



*Report for:*

## **CITY OF WINNIPEG**

-WATER AND WASTE DEPARTMENT-

### *Final Report*

WASTEWATER LIFT STATION CONDITION ASSESSMENT PHASE II

Document VII: Metcalfe Lift Station Assessment



Date: March 16, 2020  
City File No.: S-1095  
MPE Project No.: 8400-001-00

### Corporate Authorization

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**MPE ENGINEERING LTD.**

Prepared By:



*Mar 16, 2020*

M. Jason Stusick, P.Eng.  
Project Manager



*March 16, 2020*

Ryan Ursu, P.Eng.  
Mechanical Engineer



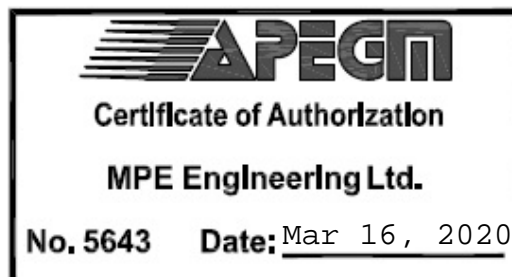
*MAR 16 2020*

Mark Baker, P.Eng.  
Structural Engineer



*MARCH 16, 2020*

Richard Ofstie, P.Eng.  
Electrical Engineer



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## 1.0 Introduction

### 1.1 Background

MPE Engineering Ltd. (MPE) conducted a visual inspection of the Metcalfe Lift Station on April 17, 2019. City of Winnipeg (the City) staff accompanied MPE for the duration of the inspection. The purpose of the site inspection was to assess the current condition of the facility and identify components that will require replacement or maintenance. The condition assessment will assist the City in making informed decisions on short and long-term maintenance requirements of the facilities. The scope of the condition assessment includes the following:

- Detailed assessment of the following **Asset Categories**:
  - Facility (including site, structural, and HVAC systems),
  - Pumps and motors,
  - Electrical and communications,
  - Pipe work and valves,
  - Power, and
  - Force mains.
- Review of code compliance, occupant safety, and accessibility.
- Recommendations and cost estimates for rehabilitation projects.
- Recommendations on any follow up re-inspection work.

This document provides an assessment of the current infrastructure in terms of the performance and condition of individual lift station components, review of lift station components with respect to the latest codes and standards, as well as a hydraulic and capacity review. The assessment identifies components that require replacement or maintenance along with associated estimation of cost.

The assessments were based on **Condition Assessment Forms** that were developed from our site investigations, discussions with Operation Staff, and review of available documents. These forms were used to assign ratings to each component of the lift station in order to develop the cost estimates and recommendations.

### 1.2 Limitations

Inspections were limited to cursory visual review of lift station components. Analysis of below grade infrastructure that was not accessible has not been included. Buried pipelines were not exposed or reviewed. Assessment of below grade infrastructure has been based on operational comments from City staff and life cycle estimations. Destructive testing methods were not conducted.

### 1.3 Design Standards & Guidelines

MPE prepared this assessment in accordance to the standards and guidelines listed in **Appendix G**.

### 1.4 Methodology

The condition assessment consisted of the following:

- Review of available documents and drawings. Documents were reviewed to determine if any previously identified issues were unresolved or remain unaddressed. Drawings were examined in order to understand intent of design, design capacity, and to review component compliance with applicable codes.
- Site inspections of each facility. Inspections were conducted by qualified personnel. Photographs of each site were taken and field assessment forms were completed. City of Winnipeg staff accompanied MPE

personnel and provided operational information, background, and the history of each facility. Additionally, City staff identified the areas of operation and maintenance concern.

- Informal interviews with Operations Staff. Interviews were conducted to collect further information about each site and to identify issues that are of importance to the maintenance staff. Staff members were also able to provide valuable historical information about deficiencies identified at each site.
- Completion of Condition Assessment Forms. The collected information was compiled and reviewed to identify deficient items. A system of rating the condition of each component was developed. Estimated costs for correcting the deficiencies were assigned to each deficiency. Recommendations were developed based on the condition of the component, importance of the component, as well as safety and code compliance. Results were compiled into the Condition Assessment Forms.

### 1.5 Evaluation Criteria

The Asset Categories identified in Section 1.1 were evaluated based on the following Likelihood Indicators:

- **Current Physical Condition** – Assesses the actual condition of the component.
- **Fitness for Purpose** – Assesses the component’s ability to consistently deliver the design performance required.
- **Maintenance and Operability** – Assesses whether optimal maintenance and operation practices occur.
- **Third Party and Environmental Damage** – Assesses vulnerability to external hazards.

*Note: The “Demand Condition” indicator, used in previous assessments conducted by the City, was removed from this assessment and incorporated into Fitness for Purpose. The “Third Party and Environmental Damage” indicator was removed from Facility assessments but remains an indicator for force main assessments.*

Table 1.1 provides a general overview of the scoring matrix that was used to assess each component. The scoring criteria was adjusted to suit each asset category, but generally utilized the following format:

Table 1.1 : CONDITION RATING LEGEND			
SCORE	5	Emergency / Critical	Component is not functional or is causing an unsafe condition
	4	Poor / Unsatisfactory	Component has extensive deficiencies that may affect plant operations. High level of maintenance may be required
	3	Fair	Component is able to function for its intended use. Additional maintenance may be required
	2	Good	Only minor deficiencies. Routine maintenance should be sufficient for foreseeable future
	1	Excellent	Component is in new condition

### 1.6 Condition Assessment Forms

The Condition Assessment Forms are the basis of our assessment. The forms compile information gained through site visits, discussions with Operations staff, review of documents, and engineering experience. A sample form is shown in Figure 1.1. Individual assessment forms were generated for each piece of equipment assessed. The completed assessment forms have been appended to this report.

Figure 1.1 – Condition Assessment Form Sample

SECTION		ITEM	DATA	Current Physical Condition	Fitness for Purpose	Assessment Scores	Likelihood Indicator Scores		
							YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
		GENERAL	Location: Drywell, Main Level Description: IC_101_Panel Function: Station Monitoring PLC Processor: SCADAPack 357 UPS Protection: Yes	3	1		2013	30	24
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5
		Current Physical Condition	<b>Equipment Visual Inspection Issues for Discussion:</b> Likelihood Indicators Rating 1 (New) or Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears to be in "Good" condition. Equipment is not rated for classified locations. Wiring methods do not follow provided raceway. Panduit cover is removed. No redundancy.			
		Current Physical Condition	<b>Canadian Electrical Code Issues Identified: Issues for Discussion:</b> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4	Notes & Comments			
		Current Physical Condition	<b>Control Wiring Terminations Visual Inspection: Issues for Discussion:</b> Asset Consideration Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1	Assessor's Rating			
		Current Physical Condition	<b>Occurrences of Maintenance Issues: Issues for Discussion:</b> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4	Recommendations with Cost Estimates			
		Fitness for Purpose	<b>Controls Functioning as Expected: Issues for Discussion:</b> Rating 1 (Always) Rating 2 (More than half of time) Rating 3 (Half of the time) Rating 4 (Less often than half) Rating 5 (Never)	1	0.3	<b>RECOMMENDATIONS:</b> Incorporate redundant control for the lift station. Upgrade HVAC system. Install panduit cover.	<b>COST ESTIMATE</b> \$ 45,000.00		
		Fitness for Purpose	<b>Panel is Appropriately Designed: Issues for Discussion:</b> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1	Pre-Established Weighting			
		Fitness for Purpose	<b>Control Logic is Appropriate for Installation: Issues for Discussion:</b> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3				
		Fitness for Purpose	<b>Communications Equipment is Appropriate: Issues for Discussion:</b> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1				
		Fitness for Purpose	<b>Equipment Remaining Service Life: Issues for Discussion:</b> Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	2	0.2				
PHOTOGRAPHS									

## 2.0 General Overview


### 2.1 Location

The Metcalfe Lift Station is located on the alley between Metcalfe Avenue and Lyndale Drive, bordering the Red River in central Winnipeg. It is east of the Red River and west of St. Mary’s Road.

### 2.2 General

The original construction date is uncertain, though the superstructure is very similar to that of the Conway Lift Station, which was constructed in 1963. The drawings provided by the City suggest that the station was constructed in the 1970’s or 1980’s. The station has gone through numerous renovations and currently services a relatively small, primarily residential area.

Table 2.1: Metcalfe Lift Station Overview		
YEAR CONSTRUCTED	1970	Major Reno: 1998
LOCATION	660 Lyndale Drive – Back lane between Metcalfe and Lyndale	
CONFIGURATION	Wet Well / Dry Well	
PUMPING CAPACITY	23.3 L/s	
TYPE OF PUMPS	Dry Pit Solids Handling	
PUMP HORSEPOWER	P1: 7.5 HP, P2: 7.5 HP	
BACKUP GENERATOR	Mobile Generator - Full Station	
VENTILATION	Dry Well: Intermittent, Wet Well: N/A	



In general, the station is in “Good” to “Fair” condition. However, the station is aging and is in need of renovation and upgrades to ensure reliable usage in the future. A structural assessment would be required prior to renovations due to past modifications to the primary structural components. Otherwise, mechanical and electrical components comprise most of the required upgrades.

*Metcalfe Site Location – Google Earth*

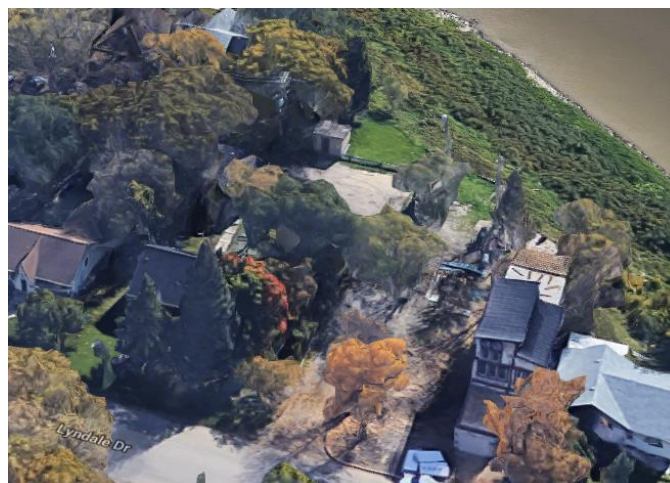
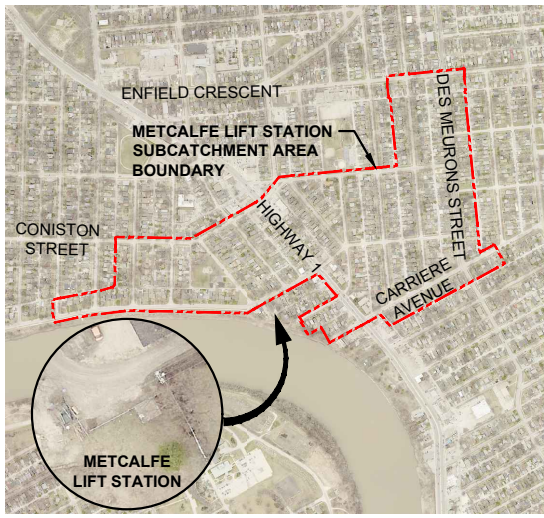


Figure 2.1 provides an overall site location plan of the lift station facility.





NOTES:

1. FORCEMAIN ALIGNMENT IS BASED ON OUR INTERPRETATION OF THE DOCUMENTS AVAILABLE TO US AT THE TIME, AND IS INTENDED FOR CONCEPTUAL PURPOSES ONLY.



CITY OF WINNIPEG

LIFT STATION ASSESSMENTS 2018-2019  
 METCALFE LIFT STATION  
 LOCATION PLAN

SCALE: 1:750

DATE: AUGUST 2019

JOB: 8400-001-00

FIGURE: 2.1



### 3.0 Information and Regulatory Review

#### 3.1 Historical Data Review

##### 3.1.1 Data Collection

The City of Winnipeg records estimated average and peak incoming flow into the lift station wet well. Estimated flows were provided by the City.

##### 3.1.2 Record Drawings, Reports, & Manuals

The following data, plans, reports, and manuals were compiled and reviewed to complete this report:

- Metcalfe Flood Pumping Station Arc Flash Study Single Line Diagram – Record Drawing; SNC-Lavalin Inc.; 2010
- Metcalfe Wastewater Pumping Station Upgrading – Record Drawing; The City of Winnipeg Water and Waste Department; 1992
- Metcalfe Lift Station Electrical and Control Upgrading – Record Drawing; The City of Winnipeg Works and Operations Division Waterworks Waste and Disposal Department; 1992
- Relocation of the Metcalfe Pumping Station Force Main – Record Drawing; The City of Winnipeg Works and Operations Division Waterworks Waste and Disposal Department; 1990
- Metcalfe Lift Station Upgrading Electrical – Record Drawing; The City of Winnipeg Works and Operations Division Waterworks Waste and Disposal Department; 1990
- Superstructure Metcalfe Place Pumping Station – Record Drawing; Greater Winnipeg Sanitary District Secondary Sewers; 1979
- Local Water and Sewer Drawings; City of Winnipeg
- Catchment Areas and Information; City of Winnipeg
- LIFT\_STN\_SERVICE\_AREAS.gws – Lift Station Catchment Areas

## 4.0 Sewage Production

### 4.1 General

The service area and design flows were generated based on discussion with the City representatives along with the design criteria presented in the *City of Winnipeg Wastewater Flow Estimation and Servicing Guidelines; 2018*.

#### 4.1.1 Catchment Area

The catchment area for the Metcalfe Lift Station was provided by the City from the LIFT\_STN\_SERVICE\_AREAS.gws workspace and consists of primarily Single Family Dwellings with a smaller area of Multi-Family Dwellings. The catchment area is located primarily east of Chandos Avenue, south of Coniston Street, west of Des Meurons Street, and north of Carriere Avenue. Figure 4.1 illustrates the sub-catchment area for the Metcalfe Lift Station.

#### 4.1.2 Peaking Factor

To account for the diurnal fluctuations in sewage flows, peak hourly flows are calculated based on the peaking factor derived from the Harmon equation:

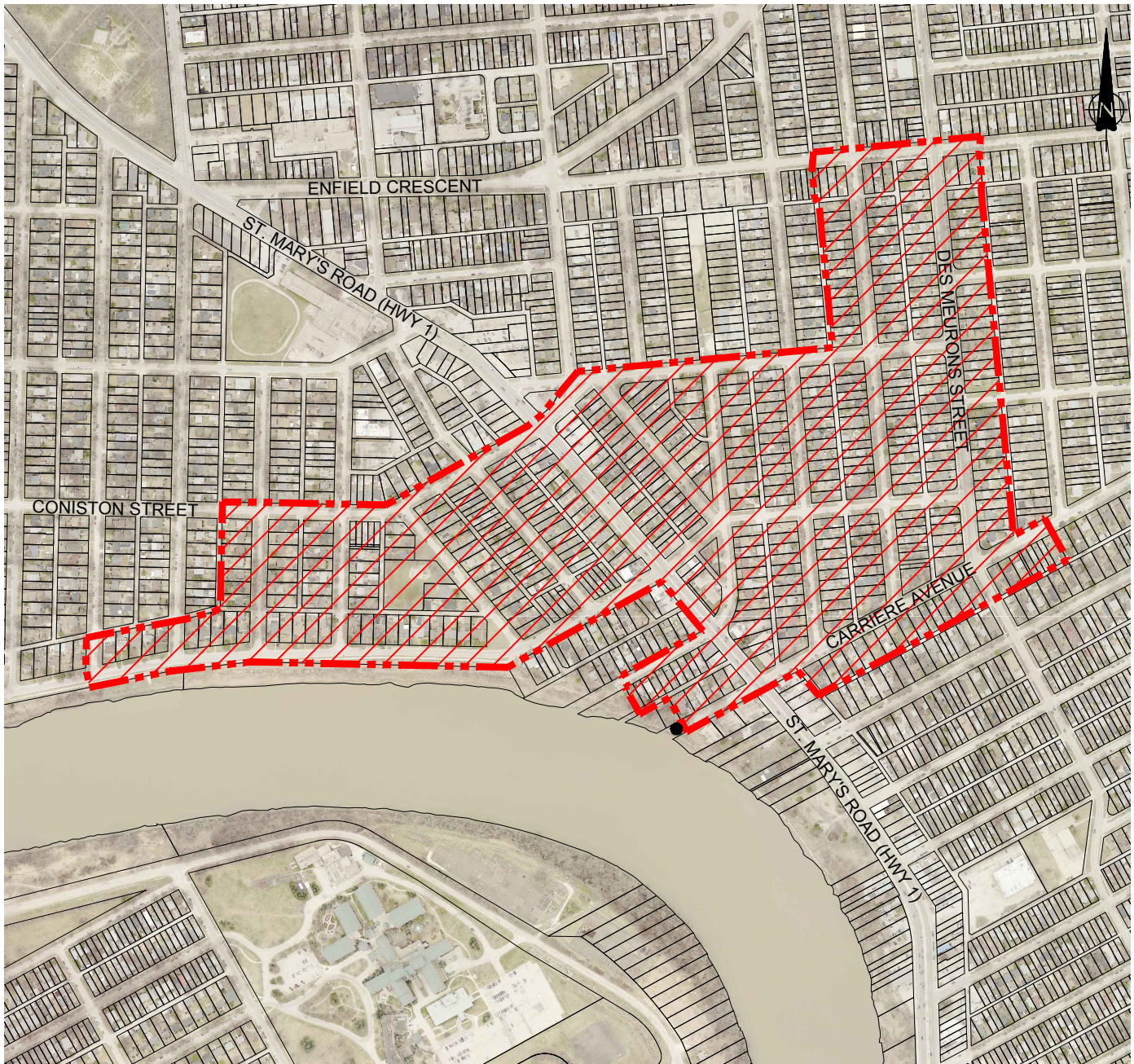
$$\text{Harmon's Peaking Factor} = 1 + 14 / (4 + P^{1/2})$$

where: P = design contributing population in thousands



*Metcalfe Wet Well*





METCALFE	
ROW LABELS	COUNT
APARTMENTS	13
CONDO-COMPLEX	2
DETACHED SINGLE DWELLING	429
MEDICL OFFICE CLINIC	1
MULTI FAMILY CONVRSN	1
OFFICE	1
PUMP/SEWAGE/LIFTSTNS	2
RES SECONDARY UNIT	1

METCALFE	
ROW LABELS	COUNT
RESIDENTIAL OUT BLDG	1
STORE	6
VACANT COMMERCIAL	1
VACANT PARK	1
VACANT RESIDENTIAL 1	6
VEHICLE SERV RELATED	3
<b>GRAND TOTAL</b>	<b>468</b>

**LEGEND**



METCALFE SUBCATCHMENT  
 AREA=35.5 ha (87.7 acres)  
 LIFT STATION



CITY OF WINNIPEG  
 LIFT STATION ASSESSMENTS 2018-2019  
 METCALFE LIFT STATION  
 SUBCATCHMENT AREA

SCALE: 1:7500

DATE: AUGUST 2019

JOB: 8400-001-00

FIGURE: 4.1

## 4.2 Wastewater Flows

### 4.2.1 Historical Flows

Historical wastewater flow data was not available for the Metcalfe Lift Station. Therefore, the following assumptions have been used to estimate the current and projected ultimate capacities for the facility:

- Land use consists of Single Family Dwellings and Multi Family Dwellings.
- Catchment area is approximately 35.5 ha.
- Average dry weather wastewater flow as follows:
  - Residential areas – 270 litres per capita day (Lpcd).
  - Commercial areas – 16,800 L/ha/day.
- Extraneous flow allowance as follows:
  - Groundwater infiltration – 2,200 L/ha/day.
  - Manhole infiltration – 12 L/min/manhole.
    - Residential manhole density – 1.6 manholes/ha.
    - Commercial/industrial manhole density – 1.0 manholes/ha.
  - Weeping tile flow – 4.55 L/min/service connection.
    - Only included in residential areas constructed prior to 1990.
- No anticipated future developments to be serviced by the lift station.

