



Report for:

CITY OF WINNIPEG

-WATER AND WASTE DEPARTMENT-

Final Report

WASTEWATER LIFT STATION CONDITION ASSESSMENT PHASE II

Document IX: Cornish Lift Station Assessment



Date: March 16, 2020

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MPE Project No.: 8400-001-00

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Corporate Authorization

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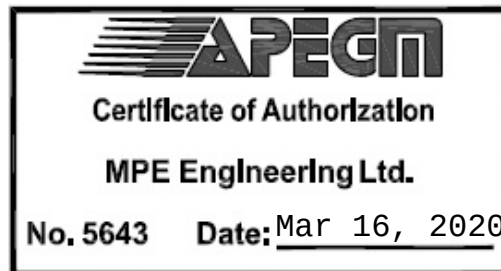


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1.0 Introduction

1.1 Background

MPE Engineering Ltd. (MPE) conducted a visual inspection of the Cornish Lift Station on July 10, 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. Qualified personnel conducted inspections. 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 deliver the design performance required consistently.
- **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.

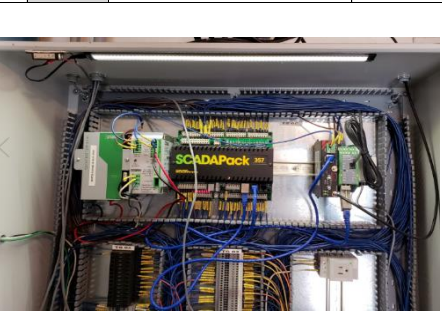
Table 1.1 provides a general overview of the scoring matrix that was used to assess each component. The scoring criteria was adjusted to suit each asset category, but generally utilized the following format:

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

Project No.: 8400-001-00 Tag: IC_101_Panel Facility: Metcalfe Lift Station Assessment Page 1 of 1		CONTROL PANEL CONDITION ASSESSMENT FORM		Assessor: Richard Ofstie Date: 29-Jun-19 Populate Date Asset ID: 14331		
SECTION	ITEM	DATA	Assessment Scores		Likelihood Indicator Scores	
			Current Physical Condition	Fitness for Purpose		
GENERAL	Location:	Drywell, Main Level	3	1	2013	
	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
	Equipment Visual Inspection: Issues for Discussion:	New) or 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. Equipment is not rated for classified 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 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			
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	RECOMMENDATIONS: Incorporate redundant control for the lift station. Upgrade HVAC system. Install panduit cover.		
Panel is Appropriately Designed: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1			
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	COST ESTIMATE \$ 45,000.00		
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	  					

2.0 General Overview

2.1 Location

The Cornish Lift Station is located at the easternmost point of Cornish Avenue in western Winnipeg. It is in a treed area bordering the Assiniboine River.

2.2 General

The Cornish lift station was originally constructed in 1936 and had mechanical and electrical upgrades in 1986. It services a primarily residential area of approximately 145 hectares. Table 2.1 provides a brief overview of the station.

Table 2.1: Cornish Lift Station Overview		
YEAR CONSTRUCTED	1936	Major Reno: 1986
LOCATION	1 Cornish Avenue	
CONFIGURATION	Wet Well / Dry Well	
PUMPING CAPACITY	66.2 L/s	
TYPE OF PUMPS	Dry Pit Solids Handling	
PUMP HORSEPOWER	P-101: 15 HP, P-102: 15 HP	
BACKUP GENERATOR	Mobile Generator - Full Station	
VENTILATION	Dry Well: Intermittent, Wet Well: N/A	

