected by CCTV in the spring. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • 2014: Asset re-inspected in the winter. Inspection confirmed that pipe is still an SPG 2. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 years (2034) to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
St Matthews Avenue (Omand's Creek Crossing)			
• 750mm diameter concrete gravity sewer installed in 1954. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2009: Asset inspected by CCTV in the fall. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in	• Low risk gravity flow asset, monitoring by Operations is not required.

		approximately 20 years (2029) to confirm the asset condition.	
Stevenson Road (Omand's Creek Crossing)			
• 250mm diameter concrete gravity sewer installed in 1965. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
Sherwin Road (Omand's Creek Crossing)			
• 450mm diameter concrete gravity sewer installed in 1964. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2012: Asset inspected by CCTV in the summer. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 20 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
Albany Street (Truro Creek Crossing)			
• 450mm diameter concrete gravity sewer. Pipe installed through creek bottom.	• degradation due to environmental stresses	• 2013: Asset inspected by CCTV in the winter. The sewer main was given a structural performance grade (SPG) of 3, indicating the sewer is in fair condition. • 2023: CCTV inspection completed. Sewer assigned a structural performance grade (SPG) of 3. • Given the condition of the sewer, it is recommended to re-inspect the sewer by CCTV in approximately 10 (2032) years to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.

Deer Lodge Place (Truro Creek Crossing)			
• 300mm diameter steel secondary siphon sewer installed in 1961. Pipe installed through creek bottom.	• mechanical stress caused by slope instability • debris accumulation • corrosion	• 2012: Dry portions of asset inspected by CCTV in the fall. The sewer main was given a structural pipe grade (SPG) of 2, indicating the sewer is in good condition. • 2013: Asset was inspected with SONAR technology in the fall. Inspection showed pipe had low debris level. • 2014: Asset partially inspected using RFEC in fall. Results show that the pipe has an estimated remaining service life of 36 years. Re-inspect using RFEC technology in approximately 20 years (2034). • 2015: Complete asset inspected by CCTV in the winter. The sewer main was given a structural performance grade (SPG) of 3, indicating the sewer is in fair condition. Inspection indicated high levels of debris; asset was cleaned. • 2019: Slope regrading and armoring is required in 5-10 year forecast. • 2023: Slope regrading and armoring is planned to be completed in 2025.	• Cleaning completed in October 2023. • Low risk gravity flow asset, monitoring by Operations is not required.
Fort Garry Bridge (Red River Crossing)			
• 700mm and 800mm diameter Series 60 HDPE siphons installed in 1970. Pipes were trenched through the riverbank, placed on the river bottom and held in place with concrete weights/anchors six meters on centre.	• mechanical stress caused by slope instability, floating of pipe, pressure fluctuations • debris accumulation • failure of upstream valve • Slow crack growth	• 2011: Internal and river bottom SONAR scans completed in 2011 which identified apparent deformation on the 800mm pipe. • 2014: Approximately 8 metres of the deformed 800mm pipe was replaced in spring. • 2017: Material testing results on the 800mm pipe show that the risk for brittle failures is increasing as the pipe becomes increasingly less ductile over time. Brittle failures are associated with slow crack growth (SCG), and SONAR inspections will allow us to assess the risk failure due to SCG. • 2021: SONAR re-inspection, internal and river bottom were completed. • 2023: Low pressure leakage test conducted and determined 700mm pipe was leaking. Follow up partial CCTV inspection performed on both pipes identified defects in both pipes. Emergency work under way to install a by-pass piping system on the bridge deck and planning for rehabilitation/replacement of both the 700mm and 800mm siphons has commenced.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation. Gates operated on west side of river only, the gates are seized/inoperable on the east side. There are no plans to repair the valves. Should the crossing require isolation in the future, other reliable and effective isolation methods will be used.

Crescent Drive (Red River Crossing)			
• A new 600mm siphon, installed in 2010, of dual encased HDPE pipe cored through limestone bedrock, well outside of riverbank failure zone.	• debris accumulation • failure of upstream valve	• HDPE pipe installed in 2010. Initial inspection when pipe is approximately 30 years old (2040). Follow-up inspection rate to be determined by the findings of the inspection.	• Annual opening and closing of isolation valves has been done to ensure proper operation. • South gate operated as scheduled. • North slide gate is damaged and was not operated – It has been determined that this gate is not required and is to be considered abandoned.
St Vital Bridge (Red River Crossing)			
• 450mm insulated steel force main installed in 2021 and suspended underneath the northbound span of the St. Vital Bridge.	• corrosion • freezing	• 2007: Flow monitoring devices (mag-meters) were installed on either side of the bridge as part of a pilot project to determine the feasibility of this type of installation for leak detection purposes; the pilot was unsuccessful for detecting leaks and would only identify catastrophic failures. • 2015: A risk assessment precluded internal inspection due to pipe configuration and lack of redundancy. • 2018: Onsite external wall thickness testing indicates pipe is at the end of its lifespan. • 2020: Pipe replacement project underway with completion expected in Q4 of 2021. Material supply and construction contracts are currently in the tendering and award process at the time of this report. • 2022: Pipe replacement completed December 2021. Final restoration completed fall 2022.	• Weekly (March-November) and monthly (December-February) visual inspections have been conducted by Wastewater Services staff. There was no visual evidence of pipe leaking under bridge structure. • Annual opening and closing of isolation valves to ensure proper operation have been done to ensure proper operation.
Warde Avenue (Seine River Crossing)			
• 750mm gravity concrete secondary sewer, installed in 2003.	• cracks and deformation due to environmental stresses	• 2003: Asset inspected by CCTV. It was given a structural performance grade (SPG) of 1, indicating the sewer is in excellent condition. • 2015: Asset inspected by CCTV in spring. The sewer main was given a structural performance grade (SPG) of 2, indicating the sewer is in good condition. • Given the condition of the sewer, it is recommended to re-inspect the interceptor by CCTV in approximately 20 years (2035) to confirm the asset condition.	• Low risk gravity flow asset, monitoring by Operations is not required.
Bishop Grandin Blvd. (Seine River Crossing)			
• 1350mm concrete gravity interceptor sewer, installed in 1967.	• cracks and deformation due to environmental stresses	• 2010: Asset inspected by CCTV in 2010 when it was given an SPG of 2, indicating the sewer is in good condition.	• Low risk gravity flow asset, monitoring by Operations is not required.