Table 4.1 illustrates the estimated wastewater flows.

TABLE 4.1: ESTIMATED WASTEWATER FLOWS								
SUBCATCHMENT DESIGN FLOW								
LAND USE	AREA (HA)	DWELLING DENSITY (DWELLINGS/HA)	DWELLINGS (NO.)	POPULATION DENSITY (PPL/DWELLING)	EQUIVALENT POPULATION	HARMON PEAKING FACTOR	AVERAGE DRY WEATHER FLOW	
							(LPCD)	(L/SEC)
Single Family Dwelling	33.5	12.29	411.7	3.05	1,256	-	270	3.9
Multi-Family Dwelling	2.0	74.13	148.3	2.30	341	-	270	1.1
<b>Subtotal</b>	<b>35.5</b>				<b>1,597</b>	<b>3.660</b>	<b>270</b>	<b>5.0</b>
							<b>(L/HA/DAY)</b>	<b>(L/SEC)</b>
Commercial		-	-	-	-	-	16,800	0.0
<b>Subtotal</b>	<b>0.0</b>						<b>16,800</b>	<b>0.0</b>
<b>Total:</b>	<b>35.5</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>5.0</b>
LAND USE	PEAK DRY WEATHER FLOW		EXTRANEOUS FLOW CONTRIBUTIONS				PEAK WET WEATHER FLOW	
	(LPCD)	(L/SEC)	GROUNDWATER	MANHOLE		WEEPING TILE		
			(L/SEC)	(MH/HA)	(L/SEC)	(L/SEC)	(L/SEC)	
Single Family Dwelling	-	-	0.9	1.6	10.7	31.2	-	
Multi-Family Dwelling	-	-	0.1	1.6	0.6	-	-	
<b>Subtotal</b>	<b>988</b>	<b>18.3</b>	<b>0.9</b>	<b>-</b>	<b>11.4</b>	<b>31.2</b>	<b>61.7</b>	
	<b>(L/HA/DAY)</b>	<b>(L/SEC)</b>	<b>(L/SEC)</b>	<b>(MH/HA)</b>	<b>(L/DAY)</b>	<b>(L/SEC)</b>	<b>(L/SEC)</b>	
Commercial	28,100	0.0	0.0	1.0	0.0	-	-	
<b>Subtotal</b>	<b>28,100</b>	<b>0.0</b>	<b>0.0</b>	<b>-</b>	<b>0.0</b>	<b>-</b>	<b>0.0</b>	
<b>Total:</b>	<b>-</b>	<b>18.3</b>	<b>0.9</b>	<b>-</b>	<b>11.4</b>	<b>31.2</b>	<b>61.7</b>	

The estimated average dry weather flow is 5.0 L/sec, the peak dry weather flow is 18.3 L/sec, and the peak wet weather flow is estimated to be 61.7 L/sec.

### 4.2.2 Projected Flows

No further expansion is anticipated for the catchment area for the Metcalfe Lift Station.



## 5.0 Lift Station Hydraulic & Capacity Review

### 5.1 Background

The lift station houses two (2) dry pit solids handling pumps. The primary pump cycles between the two pumps on a pump operational basis. The pumps start at a level of 1000 mm and stop at a level of 300 mm. Table 5.1 provides a summary of the pumps utilized at the Metcalfe Lift Station. Table 5.1 provides a summary of the pumps utilized at the Metcalfe Lift Station.

**TABLE 5.1: METCALFE LIFT STATION PUMPING SUMMARY**

PUMP	Pump Type	MANUFACTURER	MODEL	POWER (HP)	YEAR OF INSTALL	DUTY POINT		DISCHARGE SIZE (mm)
						FLOW (L/sec)	TDH (m)	
PUMP 1 - P-101	DRY PIT SOLIDS HANDLING	FAIRBANKS MORSE	K3X1	7.5	1992	22.1	9.1	100
PUMP 2 - P-102	DRY PIT SOLIDS HANDLING	FAIRBANKS MORSE	K3X1	7.5	1992	22.1	9.1	100

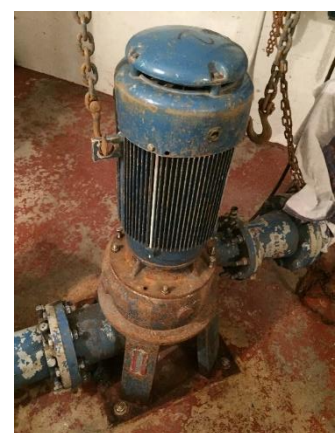
\* Based on duty point in Pump Manufacturer's datasheet

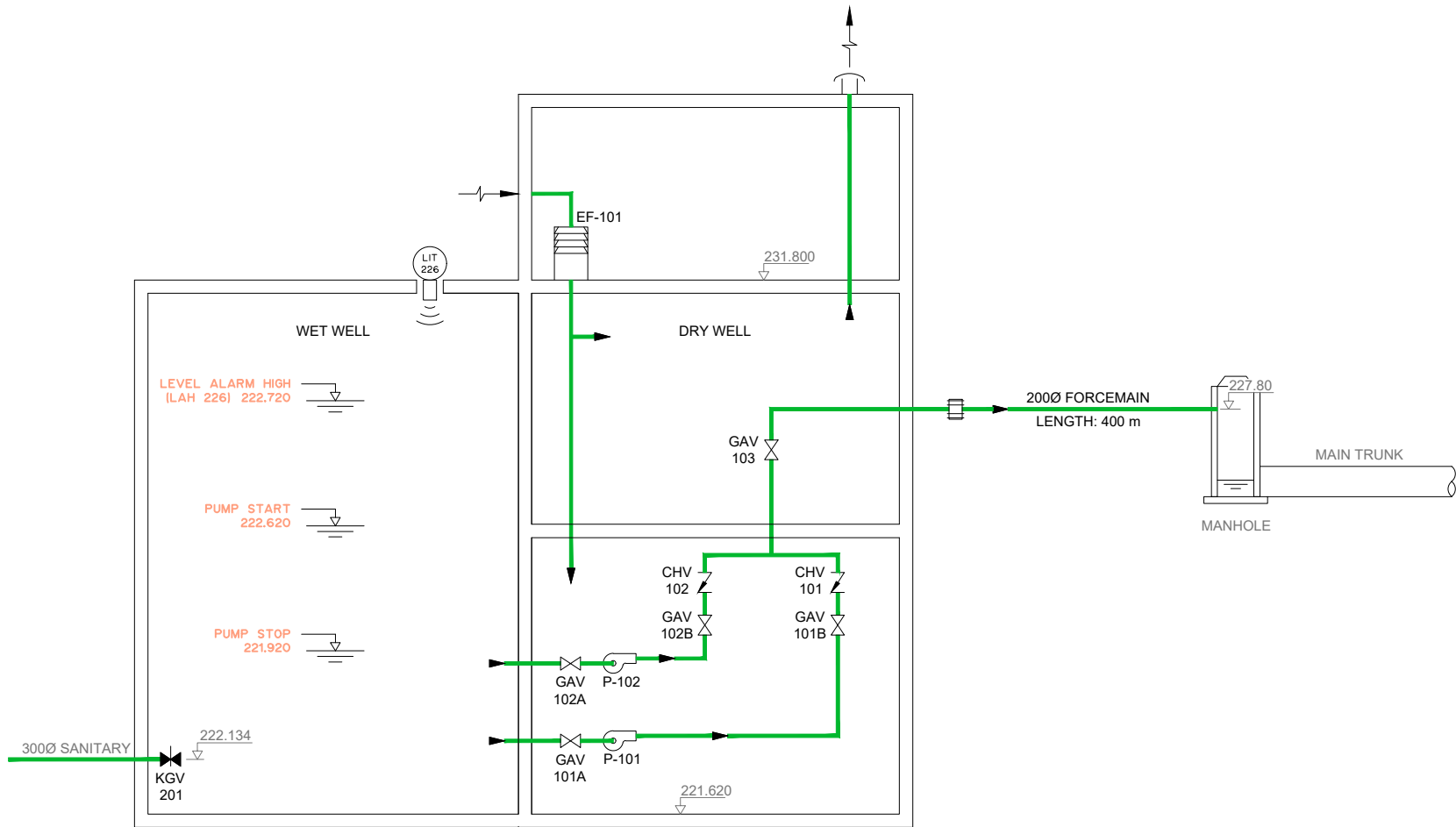
P-101 and P-102 are identical Fairbanks Morse K3X1 pumps rated for 22.1 L/sec at a Total Dynamic Head (TDH) of 9.1 m and operate at a constant speed. Operational staff noted that the pump impellers are in poor condition and there are concerns that the pumps are not able to keep up with wet weather events.

A 200 mm diameter PVC force main is used to discharge sewage from the Metcalfe Lift Station. The force main is located in the lane behind Metcalfe Place and south along St. Mary's Road where it connects to a manhole.

#### 5.1.1 Process Flow Diagram

Figure 5.1 provides an overall process flow diagram of the Metcalfe Lift Station.





P-101  
 - DUTY POINT: 22.10 L/s @ 9.1 m  
 - 7.5 HP, 1170 RPM  
 - 575 VAC/3 PH/60 Hz

P-102  
 - DUTY POINT: 22.10 L/s @ 9.1 m  
 - 7.5 HP, 1170 RPM  
 - 575 VAC/3 PH/60 Hz



LIFT STATION ASSESSMENTS 2018-2019

METCALFE  
 PROCESS FLOW DIAGRAM

SCALE: NTS

DATE: JULY 2019

JOB: 8400-001-00

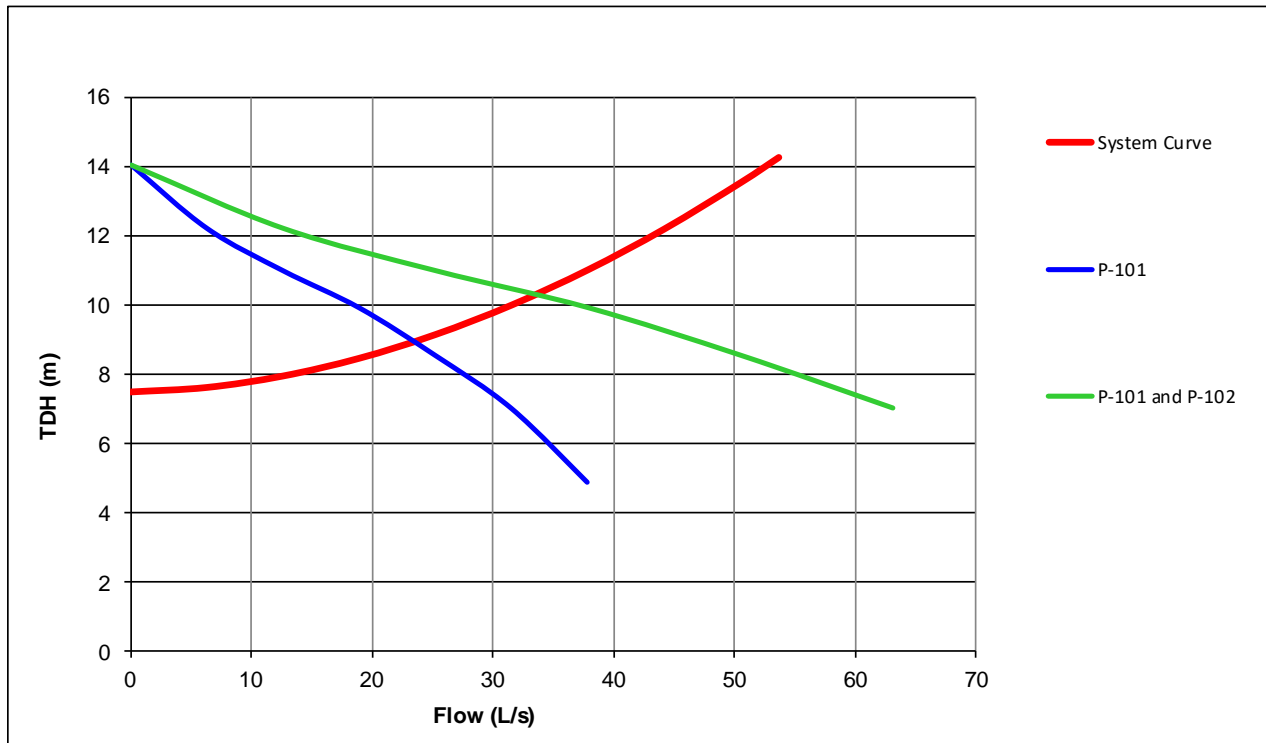
FIGURE: 5.1

## 5.2 Hydraulic Analysis

### 5.2.1 Pump Capacity Review

To develop the lift station system curve, the piping system was analyzed using the Darcy – Weisbach formula. The anticipated pump flows are determined by the intersection of the system curve with the respective pump curves. The lift station system curve versus theoretical pump performance chart is illustrated below in Figure 5.2.

Figure 5.2: Lift Station Curve vs. Pump Performance Curve



The theoretical flows that can be obtained with one pump and two pumps in operation are 23.3 L/s and 33.3 L/s, respectively.

### 5.2.2 Pumping Requirements Review

The design of the lift station pumping system must incorporate standby capacity such that when the largest pump is out of service the station is capable of handling the peak inflow rate. The rated capacity should be equal to or greater than the peak wet weather flow rate of 61.7 L/sec. The maximum pumping capacity of the lift station is approximately 33.3 L/s with both pumps in operation. The 'rated' capacity of the lift station with the largest pump being out of service is currently 23.3 L/sec. **Based on the estimated peak wet weather flow, the pumping system is not currently capable of meeting the peak influent flow requirements.**

### 5.2.3 NPSHA Analysis

A Net Positive Suction Head Available (NPSHA) analysis was performed to review the lift station suction piping system. NPSHA is the maximum absolute pressure available at the suction port of the pump above vapour pressure.



Centrifugal pumps are not capable of handling large quantities of vapour, so it is critical that there is sufficient absolute pressure on the suction side of the pump to prevent vaporization or flashing in the impeller.

An NPSHA analysis was performed at various levels in the lift station wet well. The analysis indicated that there is sufficient NPSHA to prevent cavitation. The results of the analysis are summarized in Table 5.2.

TABLE 5.2: SUCTION LINE NPSHA ANALYSIS							
CONDITION	WET WELL LEVEL (mm)	PUMP SPEED (%)	FLOW (L/s)	SUCTION LINE TOTAL DYNAMIC HEAD (m)	NPSH REQUIRED (m)	NPSH AVAILABLE AT PUMP INLET (m)	NPSH EXCESS AVAILABLE (m)
PUMP 1 STOP	300	100	22.1	0.53	2.44	9.03	6.59
PUMP 1 START	1000	100	22.1	0.53	2.44	9.73	7.29

#### 5.2.4 Force Main Review

A 200 mm diameter PVC force main is used to convey sewage from the Metcalfe Lift Station. The length of the force main is 400 m. The force main was installed in 1991 and has a volume of approximately 12.6 m<sup>3</sup>. Based on the estimated average and peak dry weather flows of 5.0 L/s and 18.3 L/s, the average retention time in the force main ranges from 11 to 42 minutes which is below the maximum recommended retention time of 4 hours.

An analysis of the force main was performed to confirm whether the force main piping is adequate to carry the flow rates from the lift station. Velocities were calculated for theoretical pumping rate scenarios at the Metcalfe Lift Station. The results are summarized in Table 5.3.

TABLE 5.3: FORCE MAIN VELOCITY		
DESCRIPTION	ONE PUMP THEORETICAL	TWO PUMPS THEORETICAL
FLOW (L/s)	23.3	33.3
FORCE MAIN VELOCITY (m/s)	0.74	1.06

The Metcalfe force main was found to be adequately sized for the flows from the lift station and the velocities are within the acceptable range of 0.6 m/sec to 1.6 m/sec.

### 5.3 Wet Well Sump Analysis

The fill time of the wet well from the pump stop level to the pump start level is approximately 16 minutes. Best industry practices state that the filling time based on average flow should not exceed 30 minutes to avoid anaerobic conditions. The existing wet well meets the maximum fill time requirements and is adequately sized for the incoming flows.

#### 5.3.1 Pump Cycling Review

The wet well size was modeled for tank level versus pump cycle time. Average dry day flow results in approximately one (1) pump cycles per hour. Peak dry day flow results in approximately three (3) pump cycles per hour. Peak wet weather flow will result in both pumps operating continuously for the duration of the storm event. The maximum allowable starting and stopping intervals for a 7.5 HP pump are 15 cycles per hour. The pump cycles are within the allowable limits and the pump capacity is acceptable for the volume of the wet well. If it were determined that

pump cycles were more than the allowable motor starts per hour, variable frequency drives (VFD's) can be fitted to the pumps to mitigate this issue.

#### **5.4 Wet Well Flow Path Review**

Sewage enters the north side of the wet well through a 300 mm diameter secondary sewer pipeline and is directed to the pump suction lines located on the south side of the wet well. The wet well is long and sloped towards the sump suction lines which prevents solids build up in the edges of the wet well. The 200 mm diameter pump suction lines are located at the bottom of the wet well. Operational staff noted that there are no noticeable issues with solids buildup in the wet well.

#### **5.5 Pump Control Strategy Review**

The following provides a brief outline of the control narrative for the lift station:

##### 5.5.1 General

- Typically, the facility is operated in Automatic mode.
- Pumps can be operated either in Manual or Automatic mode.
- There are no local motor emergency stops in the dry well lower level.

##### 5.5.2 Manual Mode

- The pumps can operate manually through a hand/off/auto switch that can bypass the controller and operate the pump.

##### 5.5.3 Automatic Mode

- In the Automatic mode the station pump controller operates the pumps based on level.
- The pumps will start when the level in the wet well rises above the "Pump Start Level" of 1000 mm.
- If any pump fails to operate correctly in Automatic mode, then a pump failure alarm will be triggered, the failed pump will automatically shut down, and the alternate pump will automatically start to replace the failed pump.
- The pumps shut down at the "Pump Stop Level" of 300 mm.

The control strategy used at the Metcalfe Lift Station is similar to the control strategy used at other lift stations throughout the City. The control strategy is well understood by the Operators and has proven to be a successful method of operation.

#### **5.6 Conclusions and Recommendations**

The hydraulic and capacity assessment of the Metcalfe Lift Station yielded the following conclusions:

- There are no issues with NPSHA or excessive pump cycling in the pumping system.
- The pumping system is capable of meeting the peak dry weather influent flow requirements; however, the pumping system is not currently capable of meeting the peak wet weather influent flow requirements.
- The existing wet well meets the maximum fill time requirements and is adequately sized for the incoming flows.
- The force main was found to be adequately sized for the flows from the lift station and the velocities are within the acceptable range.

## 6.0 Facility Condition Assessment

### 6.1 Background

The following provides a condition assessment of the building facility for the Metcalfe Lift Station in terms of the condition of individual system components and code and regulation compliance. The assessment identifies existing infrastructure that requires replacement, maintenance, or upgrades. A condition rating has been given to the components to identify the condition and cost estimates have been developed. Recommendations have been developed in order to assist the City in prioritizing future projects. The Condition Assessment Forms have been appended to this report.