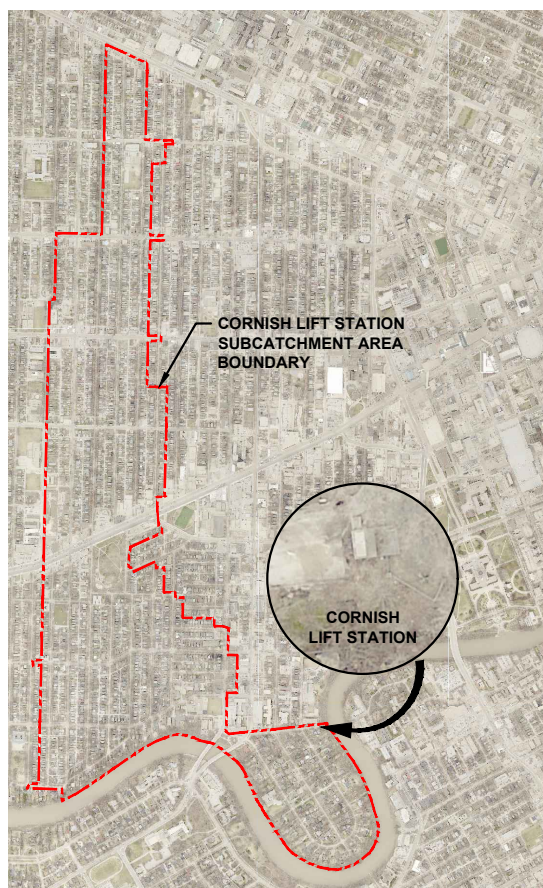
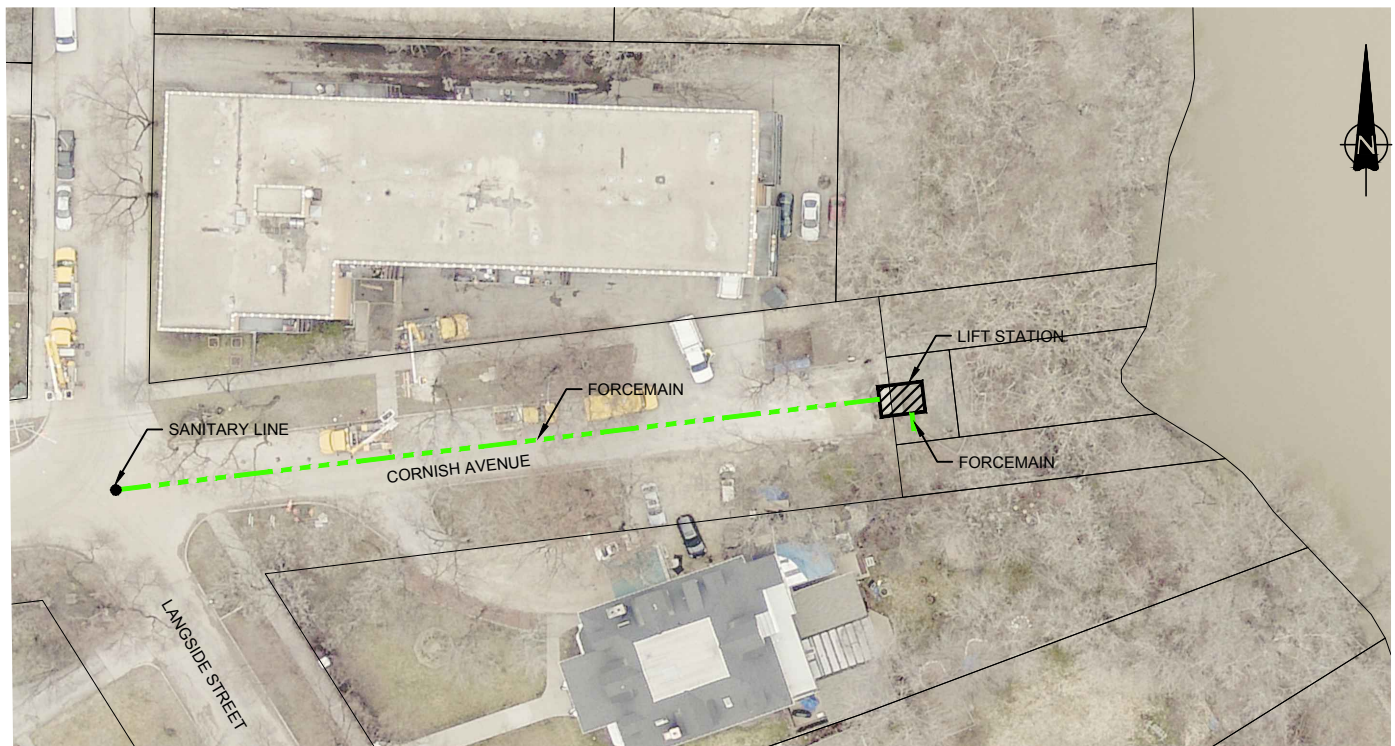


There was a minor sewage spill in the dry well during the visit. The station is aging and is in need of renovation and upgrades in order to ensure reliable usage in the future. The structure is in sound condition despite numerous renovations over the years. The layout for the pumps is tight making servicing functional although difficult. Section 11 summarizes the recommended upgrades.

Cornish 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
CORNISH 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 of Winnipeg.

3.1.2 Record Drawings, Reports, & Manuals

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

- Pump House Superstructure, Cornish Ave. Pumping Station No. 9 – City of Winnipeg; 1936
- Sections, Cornish Ave. Pumping Station No. 9 – City of Winnipeg; 1936
- Electrical Upgrading, Cornish Pumping Station – City of Winnipeg; 1986
- Station Upgrading (Mechanical), Cornish Pumping Station – City of Winnipeg; 1986

3.1.3 Missing or Conflicting Data

The following conflicting data was noted:

- The material of the force main piping was not evident on the record drawings. Asbestos cement piping was used for the purposes of determining pipeline hydraulic losses in this report.