		• Given the condition of the sewer, it is recommended to re-inspect the interceptor by CCTV in approximately 20 years (2030) to confirm the asset condition.	
West Perimeter Bridge (Assiniboine River Crossing)			
• 400mm diameter steel force main installed in 2001. Pipe was installed using horizontal directional drilling (HDD) method through riverbank and river bottom. • Pipe was damaged during installation and repaired using a special repair sleeve.	• mechanical stress caused by slope instability, pressure fluctuations • debris accumulation • corrosion	• Steel pipe installed in 2001. Initial inspection when pipe is approximately 20 years old (2021) by RFEC technology. Follow-up inspection rate to be determined by the findings of the inspection. • Inspection of steel piping using magnetic flux leakage or RFEC technology is planned for 2023. Follow-up inspection rate to be determined by the findings of the inspection. • 2023: Two access manholes installed, one on each side of the river for RFEC inspection. However, RFEC inspection was deemed too risky. Pipe was then dewatered and a full-length CCTV inspection completed. A low head leakage test was also completed at this time and the results indicated the pipe was not leaking. Follow-up inspection rate to be determined by the findings of the inspection. Final report with recommendations to be provided in 2024.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves has been done to ensure proper operation.
Community Row (Assiniboine River Crossing)			
• 600mm and 500mm diameter steel inverted interceptor siphons installed in 1971. Pipes were installed through riverbank and river bottom.	• mechanical stress caused by slope instability • debris accumulation • corrosion	• 2012: Internal SONAR inspection completed showed pipes were in good condition with peak debris levels in either pipe below 10% of the cross sectional area. • 2014: Asset was inspected using Remote Field Eddy Current (RFEC) technology in fall. Inspection results showed pipes were in poor condition in certain areas. • 2015: Both pipes were successfully rehabilitated in fall using CIPP (cured in place pipe) liners and were given a structural performance grade (SPG) of 1, indicating the sewers are in excellent condition. • Re-inspect the sewer by CCTV in approximately 30 years (2045) to confirm the asset condition. • 2019: Toe armoring required in 5-10 year forecast (2023). • 2023: Slope regrading and armoring is planned to be completed in 2025.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Isolation valves/gates were found to be inoperable and removed as part of the 2015 lining project. There are no plans to replace the valves. Should the crossing require isolation in the future, other reliable and effective isolation methods will be used.

Assiniboine Park Zoo (Assiniboine River Crossing)			
• 200mm diameter steel inverted siphon installed in 1967. Pipe was installed through riverbank and river bottom.	• mechanical stress caused by slope instability. • debris accumulation • failure of isolation valve • corrosion	• 2012: Asset inspected using RFEC in fall. Results show that the pipe has an estimated remaining service life of 57 years. Re-inspect using RFEC technology in approximately 22 years (2034). • 2021: River bottom scanning completed. Results indicated visible pipe trench. Potentially 20m of pipe may be exposed in riverbed. Trench is a straight line (north to south) indicating no major lateral shift has occurred.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Annual opening and closing of isolation valves have been done to ensure proper operation.
Heritage Park (Sturgeon Creek Crossing)			
• 250mm diameter C-900 PVC force main installed in 1989. Pipe was installed through creek bank and creek bottom.	• mechanical stress caused by slope instability, pressure fluctuations. • debris accumulation • failure of isolation valve	• 2017: Asset to undergo internal sonar inspection. Follow-up inspection rate to be determined by the findings of the inspection. • 2019: Inspection scheduled by low pressure leakage test and pipe sample material testing. • 2020: Condition assessment recommends geotechnical work (toe armouring) by 2025. • 2023: Slope regrading and armoring is planned to be completed in 2025.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer.
Windham Road (Sturgeon Creek Crossing)			
• Two 450mm diameter steel inverted siphons, encased in concrete, installed in 1964. Pipes were installed through creek bank and creek bottom.	• mechanical stress caused by slope instability • debris accumulation • failure of isolation valve • corrosion	• 2014: Assets were inspected using RFEC technology in fall. Results show that the pipes have an estimated remaining service life of 5-6 years. Rehabilitation of both pipes recommended in the 2-5 year forecast. • Site investigation and geotechnical slope stability analysis indicates south bank of the river will require slope stabilization. Geotechnical work can coincide with pipe rehabilitation. • 2018: Acoustic leak detection inspection did not identify any leaks on this asset. • 2019: Rehabilitation of both pipes by CIPP lining started in December 2019 and will be completed in January 2020. • 2020: CIPP lining of both pipes is complete. • Re-inspect the sewer by CCTV in approximately 30 years (2050) to confirm the asset condition.	• Weekly (March-November) and monthly (December-February) visual inspections were carried out by Wastewater Services staff. There were no observed riverbank stability issues, open water in the winter ice or surface disturbances, such as vortexing, in the summer. • Yearly exercising of upstream valves was completed.