### 6.2 Code Review

A review of the lift station was undertaken to verify compliance with the National Building Code. Table 6.1 provides a summary of the code review.

TABLE 6.1: METCALFE LIFT STATION - Code Review			
YEAR CONSTRUCTED	1960 (estimated)	Major Reno: 1990	
BUILDING FOOTPRINT AREA (m2)	<25m2		
LOCATION	660 Lyndale Drive		
BUILDING CLASSIFICATION	Non Combustible / Combustible		
ROOFING MATERIAL	Tar Gravel Ballast		
MAJOR OCCUPANCY CLASSIFICATION	F-3 - Low Hazard Industrial		
OCCUPANT LOADING	5 max.		
			
ITEM	REQUIREMENT	CODE COMPLIANCE	CODE REFERENCE / NOTES
BARRIER FREE ACCESS	Not Required	n/a	NBC - 3.8- A3.8.1.1
MAIN FLOOR EXITS	1 required	Yes	NBC - 3.4.2.1 (A) - Floor area < 200m2
TRAVEL DISTANCES	Less than 15 m	Yes	NBC - 3.4.2.1 (A) - F-3 Occupancy
MEZZANINE EXIT	Less than 15 m	n/a	NBC - 3.4.2.2
GUARDRAILS	0.75 kN/m lateral load	Yes	NBC - 4.1.5.14 -
IMPORTANCE FACTOR	Post Disaster	No	NBC - 4.1.2
EGRESS PATHS	1100mm min. width	Yes	NBC - 3.4.3.2
NOISE DECIBLE	< 85 dBA	Yes	OH&S Part 8. -
SPRINKLER SYSTEM	Not Required	n/a	NBC - 3.2.2
EMERGENCY LIGHTING	Required	NO	NBC - 3.2.7.3
EXIT SIGNAGE	Illuminated over door	NO	NBC - 3.4.5.1 (2)
SMOKE ALARM	Not Required	n/a	NBC - 3.2.4.11
FIRE ALARM	Not Required	n/a	NBC - 3.2.4
HAZARDOUS SUBSTANCE	CAPACITY (Litres)	REGISTERED	CODE REFERENCE / NOTES
DEISEL (Fuel Oil) - Generator Room	None	n/a	Registration with Ministry of Environment is not required
DEISEL (Fuel Oil) - Pump Station	None	n/a	Registration with Ministry of Environment is not required
CHLORINE	None	n/a	-Hazardous Substances and Waste Dangerous Goods Regulations recommends registration for tank capacity > 4000 Litres-
SECURITY	SITE SECURE	BUILDING SECURE	NOTES
PUMP STATION	NO	YES	Minor graffiti on building exterior

### 6.3 Site Conditions

The Metcalfe Lift Station is located on the alley between Metcalfe Avenue and Lyndale Drive. It is surrounded by residences and the Red River. Access to the wet well is gained through a manhole in front of the lift station. The grass around the station is kept mowed.

#### 6.3.1 Site Access and Parking Lot

The alley from which the station is access can be accessed from Lyndale Drive or St. Mary's Road. There is sufficient parking space on site but the gravel is eroding away and will have to be replaced soon. The parking area guardrail has minor damage.

#### 6.3.2 Site Grading & Landscaping

The site appeared to be sufficiently graded away from the building. No ponding has been noticed. The ground near the front of the building has settled and damaged the front step. An overhanging tree interferes with incoming wires.

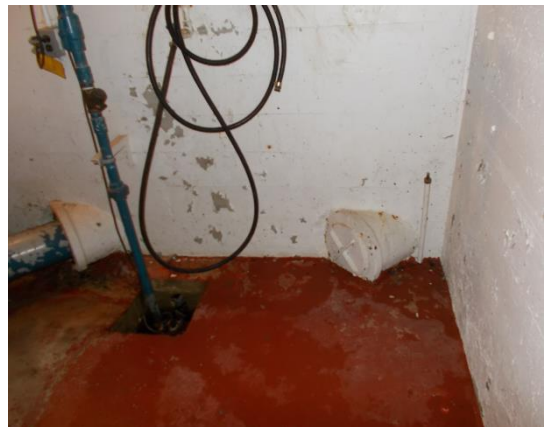
#### 6.3.3 Security and Signage

There is no perimeter fencing around the station. The building does not have windows and is secure. The electric meter located on the exterior of the building could be subject to vandalism. Signage identifies the building as a City of Winnipeg facility, but does not provide emergency contact information. This signage is damaged and mostly illegible. Other signage has been removed and stored on the roof of the station. Graffiti was noted on the exterior of the building.

### 6.4 Foundations

#### 6.4.1 Foundation Slab

The Metcalfe Lift Station foundation consists of a cast-in-place concrete wet well/dry well configuration. The concrete dry well acts as the primary foundation for the lift station building with the wet well cast against the north side. The concrete base slab finish is worn and paint is flaking off, but it remains in "Good" condition with no structural concerns. The sump pit is functional with good floor slope for drainage to the sump



#### 6.4.2 Foundation Walls, Columns, and Beams

The cast-in-place walls and beams are in "Good" condition. No structural concerns were noted, though paint is flaking off in many areas.

#### 6.4.3 Wet Well

The wet well access vault is an old masonry structure with narrow "handhold" ladder rungs imbedded in the mortar. The mortar is deteriorating and the rungs have corroded. Some bricks are loose. Access to the well is not recommended in any condition unless full harnessing and safety protocol is followed.

The wet well chamber is aged and deteriorating. The walls showed indications of deterioration of the paste, and

there is evidence of infiltration and root presence. The wet well should be replaced.



## 6.5 Primary Structural Systems

### 6.5.1 Loadbearing Walls, Columns and Beams

During the inspection, MPE was unable to assess the superstructure components due to the cladding installed. The drawings provided by the City suggest that the structure was built using Haydite blocks and Haydite precast roof panels. The **superstructure** is **structurally sound** as well as the subgrade concrete walls and base slab. The cast-in-place **concrete beams supporting the main floor slab** are in **“Good” condition**.

### 6.5.2 Suspended Floors, Trusses, and Joists

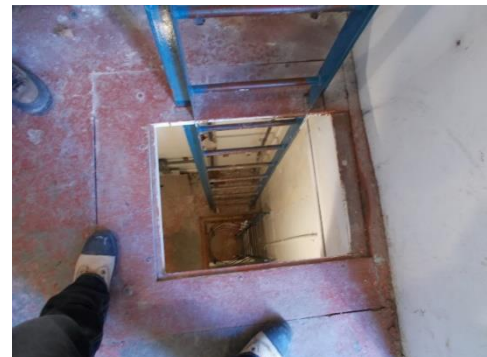
The **mid-level suspended floor slab appears to be in “Good” condition** from the top, though the finish has worn. There is damage to the bottom, exposing rebar. The **exposed rebar has corroded and will continue to damage the concrete**. During past renovations, pipe penetrations have been patched and new penetrations have been cut. There is damaged concrete around these penetrations. The suspended slab still appears suitable to support the current loading.

## 6.6 Secondary Structural Systems

### 6.6.1 Stairs, Ladders, Catwalks, Hatches, Rails

The ladders in the Metcalfe Lift Station are a **safety concern**. The upper ladder does not have a proper landing and dismounts directly over another penetration. There are no guard rails around the openings and ladders are aged and corroded. The ladders are supported in some places by slotted wood infills.

The hatches in the station are square, unhinged, and the lids are subject to falling through the openings. There are no safety guard rails in place around the hatches.



### 6.6.2 Interior Walls, Ceilings, Support Members, Equipment Pads

The equipment pads are aging with weathered paint, but are fit for use. Some metal equipment bases are corroding around the anchors.

### 6.6.3 Finishes

**The paint on the floor surfaces has worn off on all levels.** An epoxy coating on the floor would be ideal for durability, but will require additional prep work in the lower pump room due to the age of the concrete and the

surface deterioration. The paint on the lowest level walls is peeling and can be resurfaced with a latex or suitable acrylic-latex paint to improve aesthetics and protect the surfaces.

#### 6.6.4 Monorails and Hoists

The hoist is aged and corroded. It should be replaced. The lifting lugs are labelled clearly and appear to be in "Good" condition. No record was found of an independent certification of the hoist.

### 6.7 Building Envelope

#### 6.7.1 Exterior Siding, Roofing, Doors

The drawings indicate that superstructure is composed of brick-faced haydite block. The masonry is broken and cracked around an electrical penetration. This compromises the envelope and should be sealed. The metal door is aging but is still fit for use. A metal grate covers an exhaust penetration but is insufficient in shape or size to protect the penetration properly.



#### 6.7.2 Insulation, Vapour Barrier, Interior Liner

Insulation was added to the superstructure post initial construction. The rigid insulation board, vapour barrier, and painted plywood liner were properly installed and provide a suitable insulation and building envelop system for the station.



#### 6.7.3 Flashings, Soffits, Sealants, Weather-stripping

The flashings, trim, and sealants are corroded and should be replaced with the next renovation.

### 6.8 Roofing

#### 6.8.1 Roof Membrane, Insulation, Decking

Drawings indicate that the roof structure is a haydite panel system. The roofing is a bonded membrane with rock ballast. The roof is not sufficiently sloped and ponding is evident. The rock ballast has eroded away in many areas exposing the membrane to UV deterioration. The roofing will require replacement in the near future.

#### 6.8.2 Skylights, Hatches, Penetrations

The sealants around penetrations are aging and should be replaced. The rock ballast has eroded away exposing the sealant.

#### 6.8.3 Flashings, Trim, Gutters, Downspouts

The trim around the perimeter is weathered and bent. It does not provide a seal. The overflow scupper drains water against the structure. It is not sealed against adjacent flashing and the rock ballast has eroded away from it.



## 6.9 Building Mechanical

### 6.9.1 Heating

The building includes two benchtop electric heaters located on the main floor and lower level that are in “Fair” operational condition. It is recommended that **wall mount unit heaters complete with a thermostat** be installed in the building and dry well lower level to maintain a consistent temperature in the building and lower levels.

### 6.9.2 Interior Plumbing

The domestic plumbing consists of PVC piping and includes a water meter and double check valve assembly. The plumbing system is used to supply seal flush water to the pumps and supplies hose bibs in the lift station. The plumbing system is in “Fair” condition.

Drain lines from the building are directed to a sump in the dry well lower level. A sump pump is used to discharge water from the sump to the wet well. The drainage system is in “Fair” condition and no operational concerns were noted.

### 6.9.3 Fire Suppression Systems

The building has no apparent fire suppression system. It is recommended that a handheld ABC fire extinguisher be installed by the building entrance.

### 6.9.4 Gas Distribution

There is no gas distribution system at the lift station.

## 6.10 Facility Assessment Cost Summary

Table 6.2 summarizes the cost estimates and recommended Action time for each recommendation for the Facility Assessment.

TABLE 6.2: METCALFE FACILITY IMPROVEMENT COST ESTIMATES			
Item	Facility Section	Action	Cost
1	Site Conditions	Short Term	\$ 1,750.00
2	Foundations	Short Term	\$ 350,000.00
3	Primary Structural Systems	-	\$ -
4	Secondary Structural Systems	Short Term	\$ 28,000.00
5	Building Envelope	Mid Term	\$ 5,500.00
6	Roofing	Short Term	\$ 30,000.00
7	Building Mechanical	Mid Term	\$ 3,500.00
<b>Total:</b>			<b>\$ 418,750.00</b>

The capital costs for the recommended improvements have been **estimated in 2019 dollars**. The cost estimate provided is an opinion of probable cost and is a function of many factors that can change with time and hence must not be relied upon as the actual cost. Construction equipment and methods that are commonly used in the industry are assumed for estimating purposes. The estimates have been provided to assist the City with budgetary planning



purposes only and should not be used as actual quotes. The cost estimates are exclusive of taxes.

### 6.11 Conclusions & Recommendations

The major findings of the facility assessment of the Metcalfe Lift Station are summarized as follows:

- The wet well chamber and access vault are both in poor condition and should be replaced.
- Ladders, hatches, and rails are not Code compliant and constitute safety concerns.
- The roof is in poor condition and compromises the building envelope.
- There is no apparent Fire Suppression System.

A detailed breakdown of the recommendations and associated costs can be found in **Appendix A**. The recommendations summarized in Table 6.3:

TABLE 6.3: METCALFE RECOMMENDATIONS	
COMPONENT	RECOMMENDATION
SITE CONDITIONS	"City of Winnipeg" Sign should be replaced
	Re-gravel parking lot
	Replace exterior entrance patio block
FOUNDATION / WET WELL	Replace wet well access vault and chamber
PRIMARY STRUCTURAL SYSTEMS	
SECONDARY STRUCTURAL MEMBERS	Install Guardrail around openings in floor
	Install hinged lids over openings in floor
	Re-finish floors on all 3 levels.
	Re-finish walls on lower floor
BUILDING ENVELOPE	Apply anti-graffitti sealant to exterior
	Seal Exterior Penetrations
	Replace or re-finish flashing and seal. Install downspout and splashpad
	Install proper frame over exhaust vent
ROOFING	Remove and replace roof membrane system
BUILDING MECHANICAL	Install handheld fire extinguisher
	Install wall mount unit heaters in upper and lower levels of dry well


## 7.0 Mechanical Equipment Condition Assessment

### 7.1 Background

This section provides an assessment of the process mechanical equipment in terms of the condition of individual system components and code and regulation compliance. The assessment identifies existing infrastructure that will require replacement or maintenance. A condition rating and priority has been given to the equipment to identify priority of future upgrades. Recommendations and project time frames have been developed in order to assist the City in prioritizing future projects. The Condition Assessment Forms have been appended to this report.

The Metcalfe Lift Station houses sewage pumping equipment and associated piping and valves located in the dry well lower level.

TABLE 7.1: METCALFE LIFT STATION MECHANICAL OVERVIEW	
YEAR CONSTRUCTED	1992
PUMPING CAPACITY	23.3 L/sec
LOCATION	660 Lyndale Dr
NUMBER OF PUMPS	Two (2)
PUMP HORSEPOWER	P-101: 7.5 HP, P-102: 7.5 HP
TYPE OF PUMPS	Dry Pit Solids Handling
PIPING MATERIAL	Carbon Steel



All process mechanical equipment in the lift station was installed during the major upgrades in 1992. Maintenance efforts have been carried out by the City of Winnipeg Operations and Maintenance staff including routine servicing, preventative maintenance, and building cleanup. In general, the equipment is in “Fair” operational condition. Operational staff noted that there are concerns with the lift station capacity and the pumps cannot keep up with wet weather events.

### 7.2 Code Review

A review of the lift station equipment was undertaken to verify compliance with current ANSI and Hydraulic Institute design standards. Table 7.2 provides a summary of the code review.

TABLE 7.2: MECHANICAL CODE REVIEW			
YEAR CONSTRUCTED	1992		
LOCATION	660 Lyndale Dr		
<b>PUMPS</b>			
TYPE	Dry Pit Solids Handling		
PUMP LOCATION	Dry Well		
SUCTION SOURCE	Wet Well - Direct Piped		
<b>PIPING</b>			
SUCTION/DISCHARGE DIAMETER	200 mm / 150 mm		
MATERIAL	Carbon Steel		
<b>ITEM</b>	<b>REQUIREMENT</b>	<b>CODE COMPLIANCE</b>	<b>CODE REFERENCE / NOTES</b>
SUCTION INTAKE SUBMERGENCE	250 mm	YES	ANSI/HI 9.8-2012 Section 9.8.7
SUCTION INTAKE FLOOR CLEARANCE	100 mm	YES	ANSI/HI 9.8-2012 Section 9.8.3.2.3.2
SUCTION INTAKE WALL CLEARANCE	75 mm	YES	ANSI/HI 9.8-2012 Section 9.8.3.2.3.1
SUCTION BELL	Required	NO	ANSI/HI 9.6.6-2016 Section 9.6.6.3.6
SUCTION PIPING VELOCITY	2.4 m/s	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.3.1
SUCTION STRAIGHT PIPE LENGTHS	5	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.3.3
PUMP VIBRATION	0.15 in/sec	NO	ANSI/HI 9.6.4-2016 Section 9.6.4.2.5
PUMP TEMPERATURE	160 F	YES	ANSI/HI 9.6.5-2016 Section 9.6.5.2.6
DISCHARGE PIPING VELOCITY	4.5 m/s	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.4.1
VALVES	Isolation / check	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.4.3



### 7.3 Pumps

The lift station houses two (2) dry pit solids handling pumps. P-101 and P-102 are identical Fairbanks Morse Model K3X1 pumps. Each is equipped with a 7.5 HP, 575 VAC, 3 phase, 60 Hz electric motor. Both pumps are rated for 22.1 L/sec at a TDH of 9.1 m and operate at constant speed. P-101 and P-102 were installed in 1992 and are used regularly. Operational staff noted that the pump impellers are in poor condition and there are concerns that the pumps are not able to keep up with wet weather events.

Overall the pumps are in “Fair” condition. Table 7.3 provides a summary of the condition of the pumps at the Metcalfe Lift Station.

TABLE 7.3: METCALFE LIFT STATION PUMP CONDITION ASSESSMENT						
PUMP	DESCRIPTION	MAKE	MODEL	CONDITION	IMPORTANCE	ACTION
P-101	7.5 HP DRY PIT SOLIDS HANDLING	FAIRBANKS MORSE	K3X1	FAIR	Important	Short Term
P-102	7.5 HP DRY PIT SOLIDS HANDLING	FAIRBANKS MORSE	K3X1	FAIR	Important	Short Term

#### 7.3.1 Vibration and Temperature

MPE collected onsite pump vibration and temperature measurements when the pumps were in operation. Temperature measurements were recorded on the pump motor and volute using an infrared thermometer. Vibration readings were recorded in the x, y, and z axis on the pump motor and volute using a Digital Measurement Metrology Digital Vibration Meter. Table 7.4 provides a summary of the vibration and temperature readings at the Metcalfe Lift Station.

The temperature readings were found to be within the required tolerances as set out in *ANSI/HI 9.6.5-2009 Rotodynamic Pumps – Guideline for Condition Monitoring*. Pump P-102 vibration readings were found to be above the 0.15 in/s tolerance as set out in *ANSI/HI 9.6.4-2009 Rotodynamic Pumps for Vibration Measurements and Allowable Values*.

TABLE 7.4: METCALFE LIFT STATION PUMP VIBRATION AND TEMPERATURE					
PUMP		VIBRATION (in/s)			TEMPERATURE (F)
		x	y	z	
<b>P-101</b>					
	Motor	0.08	0.11	0.04	69
	Volute	0.01	0.02	0.01	48
<b>P-102</b>					
	Motor	0.16	0.36	0.12	78
	Volute	0.02	0.01	0.01	50

#### 7.4 Valves

The valves were installed in 1992. The manually actuated gate valves are used for isolation of equipment for maintenance and are not regularly exercised. The check valves are critical to the operation of the lift station and are exercised regularly through operation. In general, valves are in “Poor” to “Fair” condition. The check valves have frequent clogging issues. Table 7.5 provides a summary of the condition of the valves at the Metcalfe Lift Station.

TABLE 7.5: METCALFE LIFT STATION VALVE CONDITION ASSESSMENT					
VALVE	DESCRIPTION	SIZE	CONDITION	IMPORTANCE	ACTION
GAV-101A	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-101B	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-102A	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-102B	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-103	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
CHV-101	Ball Check Valve	150 mm	POOR	Important	Short Term
CHV-102	Ball Check Valve	150 mm	POOR	Important	Short Term



## 7.5 Piping & Fittings

The lift station includes carbon steel piping for conveyance. The pipe flanges are constructed of carbon steel and stainless steel bolts and nuts have been used. In general, the piping is in “Fair” condition. Table 7.6 provides a summary of the condition of the piping at the Metcalfe Lift Station.

TABLE 7.6: METCALFE LIFT STATION PIPING CONDITION ASSESSMENT				
PIPING	MATERIAL	CONDITION	IMPORTANCE	ACTION
P-101 Suction Line	Carbon Steel	FAIR	Important	Mid Term
P-102 Suction Line	Carbon Steel	FAIR	Important	Mid Term
P-101 Discharge Line	Carbon Steel	FAIR	Important	Mid Term
P-102 Discharge Line	Carbon Steel	FAIR	Important	Mid Term
Discharge Header	Carbon Steel	FAIR	Important	Mid Term

### 7.5.1 Non-Destructive Testing

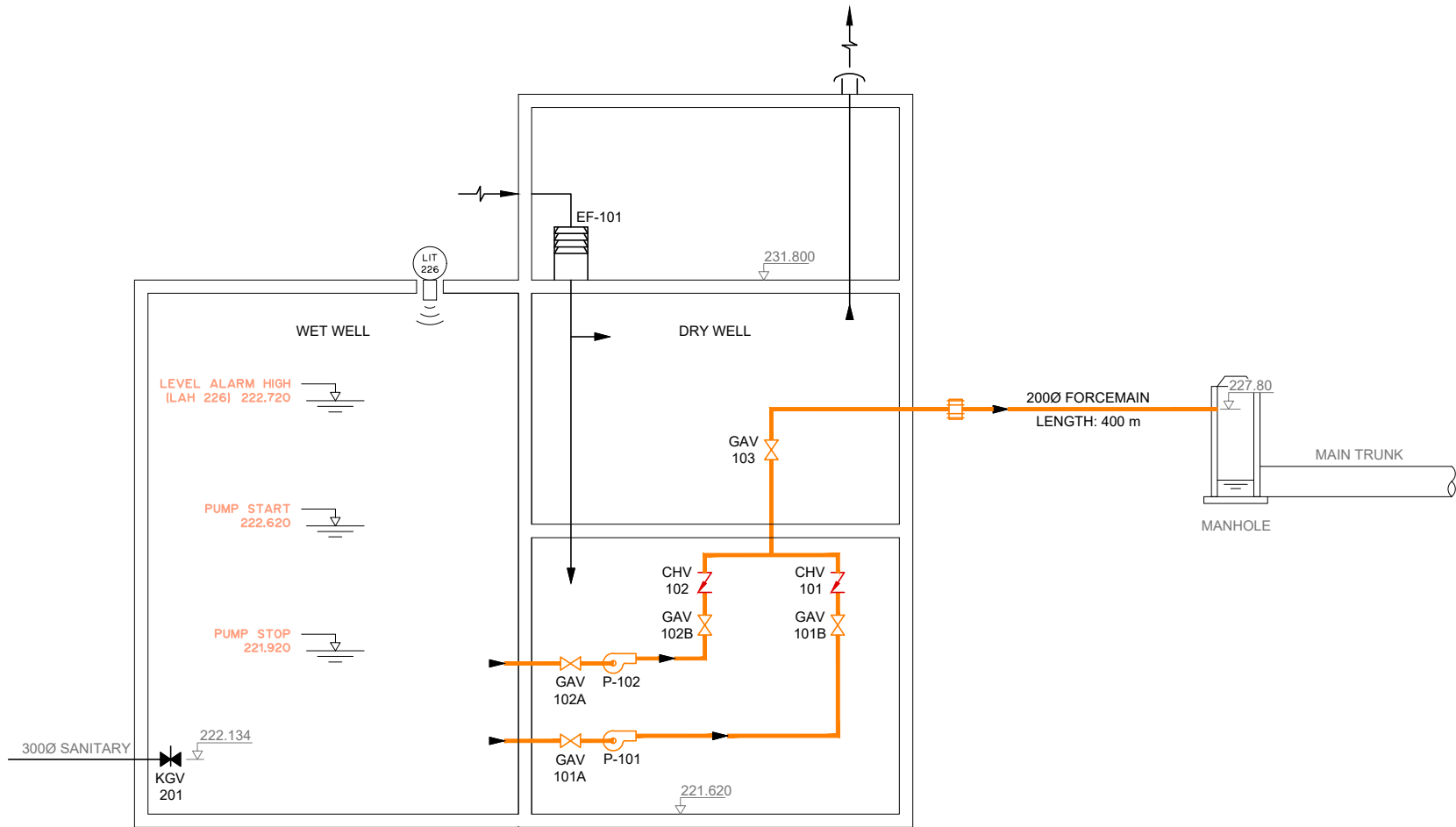
Non-destructive testing was not performed on the piping in the lift station.

### 7.5.2 Cathodic Protection

The lift station does not include cathodic protection and cathodic protection is not recommended for this station.

## 7.6 Summary of Condition Assessment

Figure 7.1 provides a graphical summary of the condition assessment of the mechanical components of the Metcalfe Lift Station.



**P-101**  
 - DUTY POINT: 18.93 L/s @ 9.6 m  
 - 10 HP, 1200 RPM  
 - 575 VAC/3 PH/60 Hz

**P-102**  
 - DUTY POINT: 18.93 L/s @ 9.6 m  
 - 10 HP, 1200 RPM  
 - 575 VAC/3 PH/60 Hz

**LEGEND**  
 — POOR  
 — FAIR  
 — GOOD  
 — EXCELENT



LIFT STATION ASSESSMENTS 2018-2019  
 METCALFE  
 CONDITION ASSESSMENT SUMMARY

SCALE: NTS

DATE: JULY 2019

JOB: 8400-001-00

FIGURE: 7.1

## 7.7 Conclusions

The major findings for the Process Mechanical Assessment are summarized as follows:

- The mechanical equipment ranges in generally “Poor” to “Fair” condition and is at or nearing the end of its service life.
- The pumping system is currently undersized to meet the peak wet weather flows.
- There are issues with the lift station pumps and check valves handling solids.
- The pumping system should be upgraded with new equipment.

## 7.8 Recommendations

### 7.8.1 Pump and Piping Replacement (0-5 years)

Due to the age and capacity of the pumping system, it is recommended that the complete replacement of the pumps, piping, and valves be completed within the next 5 years.

## 7.9 Improvement Cost Estimates

The capital costs for the recommended improvements are summarized in Table 7.7. These upgrades will provide long term benefits to the sewage works system operations. The cost estimates include contingency and engineering but do not include taxes.

TABLE 7.7: MECHANICAL EQUIPMENT IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Short Term	Pump and Piping Replacement	\$68,000
<b>TOTAL</b>			<b>\$68,000</b>

The capital costs for the recommended improvements have been *estimated in 2019 dollars*. The cost estimate provided is an opinion of probable cost and is a function of many factors that can change with time and hence must not be relied upon as the actual cost. Construction equipment and methods that are commonly used in the industry are assumed for estimating purposes.




## 8.0 Electrical Equipment Condition Assessment

### 8.1 Background

This section provides an assessment of the electrical equipment in terms of the condition of individual system components and code and regulation compliance. The assessment identifies existing infrastructure that will require replacement or maintenance. A condition rating and priority has been given to the equipment to identify priority of future upgrades. Recommendations and project time frames have been developed in order to assist the City in prioritizing future projects. The Condition Assessment Forms have been appended to this report.

The Metcalfe Lift Station houses electrical equipment such as pump motors, and full voltage starters.

TABLE 8.1: METCALFE LIFT STATION ELECTRICAL OVERVIEW	
YEAR CONSTRUCTED	1992
LOCATION	660 Lyndale Drive
SERVICE	100 AMP
VOLTAGE	600 VAC
STANDBY GENERATOR SIZE	N/A
NUMBER OF PUMPS	Two (2)
PUMP HORSEPOWER	P-101: 7.5HP, P-102: 7.5HP



### 8.2 Code Review

As part of the condition assessment of the equipment and installation methods at the Metcalfe Lift Station, MPE reviews equipment and installations to assess whether standards set forth in applicable codes and regulations are met. The Canadian Electrical Codes CSA C22.1-15 and NFPA 820 are of particular relevance for wastewater lift station electrical systems. According to the NFPA 820 Table 4.2 Row 17, a below grade or partially below grade wastewater pumping station dry well that is ventilated with fewer than 6 air changes per hour is to be classified as a Zone 2 (or Class 1 Division 2) space. The dry well and above grade building are connected through the dry well access and are therefore considered a single air space. This air space is not ventilated continuously to the minimum standards to achieve an unclassified rating. Currently, the electrical equipment within the station is not rated for use in a Zone 2 space, therefore it is recommended that the ventilation system be upgraded to provide the necessary air changes to achieve an unclassified rating. Row 1 of Table 9.1.1.4 in the NFPA 820 requires a minimum of 12 air changes per hour to classify a wet well as a Zone 2 (or Class 1 Division 2) space. This lift station wet well is unable to meet the required number of air changes per hour and is classified as a Zone 1 space. The transformer currently does not have the required clearance from a combustible as per the CEC. It is recommended to affix a steel plate behind the transformer as per CEC.

CSA C282 provides the standard for emergency electrical power supplies for buildings where emergency electrical supplies are required by the National Building Code of Canada, and for essential electrical systems such as health care facilities. Emergency power generation is not required at this facility under this definition and, therefore, it is not required that this installation adhere to the requirements of the CSA 282 standard. Table 8.2 provides a summary of the code review.

**TABLE 8.2: ELECTRICAL CODE REVIEW**

YEAR CONSTRUCTED	1992		
LOCATION	660 Lyndale Drive		
<b>WET WELL</b>			
HAZARDOUS LOCATION CLASSIFICATION	Zone 1		
CORROSIVE ENVIRONMENT CATEGORY	Category 1		
<b>DRY WELL</b>			
HAZARDOUS LOCATION CLASSIFICATION	Zone 2		
CORROSIVE ENVIRONMENT CATEGORY	Category 2		
<b>ITEM</b>	<b>REQUIREMENT</b>	<b>CODE COMPLIANCE</b>	<b>CODE REFERENCE / NOTES</b>
EXPLOSION PROOF INSTALLATION	Required	NO	CSA 22.1-15 CEC Section 18, NFPA 820
AIR CHANGES FOR UNCLASSIFIED RATING	6 air changes in dry well	NO	NFPA 820
AIR CHANGES FOR ZONE 2 RATING	12 air changes in wet well	NO	NFPA 820
CORROSIVE ENVIRONMENT WIRING	Required	NO	CSA 22.1-15 CEC Section 22
MINIMUM CLEARANCE	1 m Required	YES	CSA 22.1-15 CEC Section 2-308
MOTOR OVERCURRENT PROTECTION	Motor Breakers Adequate	YES	CSA 22.1-15 CEC Section 28-200
FEEDER OVERCURRENT PROTECTION	Service Breaker Adequate	YES	CSA 22.1-15 CEC Section 28-204
EMERGENCY POWER SUPPLY	Sufficient Capacity	N/A	CSA 22.1-15 CEC Section 46-202
EMERGENCY POWER SUPPLY	Onsite Fuel Storage	N/A	CSA C282 (Not Required)



### 8.3 Electrical Service Entrance Equipment

The electrical service is 600 VAC, 3 Phase, 100 Amp, 60 Hz service. The service is fed overhead via a pole mount transformer. The main service and associated equipment is mounted on the main level of the lift station. Metcalfe lift station’s main service is constructed as a “stick build” through the use of disconnects, splitters, and separate starters. Current City guidelines prefer the use of a Motor Control Centre (MCC) and Breakers. The transformer does not have sufficient clearance from a combustible material as per Canadian Electrical Code (CEC). The main ground is showing corrosion. The metering cabinet is not considered water tight due to the method used to connect the associated raceway. Currently there are no provisions for a temporary generator connection in the event of power outages. Table 8.3 provides a summary of the condition of the service equipment at the Metcalfe Lift Station.

**TABLE 8.3: METCALFE LIFT STATION SERVICE ENTRANCE EQUIPMENT CONDITION ASSESSMENT**

DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
Main Disconnect	600 VAC	Fair	Important	Short Term
Splitter and Meter	600 VAC	Fair	Important	Short Term

### 8.4 Cable and Conduit

The wiring style in the Metcalfe Lift Station is primarily run using RPVC throughout all levels of the dry well. Conduit does not meet Zone 2 requirements. Additionally, conduit fitting covers have been removed and not replaced once work was complete.



## 8.5 Motors

The lift station is equipped with two (2) pumps. Each pump is equipped with a 575 VAC 3 phase electric motor. Both P-101 and P-102 are equipped with a 7.5HP Marathon Electric motor. The Vent motor is a 115 VAC single phase electric motor. The pump motors for P-101 and P-102 appear to have been previously painted, likely to reduce corrosion affecting the motors. However, surface corrosion is still evident. This is likely a result of inadequate ventilation to clear the corrosive gases present in this station. For that reason, the life expectancy of these motors has been substantially reduced. These motors are in “Poor” condition. The vent motor appears to be in “Good” condition. It is recommended that motors for P-101 and P-102 be replaced. Size requirements should be assessed based on lift station capacity during rain fall events prior to replacing the motors. Table 8.4 provides a summary of the condition of the motors at the Metcalfe Lift Station.

TABLE 8.4: METCALFE LIFT STATION MOTOR CONDITION ASSESSMENT				
DESCRIPTION	HORSEPOWER	CONDITION	IMPORTANCE	ACTION
P-101 Motor	7.5HP	Poor	Important	Short Term
P-102 Motor	7.5HP	Poor	Important	Short Term
Vent Motor	3/4-1/3HP	Good	Intermediate	Mid Term

### 8.5.1 Motor Circuit Analysis/ HIPOT Testing

A motor circuit analysis was not conducted.

## 8.6 Full Voltage Starters

Each pump is equipped with a Full Voltage Non Reversing (FVNR) starter. The FVNRs appear to have been recently replaced and are in “Good” condition. Table 8.5 summarizes the condition of the starters at the lift station.

TABLE 8.5: METCALFE LIFT STATION MOTOR STARTER CONDITION ASSESSMENT				
DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
P-101 FVNR	600 VAC	Good	Important	Long Term
P-102 FVNR	600 VAC	Good	Important	Long Term

## 8.7 Transformers, Panelboards, and Distribution Equipment

Distribution Equipment is fed via a wall mounted splitter. Distribution equipment appears to be in “Good” condition. The main lighting panel is fed from a wall mounted 600VAC:120/240VAC step down transformer. The transformer is in “Fair” condition and the lighting panel is in “Good” condition. Table 8.6 provides a summary of the condition of the transformers, panelboard, and distribution equipment at Metcalfe Lift Station.

TABLE 8.6: METCALFE LIFT STATION TRANSFORMERS, PANELBOARDS, AND DISTRIBUTION EQUIPMENT CONDITION ASSESSMENT				
DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
Main Lighting Panel	120/240VAC	Good	Intermediate	Long Term
Dry Type Transformer	600:120/240 VAC	Good	Intermediate	Mid Term
Building Envelope Lighting	120VAC	Fair	Intermediate	Short Term
Emergency Lighting	N/A	N/A	Intermediate	Short Term

### 8.7.1 Lighting

Lighting at the Metcalfe lift station is outdated and does not comply with the recommended fixtures of LED or F32T8 set forth in the City of Winnipeg Design Guide. Exterior lighting above man doors would be recommended.

### 8.7.2 Emergency Lighting

No emergency lighting is present in the Metcalfe Lift Station. Winnipeg Design Guide requires emergency lighting in all facilities. Adequate emergency lighting should be added to each level of the lift station.

## **8.8 Standby Power Generators and Engines**

There is currently no connection means for standby power. A manual transfer switch should be installed for City Staff to connect their temporary generator to in the event of a power outage.

## **8.9 Conclusions**

The major findings for the electrical equipment at the Metcalfe Lift Station are summarized as follows:

- In general, the electrical equipment at this site is in “Good” condition.
- The metering cabinet is subject to water ingress due to installation methods.
- The dry well requires a ventilation upgrade in order for the existing electrical equipment to meet the Canadian Electrical Code.

## **8.10 Recommendations**

### 8.10.1 Project 1: Main Service Improvements (0-5 years)

The main service connection at the metering cabinet is showing signs of water ingress. Replace the cabinet and use a bottom entry to the cabinet complete with NEMA 3R sealing methods to ensure water can no longer enter the equipment. **Seal all penetrations into the building.**

### 8.10.2 Project 2: Motor Replacement (0-5 years)

The two pump motors have endured considerable corrosion throughout their life span and are in “Poor” condition. Prior to motor replacement, pumping concerns raised by City staff should be addressed. **New motors should be sized accordingly to meet the new pumping requirements.**

### 8.10.3 Project 2: Install Manual Transfer Switch (0-5 years)

Currently, city staff connect their temporary generator by removing the splitter cover and terminating directly to the splitter lugs. This raises safety concerns as there is potential for exposed live electrical parts for the duration of temporary power requirements. A **manual transfer switch which allows City staff to connect temporary power in a safe and efficient manner should be installed.**

### 8.10.4 Project 3: Install Non-combustible Plate for Transformer (0-5 years)

In order to leave the transformer in its current location, a non-combustible plate must be affixed to the wall as per the Canadian Electrical Code.

### 8.10.5 Project 4: Lighting and Grounding Upgrade (0-5 years)

Upgrade lighting and grounding requirements throughout the lift station to meet City Design Guidelines.

### 8.11 Improvement Cost Estimates

The capital costs for the recommended improvements have been estimated and are summarized in Table 8.7. These upgrades will provide long-term benefits to waterworks system operations. The cost estimates include contingency and engineering but do not include taxes.

TABLE 8.7: ELECTRICAL EQUIPMENT IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Short-Term	Service Improvements	\$10,000
2	Short-Term	Motor Replacement	\$30,000
3	Short-Term	Manual Transfer Switch	\$7,900
4	Short-Term	Install Non-combustible plate for Transformer	\$1,000
5	Short-Term	Lighting and Grounding Upgrade	\$37,000
<b>Total:</b>			<b>\$85,900</b>

The capital costs for the recommended improvements have been *estimated in 2019 dollars*. The cost estimate provided is an opinion of probable cost and is a function of many factors that can change with time and hence must not be relied upon as the actual cost. Construction equipment and methods that are commonly used in the industry are assumed for estimating purposes. Refer to **Appendix E** for the complete details of the capital cost estimate.



## 9.0 Controls & Instrumentation Conditions Assessment

### 9.1 Background

This section provides an assessment of the controls and instrumentation equipment in terms of the condition of individual system components and code and regulation compliance. The assessment identifies existing infrastructure that will require replacement or maintenance. A condition rating and priority has been given to the equipment, identifying future upgrades. Recommendations and project time frames are presented to assist the City in prioritizing future projects. The Condition Assessment Forms have been appended to this report.

The Metcalfe Lift Station control system consists of Schneider SCADAPack 357 and an Ultrasonic Level Transmitter with a Float Level Switch.

**TABLE 9.1: METCALFE LIFT STATION CONTROLS & INSTRUMENTATION OVERVIEW**

YEAR CONSTRUCTED	2013 (1992)
LOCATION	660 Lyndale Drive
LAST AUTOMATION UPDATE	2013
CONTROLLER	SCADAPack 357
PROGRAMMING SOFTWARE	Telepace
COMMUNICATION TYPE	4G Cellular Communication with PSTN Backup
SCADA SOFTWARE	N/A



### 9.2 Control Systems

The Metcalfe Lift Station monitoring is handled by SCADAPack 357. The RTU is used for monitoring and reporting only. Pump control is done via a Milltronics Ultrasonic Level Transmitter. In the event of a level sensor submersion or fail the Float Level Switch takes over level control. Currently, the station does not have control redundancy. This has been added to prior Lift Station upgrades and would be an expected upgrade at the Metcalfe Lift Station. Field devices include one Milltronics Ultrasonic Level Transmitter, and two FLYGT ball, one of which is no longer operational.

#### 9.2.1 Manual Control

Manual controls are located on the main level of the lift station. Hand-Off-Auto switches are located on the front panel of each motor starter. Manual control is achieved by turning the local switch to the Hand position, the motor becomes locally controlled by operations. The manual controls are functional and in “Good” condition.

#### 9.2.2 Programmable Logic Controllers (PLC) and Remote Telemetry Units (RTU)

The RTU controller in use at this lift station is a SCADAPack 357. While this RTU is capable of controlling the equipment at this lift station, it is only used to monitor the lift station. As a result, the station control is isolated from internet-connected devices. A PLC or RTU controller allows for custom lift station operation that can be programmed by any local integrator as well as the ability to adjust set points and operate pumps remotely if used for pump control. Future upgrades should evaluate if these functions are desired and options for securing communications should be explored at that time. The condition of the RTU controller is in “Good” condition. No physical degradation of the controller was noted.

### 9.2.3 Human Machine Interface (HMI)

Metcalfe Lift Station is not equipped with an HMI.

### 9.2.4 Control Panel

The control panel is located on the main level of the lift station and contains the SCADA PACK 357 as well as all of the equipment required for reporting back to the SCADA system at McPhillips Control Centre. The general condition of this panel and the equipment it contains is “Good”. While wiring is run with cable management devices such as Panduit, it has not been maintained within the Panduit. Terminations are secure and cabling appears to be in “Good” condition. Wire labelling is applied to both ends of the wire and device tagging has been used. It is recommended to separate signal cabling and unlike voltage sources into separate Panduit raceways.

### 9.2.5 SCADA

The RTU controller is integrated into the central SCADA application at the McPhillips Control Centre. Data collected by the RTU is transmitted via cellular communication to the SCADA application.

### 9.2.6 Communication Hardware

Communications to the Metcalfe Lift Station are accomplished using MTS 4G cellular communication. The station reports to the McPhillips Control Centre SCADA application at regular intervals via the communication link. A Sixnet cellular modem acts as the primary communications device enabling this link. The router is in “Good” condition.

Table 9.2 provides a summary of the condition of the control equipment at Metcalfe Lift Station.

TABLE 9.2: METCALFE LIFT STATION CONTROL PANEL CONDITION ASSESSMENT				
CONTROL PANEL	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
Control Panel	Pump Controls and Monitoring	Good	Important	N/A
Communications Equipment	Sixnet Cellular Modem	Good	Low	N/A

## 9.3 Instrumentation

Instrumentation at the Metcalfe Lift Station includes one Milltronics Ultrasonic level transmitter, a float level switch, and a Rosemount Flow Transmitter. In general, the instrumentation is in “Good” condition. Table 9.3 provides a summary of the condition of the instrumentation at the Metcalfe Lift Station.

TABLE 9.3: METCALFE LIFT STATION INSTRUMENTATION CONDITION ASSESSMENT				
INSTRUMENTATION	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
LIT-101	Level Transmitter	Good	Important	Mid Term
LSHH-101	Building Flood Detector	Good	Low	Long Term
LSHH-102	Wetwell float	N/A	Low	Mid Term
FIT-101	Flow Transmitter	Good	Important	Mid Term

### 9.3.1 Process Control

#### *9.3.1.1 Pumping*

The primary process control device used at the Metcalfe Lift Station is an Ultrasonic level sensor. The condition of the level transmitter appears to be “Good”. There is currently no redundancy in case of instrument failure. Pumps start and stop based on the wet well level determined by these devices. It is recommended that a redundant ultrasonic level transmitter be installed to mitigate the risk of environmental damage and damage to property resulting from a flood situation.

### 9.3.2 Gas Monitoring

Metcalf Lift Station does not have continuous gas monitoring. Personal gas detection monitors are used by City staff within the lift station.

### 9.3.3 Process Monitoring

The wet well level is monitored continuously using the Ultrasonic level transmitter. The wet well level is transmitted back to the central SCADA application where they are monitored by Operations staff. Issues arising from out of normal values are highlighted with alarms and operations staff are notified to take action. Flow is continuously monitored through the use of a Rosemount Flow Transmitter, allowing operations the ability to see pump performance along with providing the City with more data on flow outputs from the lift station for future planning.

### 9.3.4 Building Monitoring

Building alarms, including flood detection, are transmitted back to the central SCADA application. Operators are notified if an alarm condition exists and are able to take action to correct the alarm. No heat detector or low building temperature sensor is installed at this station. It is recommended that both of these devices be installed.

## **9.4 Pump Control Strategy & Reliability Review**

### 9.4.1 Sanitary

The pump control strategy employed at this station is a basic level based pump control system. Each pump has a start level and a shut down level. These levels have been set to the same points calling for both motors to run and stop at the same time. Multiple pumps increase system reliability; however, this system operates with only two pumps and does not have complete redundancy.

## **9.5 Conclusions**

The major findings for the controls and instrumentation at Metcalfe Lift Station are summarized as follows:

- The automation platform in use at this lift station is adequate for the needs of the station; however, it does not provide remote set point or remote pump control capability.
- No redundant level detector presents an environmental risk if the primary level detector fails.
- No heat detectors or low building temperature sensors are installed. A Heat detector would provide advanced warning of fire at this lift station, along with low building temperature sensors alleviating the risk of freezing throughout the winter months.

## **9.6 Recommendations**

### 9.6.1 Project 1: Install Building Alarm Instruments (0-5 years)

A heat detector and low building alarm should be installed to alert operators of fire or freezing conditions at the lift

station. The alarms would be transmitted back to central SCADA system allowing operators to be notified and take corrective actions.

**9.6.2 Project 2: Install a Redundant Level Transmitter (0-5 years)**

There is no redundant level sensor. Lift stations pose an environmental risk if left to overflow and a redundant level sensor would provide some protection from this possibility in the case of a primary level sensor failure. It is recommended that an ultrasonic level transmitter be installed in case of the event the lift station experiences an instrument failure.

**9.7 Improvement Cost Estimates**

The capital costs for the recommended improvements have been estimated and are summarized in Table 9.4. These upgrades will provide long term benefits to waterworks system operations. The cost estimates include contingency and engineering but do not include taxes.

TABLE 9.4: CONTROLS & INSTRUMENTATION IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Short-Term	Install Building Alarm Instruments	\$1,400
2	Short-Term	Install a Redundant Level Transmitter	\$16,800
<b>Total:</b>			<b>\$18,200</b>


The capital costs for the recommended improvements have been *estimated in 2019 dollars*. The cost estimate provided is an opinion of probable cost and is a function of many factors that can change with time and hence must not be relied upon as the actual cost. Construction equipment and methods that are commonly used in the industry are assumed for estimating purposes. Refer to **Appendix C** for the complete details of the capital cost estimate.

## 10.0 Dry & Wet Well Ventilation Review

### 10.1 Background

The Metcalfe Lift Station ventilation system includes one exhaust fan located on the main floor. The ventilation system is used intermittently when the building and dry well are occupied. The exhaust fan forces air into the dry well to create a positive pressure in the spaces. Air in the dry well is exhausted by gravity through a pipe that penetrates the roof of the building, connecting to the dry well. Fresh air is by the fan through a wall louvre. There is no permanent wet well ventilation system in place. No major ventilation upgrades have been carried out at the lift station since its original construction. In general, the equipment is showing signs of aging and is in “Fair” condition.

TABLE 10.1: METCALFE LIFT STATION VENTILATION OVERVIEW	
YEAR CONSTRUCTED	1992
ODOUR CONTROL	No
<b>DRY WELL</b>	
VENTILATION TYPE	Intermittent
VENTILATION RATE	2346 m <sup>3</sup> /hr
<b>WET WELL</b>	
VENTILATION TYPE	N/A
VENTILATION RATE	N/A



### 10.2 Ventilation Requirement Review

Table 10.2 provides a summary of the ventilation system at the Metcalfe Lift Station.

TABLE 10.2: METCALFE LIFT STATION VENTILATION REQUIREMENTS						
VENTILATED AREA	VOLUME (m <sup>3</sup> )	VENTILATION FREQUENCY	REQUIRED AIR CHANGES PER HOUR	REQUIRED VENTILATION RATE (m <sup>3</sup> /hr)	CURRENT VENTILATION RATE (m <sup>3</sup> /hr)	VENTILATION TYPE
Dry Well	200	Intermittent	30	6,006	2,346	Exhaust Fan
Wet Well	40	Intermittent	30	1,200	N/A	N/A

The current dry well ventilation system is undersized to meet NFPA 820 and Ten States ventilation requirements of 30 air changes per hour when used intermittently. There is no wet well ventilation system in place.

### 10.3 Ventilation Equipment

#### 10.3.1 Fans, Blowers, & Blower Heaters

The exhaust fan was installed in 1992. Airflow from the dry well exhaust pipe was tested using a portable anemometer and found it matches the manufacturer’s published data. In general, the exhaust fan is in “Fair” condition. Table 10.3 provides a summary of the condition of the fan.

TABLE 10.3: METCALFE LIFT STATION FAN CONDITION ASSESSMENT				
EQUIPMENT	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
EF-101	1/2 HP Centrifugal Exhaust Fan	FAIR	Important	Short Term



### 10.3.2 Intake and Exhaust Louvres and Dampers

The lift station includes intake and exhaust louvres. The louvres are in “Fair” condition.

### 10.3.3 Ventilation System Balancing

The ventilation system includes ducting for supply and exhaust in the dry well ventilation system. No concerns were noted with pressurization in the building or dry well.



## 10.4 Odour Control System

The lift station is not fitted with an odour control system.

## 10.5 Conclusion

The major findings for the Ventilation System Assessment are summarized as follows:

- The dry well intermittent ventilation system is undersized for the dry well fresh air requirements.
- There is no wet well ventilation system in place. It is recommended that a portable air supply system continue to be used for the wet well ventilation system.

## 10.6 Recommendations

### 10.6.1 Upgrade Dry Well Ventilation System (0-5 years)

In order to achieve the required ventilation rates, it is recommended that the existing ventilation system be replaced with a new ventilation system. A continuous ventilation system will provide an unclassified NFPA 820 rating. A blower heater is recommended to be installed that would connect to the existing ducting entering the drywell and building to provide heated fresh air to the spaces.

## 10.7 Improvement Cost Estimates

The capital costs for the recommended improvements are summarized in Table 10.4. These upgrades will provide long term benefits to the sewage works system operations. The cost estimates include contingency and engineering but do not include taxes.

TABLE 10.4: VENTILATION SYSTEM IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Short Term	Dry Well Ventilation Upgrades	\$38,000
<b>TOTAL:</b>			<b>\$38,000</b>

The capital costs for the recommended improvements have been *estimated in 2019 dollars*. The cost estimate provided is an opinion of probable cost and is a function of many factors that can change with time and hence must not be relied upon as the actual cost. Construction equipment and methods that are commonly used in the industry are assumed for estimating purposes.

## 11.0 Recommendations

### 11.1 Recommended Projects

A list of recommended improvements has been prepared. For each recommended item, an “Action” was assigned based on an established methodology indicating the time period when the improvement should be completed.

Through the development of recommendations relative to system improvements or upgrades, projects were identified as either “Maintenance”, “Capital”, or “Study” projects. The differentiation between “Maintenance” and “Capital” projects was established based on our understanding of the scope of the project, project cost, and the assumed ability of the City to perform the work required utilizing in-house resources. Recommended improvements for the sewage lift station are presented in Table 11.1.

<b>TABLE 11.1: SUMMARY OF RECOMMENDED IMPROVEMENTS - METCALFE LIFT STATION</b>			
<b>Item</b>	<b>Project Type</b>	<b>Action</b>	<b>Cost</b>
<b>Facility Condition Assessment</b>			
Site Conditions	Capital	Short Term	\$1,750
Foundations	Capital	Short Term	\$350,000
Primary Structural Systems			\$0
Secondary Structural Systems	Capital	Short Term	\$28,000
Building Envelope	Capital	Mid Term	\$5,500
Roofing	Capital	Short Term	\$30,000
Building Mechanical	Capital	Mid Term	\$3,500
<b>Subtotal:</b>			<b>\$418,750</b>
<b>Mechanical Equipment Condition Assessment</b>			
Pump Replacements	Capital	Short Term	\$42,000
Valve Replacements	Capital	Short Term	\$26,000
<b>Subtotal:</b>			<b>\$68,000</b>
<b>Electrical Equipment Condition Assessment</b>			
Main Service	Capital	Short Term	\$10,000
Motor Upgrades	Capital	Short Term	\$30,000
Sump Pump	Maintenance	Short Term	\$500
Transformer	Capital	Short Term	\$1,000
<b>Subtotal:</b>			<b>\$41,500</b>
<b>Controls &amp; Instrumentation Condition Assessment</b>			
Control Panel	Capital	Mid Term	\$45,000
UPS	Maintenance	Mid Term	\$2,000
Ultrasonic Level	Capital	Mid Term	\$5,000
<b>Subtotal:</b>			<b>\$52,000</b>
<b>Dry &amp; Wet Well Ventilation Review</b>			
Dry Well Ventilation System Replacement	Capital	Short Term	\$38,000
<b>Subtotal:</b>			<b>\$38,000</b>
<b>Total</b>			
<b>Total Estimated Cost - All Recommended Improvements:</b>			<b>\$618,250</b>

All recommendations were given an associated cost to implement. Cost estimates provided were based on

engineering judgment for the component replacement value, and do not include ancillary costs associated with replacing a component. The cost estimates are intended to be used as a measure of comparing the lift stations, and are not intended to be used for budgetary numbers. Actual replacement costs will require further investigation.

## 11.2 Code Compliance & Safety Concerns

A list of the code compliance and safety concerns for the sewage lift station are presented in Table 11.2.

TABLE 11.2: CODE COMPLIANCE & SAFETY CONCERNS - METCALFE LIFT STATION	
Item Description	Type
<b>Site Conditions</b>	
<b>Foundations</b>	
Wet well access vault is in poor condition and considered a "Confined Space"	Safety
Openings in floor to access lower level and foundation are too small for safe extraction	Code Compliance
<b>Primary Structural Systems</b>	
Opening in floors for access is not large enough for emergency extraction	Safety
<b>Secondary Structural Systems</b>	
Ladders are not code compliant	Code Compliance
Railings missing	Code Compliance
Ladders do not have proper landings at base.	Safety
<b>Building Envelope</b>	
<b>Roofing</b>	
<b>Building Mechanical</b>	
There is no current fire suppression system.	Code Compliance
<b>Building Ventilation</b>	
Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements	Code Compliance

## **Appendix A**

### **Facility Condition Assessment Forms**

FACILITY CONDITION ASSESSMENT  
 SITE CONDITIONS



SECTION	ITEM	DATA		ASSESSMENT SCORES			AGE			
		Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life			
Tag: STR_Site_Conditions	GENERAL	<b>CODE COMPLIANCE ISSUES:</b> _____  <b>SAFETY ISSUES:</b> Confined Space Entry to wet well		2.7	2.0	3.0			0	
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3	
	Current Physical Condition	<b>Site Access Road &amp; Parking Lot:</b> <i>Issues for Discussion:</i> - Condition of surface -potholes, mud, etc - Proper bollards in place to protect infrastructure  <b>Site Grading &amp; Landscaping:</b> <i>Issues for Discussion:</i> - Ponding water on site - Ground sloped away from the building - Condition of vegetation on site - Trees overhanging powerlines or building - Trees blocking sight lines for access / exit  <b>Fencing &amp; Signage:</b> <i>Issues for Discussion:</i> - Signage in place / visible - Fence and gate condition - Warning signage appropriate	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	3	0.4	<b>NOTES &amp; COMMENTS:</b> - Sufficient parking available adjacent to the building - Gravel lot will require gravel within 2 years - Site grading is sufficiently sloped away from building - Guard rail at front of parking lot slightly bent  - Some signage has been removed and stored on the roof - Ground at front entrance has settled and cracked the stepping stone - No fencing around the station - Site is suitably landscaped for area. Grassed area is mowed. - Tree branch starting to overhang onto power line. - Graffiti evident on building exterior				
	Fitness for Purpose	<b>Site Access Road &amp; Parking Lot:</b> <i>Issues for Discussion:</i> - Sight lines entering and exiting the site - Sufficient parking space - Emergency vehicle accessibility  <b>Site Grading &amp; Landscaping:</b> <i>Issues for Discussion:</i> - Suitability of landscaping for the community - Grading sufficient to drain site  <b>Fencing &amp; Signage:</b> <i>Issues for Discussion:</i> - Signage reflect important information, emergency # - Fencing and gate appropriate or needed for security	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	2	0.4	<b>RECOMMENDATIONS:</b> - "City of Winnipeg" Sign should be replaced - Re gravel parking lot - Replace exterior entrance patio block		<b>COST ESTIMATE</b> \$ 1,500.00 \$ 250.00		
	Safety	<b>Public and Operator Safety:</b> <i>Issues for Discussion:</i> - Historical safety incidents, or potential conditions - Evacuation of personnel (davit, gear, hatch locations)	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1					
	PHOTOGRAPHS									



FACILITY CONDITION ASSESSMENT FORM  
 FOUNDATION



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Foundations	GENERAL	CODE COMPLIANCE ISSUES: - Openings in floor to access lower level and foundation are too small for safe extraction	3.7	3.3	3.0			0
		SAFETY ISSUES: - Access to wet well is a high safety hazard	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3	
	Current Physical Condition	Base Slab: <i>Issues for Discussion:</i> - Cracking, spalling, moisture infiltration - Evidence of settlements - Sump and Pump - Groundwater seepage deterioration - Effluorescence, salts from groundwater	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.3	NOTES & COMMENTS: - Aging concrete CIP structure remains in good condition - No evidence of concrete degradation - Paint flaking off floor and walls  Wet Well: - Access vault is masonry brick construction. Mortar is deteriorating. - Rusted ladder rungs, and loose bricks make entering a safety hazard. - Wet well was assessed with boom camera. - Concrete appears deteriorating in sections. Evidence of infiltration, possible roots infiltrating. - Wet well is at end of service life  RECOMMENDATIONS: Replace wet well access vault and chamber  COST ESTIMATE \$ 350,000.00		
		Below Grade Exterior Walls, Columns, and Beams: <i>Issues for Discussion:</i> - Cracking, spalling, moisture infiltration - Evidence of movement - Damage from equipment operation / removal - Degredation at base of columns	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.3			
		Wet Well: <i>Issues for Discussion:</i> - Cracking, spalling, corrosion - Seepage through wet well wall	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.4			
		Base Slab: <i>Issues for Discussion:</i> - Sufficient space for equipment - Floor sloped sufficient to drain	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.3			
	Fitness for Purpose	Below Grade Exterior Walls: <i>Issues for Discussion:</i>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.4			
		Columns and Beams: <i>Issues for Discussion:</i> - Interference with function or equipment removal	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.3			
	Safety	Public and Operator Safety: <i>Issues for Discussion:</i> - Potential safety hazards - Evacuation of personnel (davit, gear, hatch locations)	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1			
	PHOTOGRAPHS							

FACILITY CONDITION ASSESSMENT FORM  
 PRIMARY STRUCTURAL SYSTEMS



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Primary_Str_Systems	GENERAL	CODE COMPLIANCE ISSUES:	3.0	3.0	3.0			0
		SAFETY ISSUES: - Opening in floors for access is not large enough for emergency extraction	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3	
	Current Physical Condition	<b>Loadbearing walls, columns, beams:</b> <i>Issues for Discussion:</i> - Deterioration of concrete - Corrosion of steel (beams, column base, anchors...)	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.4	<b>NOTES &amp; COMMENTS:</b> - Old penetrations in suspended slabs have been patched and a new penetration has been cut - Concrete damage around penetration - Concrete damage on underside of suspended slab has exposed rebar - Suspended floors appear in suitable condition to support current loading. - Structural slabs, beams, and walls are otherwise in fair condition		
		<b>Trusses and Joists:</b> <i>Issues for Discussion:</i> - Corrosion	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.3			
		<b>Suspended Floors:</b> <i>Issues for Discussion:</i>	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.3			
	Fitness for Purpose	<b>Loadbearing walls, columns, beams:</b> <i>Issues for Discussion:</i> - Suitable access to equipment, levels - Compliance with Codes and Standards	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.4	<b>RECOMMENDATIONS:</b>  <b>COST ESTIMATE</b>		
		<b>Trusses and Joists:</b> <i>Issues for Discussion:</i> - Clearance	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.3			
		<b>Suspended Floors:</b> <i>Issues for Discussion:</i> - Sufficient Space for layout	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.3			
	Safety	<b>Public and Operator Safety:</b> <i>Issues for Discussion:</i> - Potential safety hazards - Evacuation of personnel (davit, gear, hatch locations)	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1			
	PHOTOGRAPHS							

FACILITY CONDITION ASSESSMENT FORM  
 SECONDARY STRUCTURAL SYSTEMS



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Secondary_Str_Systems	GENERAL	<b>Secondary Structural Components:</b> - Stairs, ladders, handrails, guardrails, catwalks, mezzanines, hatches, davits, support brackets, equipment bases.						
		<b>CODE COMPLIANCE ISSUES:</b> - Ladders are not code compliant - Railings missing	3.6	3.8	3.0			0
	CURRENT PHYSICAL CONDITION	<b>SAFETY ISSUES:</b> Ladders do not have proper landings at base.	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3
		<b>Stairs, Ladders, Catwalks, Rails, Hatches:</b> <i>Issues for Discussion:</i> - Corrosion of material, anchors - Hatch seals, operability, locks	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.5	<b>NOTES &amp; COMMENTS:</b> - Ladder support frames are heavily corroded. - Ladders do not have proper landings at base. - Hoist is aged and corroded. - Floor paint is peeling on all 3 levels		
	CURRENT PHYSICAL CONDITION	<b>Interior walls, Ceiling, Supports, Equipment Base:</b> <i>Issues for Discussion:</i>	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.2	- Wall paint is peeling on lower floor		
		<b>Finishes:</b> <i>Issues for Discussion:</i> - Floor, wall, ceiling paint. Finishes on doors, etc	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.1			
	FITNESS FOR PURPOSE	<b>Monorails and Hoists:</b> <i>Issues for Discussion:</i> - Corrosion, anchor bolts, labels - Corrosive atmosphere	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.2			
		<b>Stairs, Ladders, Catwalks, Rails, Hatches:</b> <i>Issues for Discussion:</i> - Corrosion resistance of material - Suitable access to equipment, levels - Compliance with Codes and Standards	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.5	<b>RECOMMENDATIONS:</b> Install Guardrail around openings in floor \$ 3,500.00		
	FITNESS FOR PURPOSE	<b>Interior walls, Ceiling, Supports, Equipment Base:</b> <i>Issues for Discussion:</i>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.2	Install hinged lids over openings in floor \$ 3,500.00 Re-finish floors on all 3 levels. \$ 18,000.00 Re-finish walls on lower floor \$ 3,000.00		
		<b>Finishes:</b> <i>Issues for Discussion:</i> - Floor and wall protection.	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.1			
SAFETY	<b>Monorails and Hoists:</b> <i>Issues for Discussion:</i> - Transport of equipment to accessible area - Certificated by others	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.2				
	<b>Public and Operator Safety:</b> <i>Issues for Discussion:</i> - Potential safety hazards - Evacuation of personnel (davits, gear, hatch locations)	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1				
PHOTOGRAPHS								

FACILITY CONDITION ASSESSMENT FORM  
 BUILDING ENVELOPE



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Building_Envelope	GENERAL	CODE COMPLIANCE ISSUES: SAFETY ISSUES:	3.6	3.0	3.0			0
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3
	Current Physical Condition	<b>Exterior Siding, Windows, Doors:</b> <i>Issues for Discussion:</i> - Weathering, deterioration - Door swing, seals, locks - Graffiti, vandalism - UV breakdown Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.4	<b>NOTES &amp; COMMENTS:</b> - Aging flashing and sealants. - Overflow scupper drains against building. - Masonry exterior is broken around an electrical penetration, requires sealant. - Existing grate is insufficient to cover mechanical wall penetration - Interior walls were lined with 2" Rigid Insulation, Vapour Barrier, and Plywood.			
		<b>Insulation, Vapour Barrier, Interior Liner:</b> <i>Issues for Discussion:</i> - Interior frost, condensation Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.4				
		<b>Flashings, Soffits, Sealants, Weatherstripping:</b> <i>Issues for Discussion:</i> - UV breakdown Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.2				
		<b>Exterior Siding, Windows, Doors:</b> <i>Issues for Discussion:</i> - Door size, durability of siding Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.4				
	Fitness for Purpose	<b>Insulation, Vapour Barrier, Interior Liner:</b> <i>Issues for Discussion:</i> - Adequate insulation, durability of liner Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.4	<b>RECOMMENDATIONS:</b> Apply anti-graffiti sealant to exterior \$ 2,500.00 Seal Exterior Penetrations \$ 500.00 Replace or re-finish flashing and seal. Install downspout and splashpad \$ 2,000.00 Install proper frame over exhaust vent \$ 500.00			
		<b>Flashings, Soffits, Sealants, Weatherstripping:</b> <i>Issues for Discussion:</i> Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.2				
	Safety	<b>Public and Operator Safety:</b> <i>Issues for Discussion:</i> - Potential safety hazards Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1				
	PHOTOGRAPHS							



FACILITY CONDITION ASSESSMENT FORM  
 ROOFING



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Roofing	GENERAL	CODE COMPLIANCE ISSUES: SAFETY ISSUES:	3.7	3.2	3.0			0
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3
	Current Physical Condition	Roof Membrane, Insulation, Decking: <i>Issues for Discussion:</i>	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.5	NOTES & COMMENTS: - Roof is not sufficiently sloped to prevent ponding - Trim is damaged and does not provide seal - Sealants around penetrations are weathered and require replacement - Rock ballast has eroded away leaving the membrane exposed to UV deterioration. - No evidence of leakage through the roof at this point, but is to be expected in the immediate future.		
		Skylights, Hatches, Penetrations: <i>Issues for Discussion:</i>	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	3	0.3			
		Flashings, Trim, Gutters, Downspouts: <i>Issues for Discussion:</i>	Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	4	0.2			
		Roof Membrane, Insulation, Decking: <i>Issues for Discussion:</i>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.5			
		Skylights, Hatches, Penetrations: <i>Issues for Discussion:</i>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.3	RECOMMENDATIONS: Remove and replace roof membrane system		
		Flashings, Trim, Gutters, Downspouts: <i>Issues for Discussion:</i>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.2			
		Public and Operator Safety: <i>Issues for Discussion:</i> - Roof Tie-off	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1			
	PHOTOGRAPHS							



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
	Building Mechanical: - HVAC, Fire Suppression, Plumbing							

Tag: STR\_Building\_Mechanical



VENTILATION CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	ASSESSMENT SCORES				AGE		
			Current Physical Condition	Fitness For Purpose	Safety	YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Tag: VENTILATION SYSTEM	GENERAL	<b>CODE COMPLIANCE ISSUES:</b> Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements  <b>SAFETY ISSUES:</b>	3.0	4.0	3.0	1992	25	0	
	Current Physical Condition	<b>Wet Well Ventilation</b> <i>Issues for Discussion:</i> Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)  <b>Dry Well Ventilation</b> <i>Issues for Discussion:</i> Rating 1 (Excellent condition) Rating 2 (Good condition) Rating 3 (Functional condition) Rating 4 (Poor condition) Rating 5 (Not functional)	0	0	<b>NOTES &amp; COMMENTS:</b> - No wet well ventilation system. - Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements of 30 air changes per hour when used intermittently.  <b>RECOMMENDATIONS:</b> - Replace Dry Well Ventilation System  <b>COST ESTIMATE</b> \$ 38,000.00				
	Fitness for Purpose	<b>Wet Well Ventilation</b> <i>Issues for Discussion:</i> Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)  <b>Dry Well Ventilation</b> <i>Issues for Discussion:</i> Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	0	0					
	Safety	<b>Operator Safety</b> <i>Issues for Discussion:</i> - Monitors, Alarms Rating 1: No safety hazard conditions Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1					
	PHOTOGRAPHS								

## **Appendix B**

### **Pumps Condition Assessment Forms**

Project No.: 8400-001-00  
 Tag: P\_101  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

**PUMP CONDITION ASSESSMENT FORM**



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING			AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation	YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_101 Description: Dry Pit Solids Handling	GENERAL	Location: Dry Well Lower Level	3.2	2.9	2.1	1992	25	0
		Type: 7.5 HP Vertical End Suction						
		Description: Dry Pit Solids Handling						
		Manufacturer: Fairbanks Morse						
		Model: K3X1						
		RPM: 1170						
		Rated Voltage: 575 V						
	Rated Current: 8.3 A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3	
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	VIBRATION (in/s) Motor 0.08 0.11 0.04 Volute 0.01 0.02 0.01		
		Equipment Corrosion Noted: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.2	NOTES & COMMENTS: Pump is at the end of its service life. The pumping system is capable of meeting the peak dry weather influent flow requirements, however the pumping system is not currently capable of meeting the peak wet weather influent flow requirements.		
		Condition of Pump Accessories: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.1			
		Rebuild Potential of Pump: Issues for Discussion:	Rating 1 (N/A - Pump is new) Rating 2 (Pump re-build feasible) Rating 3 (Pump rebuild / replace equally feasible) Rating 4 (Approaching end of useful life) Rating 5 (At or surpassed useful life)	4	0.2			
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3			
	Fitness for Purpose	Design Flow Rate: Issues for Discussion:	Rating 1 (Pump consistently provides design flow rate) Rating 2 (Pump consistently provides +/- 10% of design flow rate) Rating 3 (Pump consistently provides +/- 25% of design flow rate) Rating 4 (Pump performance a potential issue during high flow events) Rating 5 (Pump performance a critical issue)	4	0.2			
		Pump Redundancy: Issues for Discussion:	Rating 1 (100% redundancy) Rating 3 (50% redundancy) Rating 5 (No redundancy. Risk of critical failure)	3	0.2			
Appropriate Pump Type for Application: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper pump selection for application. Risk of critical failure)	1	0.2	RECOMMENDATIONS Replace pump			
Available Water Supply for Pumps (If Required): Issues for Discussion:		Rating 1 (Yes) Rating 2 (No - Not required for installed pumping equipment) Rating 3 (Yes - Flow / pressure inadequate for installed pumping equipment) Rating 4 (No - Available source on site but not connected) Rating 5 (No - No available source)	1	0.1	COST ESTIMATE \$ 21,000.00			
Pump Capacity: Issues for Discussion:		Rating 1 (Pump has sufficient capacity for current and projected demand conditions) Rating 2 (Pump has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Pump has sufficient capacity) Rating 4 (Pump does not meet current demand condition) Rating 5 (Pump is critically undersized and likelihood of station backup is high)	4	0.3				
Maintainability and Operability		Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.25			
	Piping/Equipment Interference with Pump Removal: Issues for Discussion:	Rating 1 (No interference) Rating 2 (Yes - Some minor piping/equipment interference with pump removal) Rating 3 (Yes - Piping/equipment interference causes minor alteration of work method) Rating 4 (Yes - Piping/equipment interference causes major alteration of work method) Rating 5 (Yes - Piping/equipment interference prevents safe removal of pumps)	2	0.2				
	Provision of Direct Lift Spot for Pump Removal: Issues for Discussion:	Rating 1 (Yes - Accessible unobstructed direct lift spot for pump removal) Rating 2 (Yes - Accessible direct lift spot for pump removal, with minor obstructions) Rating 3 (Yes - Direct lift spot with limited access and minor obstructions) Rating 4 (Yes - Direct lift spot with difficult access and major obstructions) Rating 5 (No provision for direct pump removal)	2	0.1				
	Pumping Equipment Uniformity: Issues for Discussion:	Rating 1 (Yes - All installed pumps are identical model and duty point) Rating 2 (Yes - All installed pumps are identical model with varying duty points) Rating 3 (No - All installed pumps are different models, but same manufacturer) Rating 4 (No - All installed pumps are different models and different manufacturers) Rating 5 (No - Pump record information (design duty point) is not known)	1	0.2				
	Availability of Spare Parts: Issues for Discussion:	Rating 1 (Yes - Spare parts readily available with < 6 week lead time) Rating 2 (Yes - Spare parts readily available with 6-8 week lead time) Rating 3 (Yes - Spare parts readily available with > 8 week lead time) Rating 4 (Yes - Select spare parts available with varying lead times) Rating 5 (No - Spare parts no longer available for this equipment)	3	0.25				
PHOTOGRAPHS								

Project No.: 8400-001-00  
 Tag: P\_102  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

**PUMP CONDITION ASSESSMENT FORM**



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE				
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE		
Equipment Tag: P_102 Description: Dry Pit Solids Handling	GENERAL	Location: Dry Well Lower Level	3.2	2.9	2.1		1992	25	0		
		Type: 7.5 HP Vertical End Suction									
		Description: Dry Pit Solids Handling									
		Manufacturer: Fairbanks Morse									
		Model: K3X1									
		RPM: 1170									
		Rated Voltage: 575 V									
	Rated Current: 8.3 A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3				
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	VIBRATION (in/s)			X	Y	Z
		Equipment Corrosion Noted: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.2	Motor 0.16 0.36 0.12 Volute 0.02 0.01 0.01					
		Condition of Pump Accessories: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.1	NOTES & COMMENTS: Pump is at the end of its service life. The pumping system is capable of meeting the peak dry weather influent flow requirements, however the pumping system is not currently capable of meeting the peak wet weather influent flow requirements.					
		Rebuild Potential of Pump: Issues for Discussion:	Rating 1 (N/A - Pump is new) Rating 2 (Pump re-build feasible) Rating 3 (Pump rebuild / replace equally feasible) Rating 4 (Approaching end of useful life) Rating 5 (At or surpassed useful life)	4	0.2						
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
	Fitness for Purpose	Design Flow Rate: Issues for Discussion:	Rating 1 (Pump consistently provides design flow rate) Rating 2 (Pump consistently provides +/- 10% of design flow rate) Rating 3 (Pump consistently provides +/- 25% of design flow rate) Rating 4 (Pump performance a potential issue during high flow events) Rating 5 (Pump performance a critical issue)	4	0.2						
		Pump Redundancy: Issues for Discussion:	Rating 1 (100% redundancy) Rating 3 (50% redundancy) Rating 5 (No redundancy. Risk of critical failure)	3	0.2						
Appropriate Pump Type for Application: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper pump selection for application. Risk of critical failure)	1	0.2	RECOMMENDATIONS						
Available Water Supply for Pumps (If Required): Issues for Discussion:		Rating 1 (Yes) Rating 2 (No - Not required for installed pumping equipment) Rating 3 (Yes - Flow / pressure inadequate for installed pumping equipment) Rating 4 (No - Available source on site but not connected) Rating 5 (No - No available source)	1	0.1	Replace pump						
Pump Capacity: Issues for Discussion:		Rating 1 (Pump has sufficient capacity for current and projected demand conditions) Rating 2 (Pump has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Pump has sufficient capacity) Rating 4 (Pump does not meet current demand condition) Rating 5 (Pump is critically undersized and likelihood of station backup is high)	4	0.3	COST ESTIMATE						
Replacement pump		\$	21,000.00								
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.25							
	Piping/Equipment Interference with Pump Removal: Issues for Discussion:	Rating 1 (No interference) Rating 2 (Yes - Some minor piping/equipment interference with pump removal) Rating 3 (Yes - Piping/equipment interference causes minor alteration of work method) Rating 4 (Yes - Piping/equipment interference causes major alteration of work method) Rating 5 (Yes - Piping/equipment interference prevents safe removal of pumps)	2	0.2							
	Provision of Direct Lift Spot for Pump Removal: Issues for Discussion:	Rating 1 (Yes - Accessible unobstructed direct lift spot for pump removal) Rating 2 (Yes - Accessible direct lift spot for pump removal, with minor obstructions) Rating 3 (Yes - Direct lift spot with limited access and minor obstructions) Rating 4 (Yes - Direct lift spot with difficult access and major obstructions) Rating 5 (No provision for direct pump removal)	2	0.1							
	Pumping Equipment Uniformity: Issues for Discussion:	Rating 1 (Yes - All installed pumps are identical model and duty point) Rating 2 (Yes - All installed pumps are identical model with varying duty points) Rating 3 (No - All installed pumps are different models, but same manufacturer) Rating 4 (No - All installed pumps are different models and different manufacturers) Rating 5 (No - Pump record information (design duty point) is not known)	1	0.2							
	Availability of Spare Parts: Issues for Discussion:	Rating 1 (Yes - Spare parts readily available with < 6 week lead time) Rating 2 (Yes - Spare parts readily available with 6-8 week lead time) Rating 3 (Yes - Spare parts readily available with > 8 week lead time) Rating 4 (Yes - Select spare parts available with varying lead times) Rating 5 (No - Spare parts no longer available for this equipment)	3	0.25							
PHOTOGRAPHS											

## **Appendix C**

### **Electrical & Communication Condition Assessment Forms**

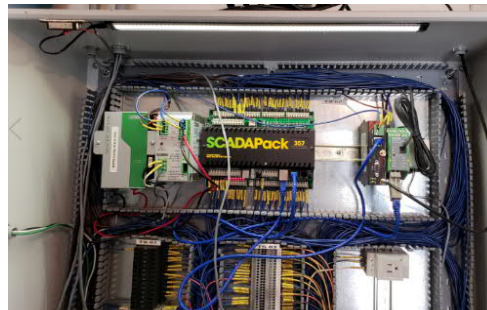


CONTROL PANEL CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	Assessment Scores				Component Age			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_101_Panel Description: IC_101_Panel	GENERAL	Location: Drywell, Main Level	3.2	1.4			2013	30	24	
		Description: IC_101_Panel								
		Function: Station Monitoring								
		PLC Processor: SCADAPack 357								
		UPS Protection: Yes								
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears to be in "Good" condition. Equipment is not rated for Zone 2 locations. Wiring methods do not follow provided raceway. Panduit cover is removed. No redundancy.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Control Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1					
		Occurrences of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
Fitness for Purpose	Controls Functioning as Expected: Issues for Discussion:	Rating 1 (Always) Rating 2 (More than half of time) Rating 3 (Half of the time) Rating 4 (Less often than half) Rating 5 (Never)	1	0.3	<b>RECOMMENDATIONS:</b>		<b>COST ESTIMATE</b>			
	Panel is Appropriately Designed: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1	Incorporate redundant control for the lift station. Upgrade HVAC system. Install panduit cover.		\$ 1,400.00			
	Control Logic is Appropriate for Installation: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3	Install building alarms (heat, ambient temperature, intrusion, etc.)					
	Communications Equipment is Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1						
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	2	0.2						

PHOTOGRAPHS





UPS CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	Assessment Scores				Component Age			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_101_UPS Description: IC_101_UPS	GENERAL	Location: Dry Well, Main Level	3.0	1.8			2013	25	19	
		Description: IC_101_UPS								
		Make: Phoenix								
		Model: Quint-BAT/24DC/3.4AH								
		Rated VA:								
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears in "Good" condition. Battery expires in August 2020.  <b>RECOMMENDATIONS:</b> Maintain regular maintenance checks to ensure UPS is operational. Replace battery as needed.  <b>COST ESTIMATE</b>				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Control Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
		Occurrences of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
		UPS system is Present & Designed Appropriately: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.2					
	Fitness for Purpose	UPS External Maintenance Bypass is Installed: Issues for Discussion:	Rating 1 (Yes) Rating 5 (No)	5	0.1					
		UPS Redundancy is Required / Installed: Issues for Discussion:	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1					
		UPS is Sized Appropriately: Issues for Discussion:	Rating 1 (Yes) Rating 3 (Load > 80% or Runtime below design guidelines) Rating 5 (Load and Runtime outside guidelines)	1	0.2					
		UPS Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	2	0.4					
PHOTOGRAPHS										

SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_101_Ultrasonic_Level Description: IC_101_Ultrasonic_Level	GENERAL	Location: Dry Well, Sub Grade	2.6	1.9			2013	20	14	
		Description: IC_101_Ultrasonic_Level								
		Make: Milltronics								
		Model: Multi Ranger 100 (Panel Mount)								
		Device Span: 0.3 to 15m (1 to 50ft)								
		Input/Output: Input								
		Signal Type: 0-20 or 4-20mA								
	Rated Voltage: 100-230VAC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			10			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Level transmitter provides station pump control and appears to be in "Good" condition. No redundant controls or level sensors are present. Equipment does not meet Zone 2 requirements.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
Control Wiring Terminations Visual Inspection: Issues for Discussion:		Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1						
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	1	0.4						
Instrument/Measurement is Designed Appropriately: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3						
Fitness for Purpose	Instrument Redundancy is Required/Installed: Issues for Discussion:	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	5	0.1	<b>RECOMMENDATIONS:</b> Install redundant pump control and instrument.		<b>COST ESTIMATE</b> \$ 16,800.00			
	Instrument Range is Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1						
	Instrument Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	2	0.5						
PHOTOGRAPHS										

SECTION	ITEM	DATA	Assessment Scores				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: IC_101_Flow Description: IC_101_Flow	GENERAL	Location: Dry Well, Main Level	1.0	1.5			2013	20	14
		Description: IC_101_Flow							
		Make: Rosemount							
		Model: 8712							
		Device Span: 0.01-39ft/s (0-12m/s)							
		Input/Output: Input							
		Signal Type: 4-20mA							
	Rated Voltage: 90-250VAC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		10			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.  RECOMMENDATIONS: COST ESTIMATE			
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4				
Control Wiring Terminations Visual Inspection: Issues for Discussion:		Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	1	0.4					
Fitness for Purpose	Instrument/Measurement is Designed Appropriately: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3					
	Instrument Redundancy is Required/Installed: Issues for Discussion:	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1					
	Instrument Range is Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1					
	Instrument Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	2	0.5					
PHOTOGRAPHS									

SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_101_FLYGT Description: IC_101_FLYGT	GENERAL	Location: Dry Well, Sub Grade	1.0	1.0			2016	20	17	
		Description: IC_101_FLYGT								
		Make: Xylem								
		Model: ENM-10								
		Device Span: 0.95-1.10g/cm3								
		Input/Output: Input								
		Signal Type: Discrete								
	Rated Voltage: 250VAC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			10			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	NOTES & COMMENTS: Flygt appears in "Good" condition. Existing flygt (blue in picture below) has been removed from service.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
		Control Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
		Occurrences of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	1	0.4					
	Fitness for Purpose	Instrument/Measurement is Designed Appropriately: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3	RECOMMENDATIONS: Maintain routine maintenance checks to ensure device is operational. Replace Flygt Ball as required.				
		Instrument Redundancy is Required/Installed: Issues for Discussion:	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1					
		Instrument Range is Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1					
Instrument Remaining Service Life: Issues for Discussion:		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	1	0.5						
PHOTOGRAPHS										



## **Appendix D**

### **Pipe Work & Valves Condition Assessment Forms**

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_101A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.3	1.0	1.6		1992	25	0	
		Description: Gate Valve								
		Size: 150 mm								
		Valve Make: McAvity								
		Valve Model: 296								
		Actuation: Manual - Hand Wheel								
		Actuator Make: N/A								
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3				
	Current Physical Condition	Valve Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.				
		Valve Corrosion Noted: <i>Issues for Discussion:</i>	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	3	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of critical failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 4,000.00			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_101B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.5	1.0	1.6		1992	25	0	
		Description: Gate Valve								
		Size: 150 mm								
		Valve Make: Mueller								
		Valve Model: 2360								
		Actuation: Manual - Hand Wheel								
		Actuator Make: N/A								
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3				
	Current Physical Condition	Valve Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.				
		Valve Corrosion Noted: <i>Issues for Discussion:</i>	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	4	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of critical failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 4,000.00			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

Project No.: 8400-001-00  
 Tag: GAV\_102A  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: GAV_102A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.3	1.0	1.6		1992	25	0
		Description: Gate Valve							
		Size: 150 mm							
		Valve Make: McAvity							
		Valve Model: 296							
		Actuation: Manual - Hand Wheel							
		Actuator Make: N/A							
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Valve Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.  Valve is difficult to operate (sticks).				
		<b>Valve Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	3	0.2					
<b>Valve Operation:</b> <i>Issues for Discussion:</i> Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)		4	0.3						
<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)		3	0.3						
Fitness For Purpose	<b>Appropriate Valve Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of critical failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 4,000.00			
	<b>Valve Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	<b>Sufficient Access to Exercise Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS									

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_102B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.5	1.0	1.6		1992	25	0	
		Description: Gate Valve								
		Size: 150 mm								
		Valve Make: Mueller								
		Valve Model: 2360								
		Actuation: Manual - Hand Wheel								
		Actuator Make: N/A								
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3				
	Current Physical Condition	Valve Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.				
		Valve Corrosion Noted: <i>Issues for Discussion:</i>	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	4	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 2 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 4,000.00			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										



Project No.: 8400-001-00  
 Tag: GAV\_103  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_103 Description: Gate Valve	GENERAL	Location: Dry Well Mid Level	3.3	1.0	1.6		1992	25	0	
		Description: Gate Valve								
		Size: 150 mm								
		Valve Make: Mueller								
		Valve Model: 2360								
		Actuation: Manual - Hand Wheel								
		Actuator Make: N/A								
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3				
	Current Physical Condition	Valve Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.				
		Valve Corrosion Noted: <i>Issues for Discussion:</i>	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	3	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of critical failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 4,000.00			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

Project No.: 8400-001-00  
 Tag: CHV\_101  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: CHV_101 Description: Check Valve	GENERAL	Location: Dry Well Lower Level	3.8	1.0	1.6		1992	25	0	
		Description: Check Valve								
		Size: 150 mm								
		Valve Make: Hillen De Lelie (HDL)								
		Valve Model: 5087								
		Actuation: N/A								
		Actuator Make: N/A								
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3				
	Current Physical Condition	Valve Visual Inspection: Issues for Discussion:	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.  Frequent issues with clogging.				
		Valve Corrosion Noted: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	4	0.2					
Valve Operation: Issues for Discussion:		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	4	0.3						
Fitness For Purpose	Appropriate Valve Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 2 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 3,000.00			
	Valve Capacity: Issues for Discussion:	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

Project No.: 8400-001-00  
 Tag: CHV\_102  
 Facility: Metcalfe Lift Station  
 Assessment Page 1 of 1

VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu  
 Date: 29-Jun-19

Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: CHV_102 Description: Check Valve	GENERAL	Location: Dry Well Lower Level	3.8	1.0	1.6	1992	25	0	
		Description: Check Valve							
		Size: 150 mm							
		Valve Make: Hillen De Lelie (HDL)							
		Valve Model: 5087							
		Actuation: N/A							
		Actuator Make: N/A							
	Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)	3				
	Current Physical Condition	Valve Visual Inspection: Issues for Discussion:	Rating 1 (New) Rating 2 (Good condition, functions well) Rating 3 (Fair condition) Rating 4 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.2	<b>NOTES &amp; COMMENTS:</b> Valve has exceeded its expected service life.  Frequent issues with clogging.			
		Valve Corrosion Noted: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Extensive corrosion) Rating 5 (Corrosion affects operability)	4	0.2				
Valve Operation: Issues for Discussion:		Rating 1 (New) Rating 2 (Valve functions well) Rating 3 (Functions but with difficulty) Rating 4 (Valve operable but exceeds service life) Rating 5 (No - Valve inoperable)	4	0.3					
Occurrence of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	4	0.3					
Fitness For Purpose	Appropriate Valve Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 2 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	<b>RECOMMENDATIONS:</b> Replace valve		<b>COST ESTIMATE</b> \$ 3,000.00		
	Valve Capacity: Issues for Discussion:	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7					
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6					
	Sufficient Access to Exercise Valve: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4					
PHOTOGRAPHS									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P101_Suction Description: P-101 Suction Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6	1992	50	23	
		Description: P-101 Suction Line							
		Size: 200 mm							
		Material: Carbon Steel							
		Service: Sewage							
	Coating: Epoxy	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Piping Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.3	<b>NOTES &amp; COMMENTS:</b> <i>Piping is nearing its expected service life.</i>				
		<b>Piping Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.4					
		<b>Condition of Potable Water Piping and Backflow</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	0	0					
		<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3					
	Fitness for Purpose	<b>Force Main Shut Off Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3					<b>RECOMMENDATIONS:</b>  <b>COST ESTIMATE</b>
		<b>Flow Meter Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2					
		<b>Appropriate Piping Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1					
	Maintainability and Operability	<b>Piping Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Piping has sufficient capacity for current and projected demand conditions) Rating 2 (Piping has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Piping has sufficient capacity) Rating 4 (Piping does not meet current demand condition) Rating 5 (Piping is critically undersized and likelihood of station backup is high)	1	0.4					
		<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6					
<b>Isolation Valves Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes ) Rating 5 (No)		1	0.4						
PHOTOGRAPHS									



PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P102_Suction Description: P-102 Suction Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1992	50	23
		Description: P-102 Suction Line							
		Size: 200 mm							
		Material: Carbon Steel							
		Service: Sewage							
	Coating: Epoxy	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Piping Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.3	<b>NOTES &amp; COMMENTS:</b> Piping is nearing its expected service life.				
		<b>Piping Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.4					
		<b>Condition of Potable Water Piping and Backflow</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	0	0					
		<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3					
Fitness for Purpose	<b>Force Main Shut Off Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3						
	<b>Flow Meter Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2						
	<b>Appropriate Piping Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1						
Maintainability and Operability	<b>Piping Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Piping has sufficient capacity for current and projected demand conditions) Rating 2 (Piping has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Piping has sufficient capacity) Rating 4 (Piping does not meet current demand condition) Rating 5 (Piping is critically undersized and likelihood of station backup is high)	1	0.4						
	<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	<b>Isolation Valves Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes ) Rating 5 (No)	1	0.4						
PHOTOGRAPHS									
						RECOMMENDATIONS:		COST ESTIMATE	

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P101_Discharge Description: P_101 Discharge Line	GENERAL	Location: Dry Well Lower Level	3.0	1.8	1.6	1992	50	23	
		Description: P-101 Discharge Line							
		Size: 150 mm							
		Material: Carbon Steel							
		Service: Sewage							
	Coating: Epoxy	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Piping Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.3	<b>NOTES &amp; COMMENTS:</b> Piping is nearing its expected service life.				
		<b>Piping Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.4					
		<b>Condition of Potable Water Piping and Backflow</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	0	0					
		<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3					
	Fitness for Purpose	<b>Force Main Shut Off Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3					<b>RECOMMENDATIONS:</b>  <b>COST ESTIMATE</b>
		<b>Flow Meter Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2					
		<b>Appropriate Piping Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of critical failure)	1	0.1					
	<b>Piping Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Piping has sufficient capacity for current and projected demand conditions) Rating 2 (Piping has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Piping has sufficient capacity) Rating 4 (Piping does not meet current demand condition) Rating 5 (Piping is critically undersized and likelihood of station backup is high)	3	0.4						
	Maintainability and Operability	<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6					
<b>Isolation Valves Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes ) Rating 5 (No)		1	0.4						
PHOTOGRAPHS									



PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P102_Discharge Description: P-102 Discharge Line	GENERAL	Location: Dry Well Lower Level	3.0	1.8	1.6		1992	50	23
		Description: P-102 Discharge Line							
		Size: 150 mm							
		Material: Carbon Steel							
		Service: Sewage							
	Coating: Epoxy	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Piping Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.3	<b>NOTES &amp; COMMENTS:</b> Piping is nearing its expected service life.				
		<b>Piping Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.4					
		<b>Condition of Potable Water Piping and Backflow</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	0	0					
		<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3					
Fitness for Purpose	<b>Force Main Shut Off Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3						
	<b>Flow Meter Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2						
	<b>Appropriate Piping Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of critical failure)	1	0.1						
Maintainability and Operability	<b>Piping Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Piping has sufficient capacity for current and projected demand conditions) Rating 2 (Piping has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Piping has sufficient capacity) Rating 4 (Piping does not meet current demand condition) Rating 5 (Piping is critically undersized and likelihood of station backup is high)	3	0.4						
	<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	<b>Isolation Valves Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes ) Rating 5 (No)	1	0.4						
PHOTOGRAPHS									
						<b>RECOMMENDATIONS:</b>		<b>COST ESTIMATE</b>	

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_Discharge_HDR Description: Discharge Header	GENERAL	Location: Dry Well Lower/Mid Level	2.7	1.8	1.6		1992	50	23
		Description: Discharge Header							
		Size: 150 mm							
		Material: Carbon Steel							
		Service: Sewage							
	Coating: Epoxy	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3			
	Current Physical Condition	<b>Piping Visual Inspection:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 3 (Minor leaks) Rating 5 (Risk of critical failure)	3	0.3	<b>NOTES &amp; COMMENTS:</b> <i>Piping is nearing its expected service life.</i>				
		<b>Piping Corrosion Noted:</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.4					
		<b>Condition of Potable Water Piping and Backflow</b> <i>Issues for Discussion:</i> Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	0	0					
		<b>Occurrence of Maintenance Issues:</b> <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3					
	Fitness for Purpose	<b>Force Main Shut Off Valve:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3					
		<b>Flow Meter Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2					
		<b>Appropriate Piping Configuration:</b> <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1					
	Maintainability and Operability	<b>Piping Capacity:</b> <i>Issues for Discussion:</i> Rating 1 (Piping has sufficient capacity for current and projected demand conditions) Rating 2 (Piping has sufficient capacity for current demand conditions with minor surplus) Rating 3 (Piping has sufficient capacity) Rating 4 (Piping does not meet current demand condition) Rating 5 (Piping is critically undersized and likelihood of station backup is high)	3	0.4					
		<b>Sufficient Access to Perform O&amp;M Activities Safely:</b> <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6					
<b>Isolation Valves Installed:</b> <i>Issues for Discussion:</i> Rating 1 (Yes ) Rating 5 (No)		1	0.4						
PHOTOGRAPHS									

## **Appendix E**

### **Power Condition Assessment Forms**

SECTION	ITEM	DATA	CONDITION RATING				AGE										
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE								
Equipment Tag: E-E101_Service Description: E-E101_Service	GENERAL	Location: Dry Well, Main Level	3.2	2.8			1990	40	11								
		Description: E-E101_Service															
		Phase: 3 Phase															
		Rated Voltage: 600 VAC															
		Rated Current: 100 A															
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5										
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.1	<b>NOTES &amp; COMMENTS:</b> Service is fed overhead via pole mounted transformers. Service equipment is in "Fair" condition. Moisture is evident within the main disconnect. Grounding is showing signs of deterioration. Exterior metering enclosure has visible gap at point of connection, allowing moisture into the cabinet. Non-current carrying metal equipment parts are not bonded as per City Design Standards.											
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4												
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1												
		Occurrences of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4												
	Fitness for Purpose	Meets City Electrical Design Guide: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.2						<b>RECOMMENDATIONS:</b> Replace metering cabinet. Use bottom entry when terminating teck cable. If bottom entry is not possible use water tight seal to prevent moisture penetrating the cabinet. Proper seals required when entering the building envelope.  Supply and Install Manual Transfer Switch with Disconnect  Perform Lighting and Grounding Upgrade						
		Standby Generator Needed & Present: Issues for Discussion:	Rating 1 (Yes / Not needed) Rating 3 (Needed / Portable Generator) Rating 5 (Needed / Not Available)	3	0.2											\$	10,000.00
		Is Main Breaker Present & Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (Present, not appropriate) Rating 5 (Not Present)	1	0.05												
		Is Grounding System Present & Appropriate: Issues for Discussion:	Rating 1 (Yes) Rating 3 (Present, not appropriate) Rating 5 (Not Present)	3	0.1											\$	7,900.00
		Is Utility Service appropriate: (600V/3PH) Issues for Discussion:	Rating 1 (Yes) Rating 5 (No)	1	0.1												
Has the Service Capacity Been Reached? Issues for Discussion:		Requires review of service calculation. Rating 1 (Service < 85% capacity) Rating 3 (Service 85% - 99% capacity) Rating 5 (Service > 99% capacity)	1	0.1	\$											37,000.00	
Equipment Remaining Service Life: Issues for Discussion:		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	4	0.25													
PHOTOGRAPHS																	

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_E101_Starter Description: E-E101_Starter	GENERAL	Location: Dry Well, Main Level	3.2	1.5			2010	40	31
		Description: E-E101_Starter							
		Manufacturer: Square D							
		Model: 8538							
		Phase: 3 Phase							
		Rated Voltage: 600V							
	Rated Horsepower: 10HP	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears to have been recently replaced and is in "Good" Condition. Equipment is not rated for Zone 2 locations.			
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4				
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1				
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
Meets City Electrical Design Standards: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.25					
Fitness for Purpose	Has the Breaker Capacity been Reached? Issues for Discussion:	Review starts per hour vs. recommendation Rating 1 (< 80% rec. starts / hour) Rating 3 (80% - 95% rec. starts / hour) Rating 5 (>95% rec. starts / hour)	1	0.25	<b>RECOMMENDATIONS:</b> Upgrade HVAC system to achieve minimum air change requirements.				
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	1	0.5					
PHOTOGRAPHS									

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_E102_Starter Description: E_E102_Starter	GENERAL	Location: Dry Well, Main Level	3.2	1.5			2010	40	31
		Description: E-E102_Starter							
		Manufacturer: Square D							
		Model: Class 8538							
		Phase: 3 Phase							
		Rated Voltage: 600V							
	Rated Horsepower: 10HP	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears to have been recently replaced and is in "Good" Condition. Equipment is not rated for Zone 2 locations.			
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4				
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1				
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
Meets City Electrical Design Standards: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.25					
Fitness for Purpose	Has the Breaker Capacity been Reached? Issues for Discussion:	Review starts per hour vs. recommendation Rating 1 (< 80% rec. starts / hour) Rating 3 (80% - 95% rec. starts / hour) Rating 5 (>95% rec. starts / hour)	1	0.25	<b>RECOMMENDATIONS:</b> Upgrade HVAC system to achieve minimum air change requirements.				
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	1	0.5					<b>COST ESTIMATE</b>
PHOTOGRAPHS									



SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: E_E101_Dist_Panel Description: E_E101_Dist_Panel	GENERAL	Location: Dry Well, Main Level	3.0	1.0			2010	40	31	
		Description: E_E101_Dist_Panel								
		Manufacturer: Square D								
		Model: QO Load Center								
		Phase: Single Phase								
		Rated Voltage: 120/240								
	Rated Current:	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment Appears in "Good" condition. Equipment is not rated for Zone 2 locations. Knockout in bottom of panel not filled.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4						
Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	<b>RECOMMENDATIONS:</b> Upgrade HVAC system to meet minimum air changes. Install knockout filler.					
	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Panel < 70% Full) Rating 2 (Panel < 90% Full) Rating 3 (Panel > 90 Full or Loaded) Rating 4 (Panel Full but not Loaded) Rating 5 (Panel 100% Full or Loaded)	1	0.25						
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	1	0.5						
PHOTOGRAPHS										

MOTOR CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE					
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE			
Equipment Tag: E_E101_Motor Description: E_E101_Motor	GENERAL	Location: Dry Well, Sub Grade	3.4	2.3			1970	50	1			
		Description: E_E101_Motor										
		Manufacturer: Marathon Electric										
		Model: YD 254TTFL5097AN L										
		Horsepower: 7.5HP										
		Rated Voltage: 575										
		Phase: 3 Phase										
		Rated Current: 8.3A										
	RPM: 1140	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			10					
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.1	<b>NOTES &amp; COMMENTS:</b> Motor appears to have been painted but still shows evidence of corrosion. Equipment is not rated for Zone 2 locations. Peckerhead seal appears to be dried out and has pieces missing. Excessive slack in feeder cable without proper means of protection which can result in damage during maintenance activities. Equipment is nearing the end of its expected service life.						
Canadian Electrical Code Issues Identified: Issues for Discussion:		Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4								
Wiring Terminations Visual Inspection: Issues for Discussion:		Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1								
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4								
Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	<b>RECOMMENDATIONS:</b> Replace motor once HVAC concerns have been addressed. Install raceway for cable protection.							
	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Below service factor) Rating 2 (Occasional within service factor) Rating 3 (Frequent within service factor) Rating 4 (Always Within Service Factor) Rating 5 (> Service Factor)	2	0.5								
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	4	0.25								
PHOTOGRAPHS												
	<table border="1"> <thead> <tr> <th colspan="2">COST ESTIMATE</th> </tr> </thead> <tbody> <tr> <td>Replace motor once HVAC concerns have been addressed. Install raceway for cable protection.</td> <td>\$ 15,000.00</td> </tr> </tbody> </table>									COST ESTIMATE		Replace motor once HVAC concerns have been addressed. Install raceway for cable protection.
COST ESTIMATE												
Replace motor once HVAC concerns have been addressed. Install raceway for cable protection.	\$ 15,000.00											



MOTOR CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_E102_Motor Description: E_E102_Motor	GENERAL	Location: Dry Well, Sub Grade	3.4	2.3			1970	50	1
		Description: E_E102_Motor							
		Manufacturer: Marathon Electric							
		Model: YD 254TFL5097AN L							
		Horsepower: 7.5HP							
		Rated Voltage: 575							
		Phase: 3 Phase							
		Rated Current: 8.3A							
	RPM: 1140	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			10		
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	3	0.1	<b>NOTES &amp; COMMENTS:</b> Motor appears to have been painted but still shows evidence of corrosion. Equipment is not rated for Zone 2 locations. Peckerhead seal appears to be dried out and has pieces missing. Excessive slack in feeder cable without proper means of protection which can result in damage during maintenance activities. Equipment is nearing the end of its expected service life.			
Canadian Electrical Code Issues Identified: Issues for Discussion:		Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
Wiring Terminations Visual Inspection: Issues for Discussion:		Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1					
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	<b>RECOMMENDATIONS:</b> Replace motor once HVAC concerns have been addressed. Install raceway for cable protection				
	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Below service factor) Rating 2 (Occasional within service factor) Rating 3 (Frequent within service factor) Rating 4 (Always Within Service Factor) Rating 5 (> Service Factor)	2	0.5					
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	4	0.25					
PHOTOGRAPHS									
							<b>COST ESTIMATE</b> \$ 15,000.00		

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: E_E103_Motor Description: E_E103_Motor	GENERAL	Location: Dry Well, Sub Grade	3.0	2.0			2010	15	6	
		Description: E_E103_Motor								
		Manufacturer: Dayton								
		Model: 6K050D								
		Horsepower: 3/4-1/3HP								
		Rated Voltage: 115								
		Phase: Single Phase								
		Rated Current: 11.4/7.7A								
	RPM: 1725/1140	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5				
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	1	0.1	<b>NOTES &amp; COMMENTS:</b> Motor appears to be in "Good" condition. Equipment is not rated for Zone 2 locations.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
		Occurrences of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
	Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	<b>RECOMMENDATIONS:</b> Upgrade motor requirements as needed based on new HVAC design.				
		Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Below service factor) Rating 2 (Occasional within service factor) Rating 3 (Frequent within service factor) Rating 4 (Always Within Service Factor) Rating 5 (> Service Factor)	2	0.5					
Equipment Remaining Service Life: Issues for Discussion:		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.25						
PHOTOGRAPHS										
	<b>COST ESTIMATE</b>									
	Upgrade motor requirements as needed based on new HVAC design.									



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_E101_Sump_Pump Description: E_E101_Sump_Pump	GENERAL	Location: Dry Well, Sub Grade	1.7	2.3			2010	10	1
		Description: E_E101_Sump_Pump							
		Manufacturer: Franklin Electric							
		Model: ESP33AV							
		Horsepower: 1/3HP							
		Rated Voltage: 115							
		Phase: Single Phase							
		Rated Current: 5.6A							
	RPM: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	4	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment shows considerable corrosion and is in "Poor" condition.			
Canadian Electrical Code Issues Identified: Issues for Discussion:		Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
Wiring Terminations Visual Inspection: Issues for Discussion:		Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	<b>RECOMMENDATIONS:</b> Maintain regular maintenance checks to ensure pump is operational. Replace pump as needed.				
	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Below service factor) Rating 2 (Occasional within service factor) Rating 3 (Frequent within service factor) Rating 4 (Always Within Service Factor) Rating 5 (> Service Factor)	2	0.5					
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	4	0.25					
PHOTOGRAPHS									

TRANSFORMER CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: E_E101_Transformer Description: E_E101_Transformer	GENERAL	Location: Dry Well, Main Level	2.7	2.2			1993	40	14	
		Description: E_E101_Transformer								
		Manufacturer: Delta								
		Model: DS 015								
		Phase: Single Phase								
		Rated Voltage: 600V:120/240V								
	Rated kVA: 15 kVA	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			10			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like new) Rating 2 (Minor surface corrosion) Rating 3 (Surface & internal corrosion) Rating 4 (Severe corrosion) Rating 5 (Safety concern)	2	0.1	<b>NOTES &amp; COMMENTS:</b> Equipment appears to be in "Good" condition. Equipment is not rated for Zone 2 locations. Clearance from a combustible material has not been maintained. Enclosure has not been grounded. Grounding is not insulated.  <b>RECOMMENDATIONS:</b> Improve HVAC requirements to meet minimum air changes. Install non combustible backing as per CEC. Replace ground with insulated ground and bond enclosure.				
		Canadian Electrical Code Issues Identified: Issues for Discussion:	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: Issues for Discussion:	Rating 1 (Connections tight, labelled) Rating 2 (Missing labels) Rating 3 (Loose / disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	1	0.1					
Occurrences of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	1	0.4						
Fitness for Purpose	Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.2	<b>COST ESTIMATE</b> \$ 1,000.00					
	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (<75%) Rating 2 (<85%) Rating 3 (<95%) Rating 4 (At capacity) Rating 5 (Above capacity)	1	0.4						
	Equipment Remaining Service Life: Issues for Discussion:	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.4						

PHOTOGRAPHS





## **Appendix F**

### **Force Main Condition Assessment Forms**

**FORCEMAIN PIPING CONDITION ASSESSMENT FORM**



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	3rd Party & Environmental Damage	Year Installed	Expected Service Life	Remaining Service Life	
Equipment Tag: FM_Pipe Description: Sanitary Force Main	GENERAL	Location: Lane behind Metcalfe Place and along St. Mary's Road	1.8	1.0	1.6	1991	75	47	
		Description: Sanitary Force Main							
		Size: 200 mm							
		Material: PVC							
		Service: Sewage							
		Coating: N/A							
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		10			
	Current Physical Condition	Force Main Breaks or Leaks in the Past: <i>Issues for Discussion:</i>	Rating 1 (Like new) Rating 3 (Minor repairs) Rating 4 (Major repairs) Rating 5 (Risk of critical failure)	1	0.6	NOTES & COMMENTS: The force main is within its expected service life.			
		Force Main Age: <i>Issues for Discussion:</i>	Rating 1 (Less than 10 years old) Rating 2 (Less than 25 years old) Rating 3 (Greater than 25 years old) Rating 4 (Greater than 50 years old) Rating 5 (Greater than 75 years old)	3	0.4				
		Compatibility with Pumps and Motors: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper force main selection for application. Risk of critical failure)	1	1				
3rd Party & Environmental Damage	Force Main Attached to a Bridge: <i>Issues for Discussion:</i>	Rating 1 (No) Rating 5 (Yes)	1	0.2	RECOMMENDATIONS:		COST		
	Force Main Near Other Underground Utilities: <i>Issues for Discussion:</i>	Rating 1 (No) Rating 3 (Yes - Minor nearby utilities) Rating 5 (Yes - Major nearby utilities)	3	0.3					
	Force Main Under a River Crossing: <i>Issues for Discussion:</i>	Rating 1 (No) Rating 3 (Yes - location of pipe not an issue) Rating 5 (Yes - location of pipe is an issue)	1	0.5					
PHOTOGRAPHS									

**Appendix G**  
**Design Standards & Guidelines**

## Appendix G – Design Standards and Guidelines

The Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers and Ontario Ministry of the Environment, as stipulated in *Recommended Standards for Wastewater Facilities – 2014 and Design Guidelines for Sewage Works – 2008*, have established standards and guidelines for public sewage works such as gravity sewers, force mains, and sewage pumping stations. The following information summarizes the guidelines and best industry practices as they relate to the components of the sewage pumping facility.

### Structures – Regulatory Requirements

Lift station structures should be designed to facilitate removing pumps, monitors, and other mechanical and electrical equipment. In areas where high groundwater conditions are expected, adequate provisions should be made for protection against buoyancy of the lift station structures. Lift station structures should be water tight, protected from physical damage from a 100-year flood, and should remain fully operational and accessible during a 25-year flood. Lift stations are to be designed as “Post-Disaster” buildings under the Manitoba Building Code.

### Pumps – Regulatory Requirements

Lift stations shall be designed with multiple pump units, with provision for the peak wastewater design flows to be handled by the remaining pumps in the event of the largest pump being out of service. Pumps handling raw wastewater should be capable of passing particles of a minimum 75 mm in diameter. Minimum pump suction and discharge openings should be 100 mm in diameter. Each pump should have an individual intake with wet well and intake designed to avoid turbulence near the intake and prevent vortexing. In order to minimize hydraulic surges, lift stations should be designed to deliver as uniform a flow as practicable.

### Valves – Regulatory Requirements

Suitable shut-off valves should be placed on the discharge lines of pumps. Check valves should be placed between the shut-off valve and the pump on the discharge line of each pump. Check valves should be suitable for the material being handled and shall be placed on the horizontal portion of the discharge piping with the exception of ball check valves, which may be placed in the vertical. Valves should be capable of withstanding normal operating pressure and water hammer. All valves should be operable from floor level and accessible for maintenance.

### Wet Wells – Regulatory Requirements

Wet well sizing should take into consideration the design fill time and minimum pump cycle time. The effective volume of the wet well should be based on design average flow and is not to exceed a fill time of 30 minutes unless the facility is designed to provide flow equalization/storage. When selecting the minimum cycle time, the motor manufacturer’s duty cycle recommendations should be utilized. Provisions should be made so that the fill time indicated is not exceeded for initial flows when the anticipated initial flow to the pumping station is less than the design average flow. Pump configurations within the wet well should be designed to avoid settling of solids. The wet well floor should have a minimum slope of 1:1 to the hopper bottom.

### Flow Measurement – Regulatory Requirements

All lift stations should be provided with suitable devices for measuring wastewater flow. Large lift stations with peak design flow greater than 50 L/s should be provided with indicating, totalizing, and recording flow measurement devices. Elapsed time meters may be used for lift stations with peak design flow less than 50 L/s.

### Electrical Equipment – Regulatory Requirements

Electrical systems and associated components (motors, lights, cable, switchboxes, control circuits, etc.) in lift station wet wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapours are likely to occur in normal operation, should comply with the Canadian Electrical Code requirements for Zone 1 hazardous locations. Equipment located in wet wells should be suitable for use in corrosive conditions and meet the requirements under the Canadian Electrical Code for Category 2 corrosive environments. Electrical systems installed in lift station dry wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapours are not likely to occur in normal operation, should comply with the Canadian Electrical Code requirements for Zone 2 hazardous locations. Equipment located in dry wells should be suitable for use in corrosive conditions and meet the requirements under the Canadian Electrical Code for Category 1 corrosive environments. If a lift station dry well complies with the ventilation requirements set forth in the NFPA standard 820 to be an unclassified space, the electrical systems installed in dry wells may not be considered a Zone 2 hazardous location.

### Alarm Systems – Regulatory Requirements

Alarm systems should be provided for lift stations. Alarms should be in place for cases of high and low liquid levels, power failure, sump pump failure, pump failure, unauthorized entry, or any cause of lift station fault. Lift station alarms should be telemetered to the personnel in charge of operating the lift station. In some cases, audio-visual alarm systems with a self-contained power supply may be installed in lieu of a telemetering system depending on location, station holding capacity, and inspection frequency.

### Emergency Operation – Regulatory Requirements

Lift stations should be designed to operate in such a way that equipment failure may not result in the discharge of raw wastewater to any waters and to protect public health by preventing backup of wastewater and subsequent discharge to basements, streets, and other public and private property.

### Ventilation – Regulatory Requirements

Ventilation systems shall be designed to function year round, including fresh air intake louvers and openings. To prevent subsequent blockages, screen openings should be sized to avoid build-up of frost during winter months. Ventilation of the wet well may be either continuous or intermittent. If continuous, a minimum of 12 complete air changes per hour is required. If intermittent, a minimum of 30 complete air changes per hour during the period of occupancy is required. Fresh air should be forced into wet wells by mechanical means at a point about 30 cm above the expected high liquid level, with provision for emergency automatic blow-by to elsewhere in the wet well, should the fresh air outlet become submerged. Provision should be made in the lift station system design to verify that the ventilation fan is operational and the air change capacity is achieved.

Ventilation of the dry well may be either continuous or intermittent. If continuous, a minimum of 6 complete air changes per hour are required. If intermittent, a minimum of 30 complete air changes per hour during the period of occupancy are required. Positive pressure ventilation is recommended and the system is to avoid dispensing contaminants throughout other areas of the lift station.

Provision for heating of intake air is recommended. Switches for the operation of ventilation equipment are to be plainly identified and located within arm's reach of the lift station entry way. All intermittently operated ventilation equipment should be interconnected with the lighting system.

#### Force main – Regulatory Requirements

The minimum pipe diameter for a force main should not be less than 100 mm. Velocities less than 0.6 m/sec (2 ft/sec) and greater than 1.6 m/sec (5.2 ft/sec) are not recommended. Above 3.0 m/sec pipe scouring can damage the walls of the pipe. Below 0.6 m/sec solid particles can separate from the wastewater and settle to the bottom of the pipe, which can obstruct the pipe flow over time. Total retention time in a force main should be kept under 4 hours to avoid anaerobic fermentation and the resultant production of odorous, hazardous, and corrosive gases.

#### Sewer – Regulatory Requirements

It is recommended that no gravity sewer conveying raw sewage should be less than 200 mm in diameter. Sanitary sewers should be designed and constructed with such slopes to give a mean velocity of not less than 0.6 m/s (2 fps) during average flow conditions with due consideration given to actual depth of sewage flowing in the pipe. Slopes slightly less than those required for 0.6 m/s (2 fps) may be considered if the depth of flow will be 0.3 of the diameter or greater for design average flow, and provisions can be made for frequent cleaning. Manholes should be installed at the end of each line and at all changes in grade, size, or alignment. Manhole spacing should not exceed 120 m for sewers 380 mm (15 inches) in diameter or less. The sewer shall be installed at no less than 600 mm below a water line if installed in the same trench and the horizontal separation distance is a minimum of 300 mm. Best industry practices are to maintain a minimum of 3 meters separation distance between water and sewer lines and a separation distance of 300 mm when crossing with the water line above.

#### Design Standards & Guidelines

- MPE prepared this assessment in accordance to the following standards and guidelines as a minimum:
- City of Winnipeg Design and Development Standards Manual, 2017
- City of Winnipeg Sewage Works Control Bylaw (Bylaw No. 5115)
- City of Winnipeg Standard Construction Specifications and Drawings, Roadways, Water, and Sewer
- The Waterworks and Sewage Works Regulations, 2015
- The Environmental Management and Protection Act, 2002
- Water Security Agency, Sewage Works Design Standard (EPB 503), Nov. 15, 2012
- AWWA M11 – Steel Pipe – A Guide for Design and Installation
- AWWA M23 – PVC Pipe: Design and Installation
- AWWA M55 – PE Pipe: Design and Installation
- ANSI/HI – 1.3, 1.4, 1.6, 9.1-9.5 Standards for Centrifugal Pumps
- ANSI/HI – 9.6.4 Rotodynamic Pumps for Vibration Measurements & Allowable Values
- ANSI/HI – 9.6.5 Rotodynamic Pumps – Guideline for Condition Monitoring
- ANSI/HI – 9.6.6 Rotodynamic Pumps for Pump Piping



- ANSI/HI – 9.8 Pump Intake Design
- ANSI/HI – 11.6-2012 Rotodynamic Submersible Pumps: for Hydraulic Performance
- ASME/ANSI B16.5 – 2013
- ANSI – Applicable Standards
- ASTM – Applicable Standards
- AMSE – Applicable Standards
- AWWA – Applicable Standards
- Saskatchewan Plumbing and Drainage Regulations
- Canadian Standards Association (CSA)
- National Sanitation Foundation (NSF)
- Canadian Electrical Code (CEC)
- Institute of Electrical and Electronic Engineers (IEEE)
- Electrical and Electronic Equipment Manufacturers Association of Canada (EEMAC)
- National Building Code of Canada
- National Plumbing Code of Canada
- Canadian Standards Association (CSA) Natural Gas and Propane Installation Code CSA B149.1
- American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE)
- ACI, Requirements for Assessment, Repair, and Rehab of Existing Concrete Structures (ACI 562M-16)
- ACI, Metric Building Code Requirements for Structural Concrete and Commentary (ACI 318M-14)
- ACI, Code Requirements for Environmental Engineering Concrete Structures (ACI 350-06)
- Process Industry Practices, Fixed Ladders and Cages (PIP STF05501)
- National Fire Code of Canada
- NFPA 820
- The Uniform Building & Accessibility Standards Regulations of Saskatchewan
- The Occupational Health and Safety Act