4.0 Sewage Production

4.1 General

The service area and design flows were generated based on discussion with the City of Winnipeg 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 Cornish Lift Station was provided by the City from the LIFT_STN_SERVICE_AREAS.gws workspace and consists of primarily Single Family Dwellings with areas of Multi Family Dwellings and Commercial areas. The catchment area is located primarily east of Ruby Street, north of the River, west of Sherbrooke Street, and south of Notre dame Avenue. Figure 4.1 illustrates the sub-catchment area for the Cornish Lift Station.

4.1.2 Peaking Factor

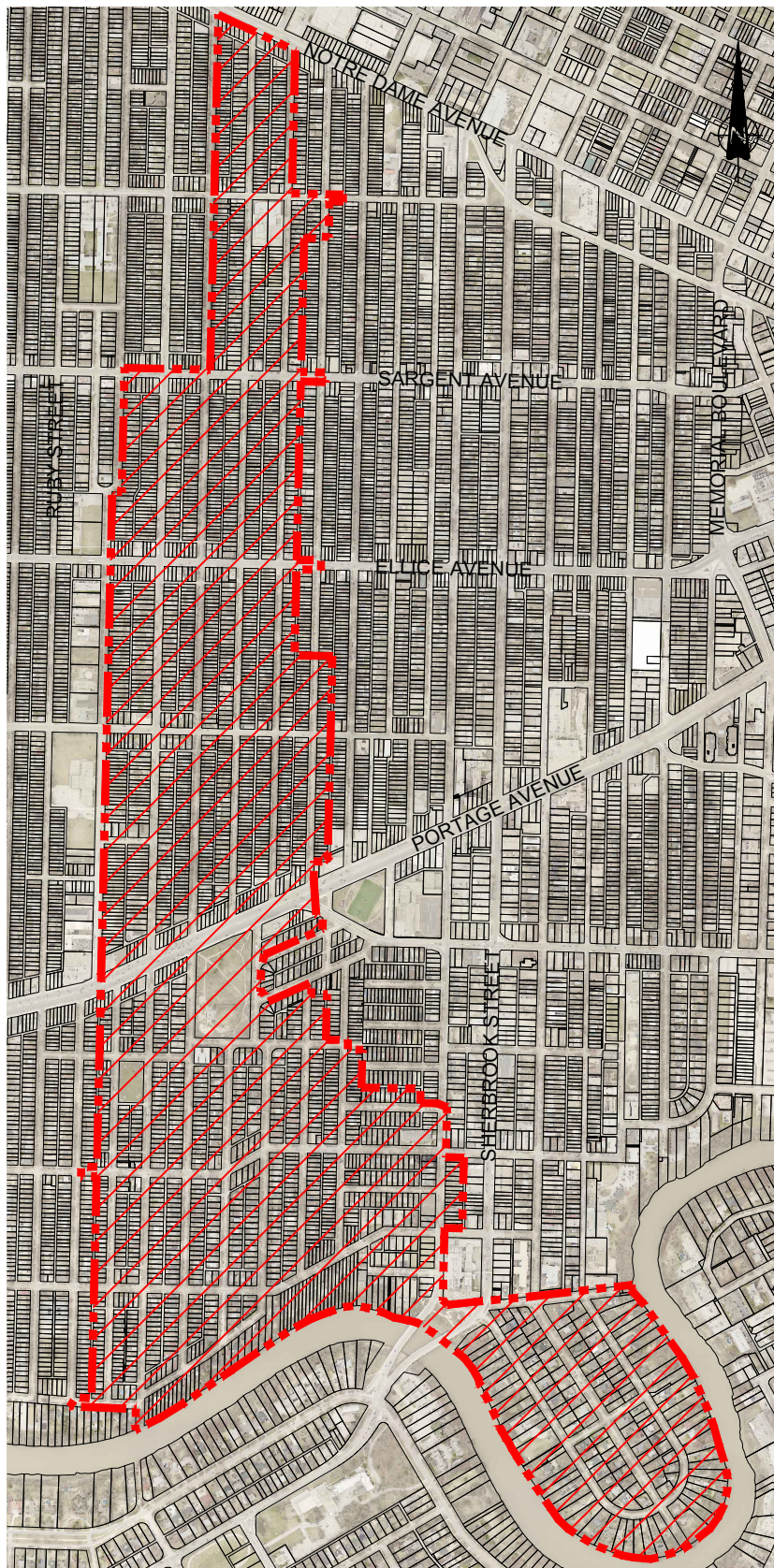
To account for the diurnal fluctuations in sewage flows, peak hourly flows are calculated based on the peaking factor derived from the Harmon equation:

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

where: P = design contributing population in thousands



Cornish Lift Station Wet Well



CORNISH	
ROW LABELS	COUNT
APARTMENTS	53
APARTMENTS MULTI USE	3
BANK	1
BANQUET/MEETING HALL	2
CHURCH	13
COMMERCIAL MULTI USE	12
COMMERCIAL ROW HOUSE	3
COMMUNITY CENTRE	1
CONDO-COMPLEX	7
CONDO-ROWHOUSE	20
CONVENIENCE STORE	1
DAY CARE	2
DETACHED SINGLE DWELLING	1709
DUPLEX	46
GOVERNMENT OFFICE	1
HOSPITAL	2
HYDRO SUB-STATIONS	1
LIBRARY	1
MEDICAL OFFICE CLINIC	1
MULTI FAMILY CONVRSN	300
MULTI RES BUILDINGS	10
NGHBRHD SHOP CENTRE	2
NON RES GROUP CARE	1
OFFICE	9
PARK WITH BUILDING	2
REFERENCE ROLL	1
RES GROUP CARE	2
RES SECONDARY UNIT	1
RESIDENTIAL MULTI USE	6
RESTAURANT	4
ROOMING HOUSE	1
ROW HOUSING	3
SCHOOL	4
SIDE BY SIDE	13
STORE	24
SURFACE PARKING	2
TRIPLEX	2
VACANT COMMERCIAL	2
VACANT PARK	1
VACANT RESIDENTIAL 1	26
VACANT RESIDENTIAL 2	7
VEHICLE SERV RELATED	4
WAREHOUSE	2
GRAND TOTAL	2308

LEGEND



CORNISH SUBCATCHMENT
AREA=145.0 ha (358.3 acres)



CITY OF WINNIPEG

LIFT STATION ASSESSMENTS 2018-2019
CORNISH LIFT STATION
SUBCATCHMENT AREA

SCALE: 1:15 000

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 Cornish 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, Multi Family Dwellings, and Commercial Areas.
- Catchment area is approximately 145.0 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	138.0	12.29	1,696.0	3.05	5,173	-	270	16.2
Multi-Family Dwelling	5.0	74.13	370.7	2.30	852	-	270	2.7
Subtotal	143.0				6,025	3.169	270	18.8
							(L/HA/DAY)	(L/SEC)
Commercial	2.0	-	-	-	-	-	16,800	0.4
Subtotal	2.0						16,800	0.4
Total:	145.0	-	-	-	-	-	-	19.2
LAND USE	PEAK DRY WEATHER FLOW		EXTRANEEOUS FLOW CONTRIBUTIONS				PEAK WET WEATHER FLOW	
			GROUNDWATER	MANHOLE		WEEPING TILE		
	(LPCD)	(L/SEC)	(L/SEC)	(MH/HA)	(L/SEC)	(L/SEC)	(L/SEC)	(L/SEC)
Single Family Dwelling	-	-	3.5	1.6	44.2	128.6	-	-
Multi-Family Dwelling	-	-	0.1	1.6	1.6	-	-	-
Subtotal	856	59.7	3.5	-	45.8	128.6	237.6	
	(L/HA/DAY)	(L/SEC)	(L/SEC)	(MH/HA)	(L/SEC)	(L/SEC)	(L/SEC)	
Commercial	28,100	0.7	0.1	1.0	0.4	-	-	-
Subtotal	28,100	0.7	0.1	-	0.4	-	1.1	
Total:	-	60.3	3.6	-	46.2	128.6	238.7	

The estimated average dry weather flow is 19.2 L/sec, the peak dry weather flow is 60.3 L/sec, and the peak wet weather flow is estimated to be 238.7 L/sec.

4.2.2 Projected Flows

No further expansion is anticipated for the catchment area for the Cornish 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. Only one pump will operate under normal conditions and the pumping control system will allow a second pump to be called into operation if required based on the level in the wet well. The primary pump starts at a level of 1372 mm and the secondary pump starts if it exceeds 1615 mm. Table 5.1 provides a summary of the pumps utilized at the Cornish Lift Station.

TABLE 5.1: CORNISH 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	CORNELL	6NHDH	15	1987	65	8.5	150
PUMP 2 - P-102	DRY PIT SOLIDS HANDLING	CORNELL	6NHDH	15	1987	65	8.5	150

* Based on duty point in Pump Manufacturer's datasheet

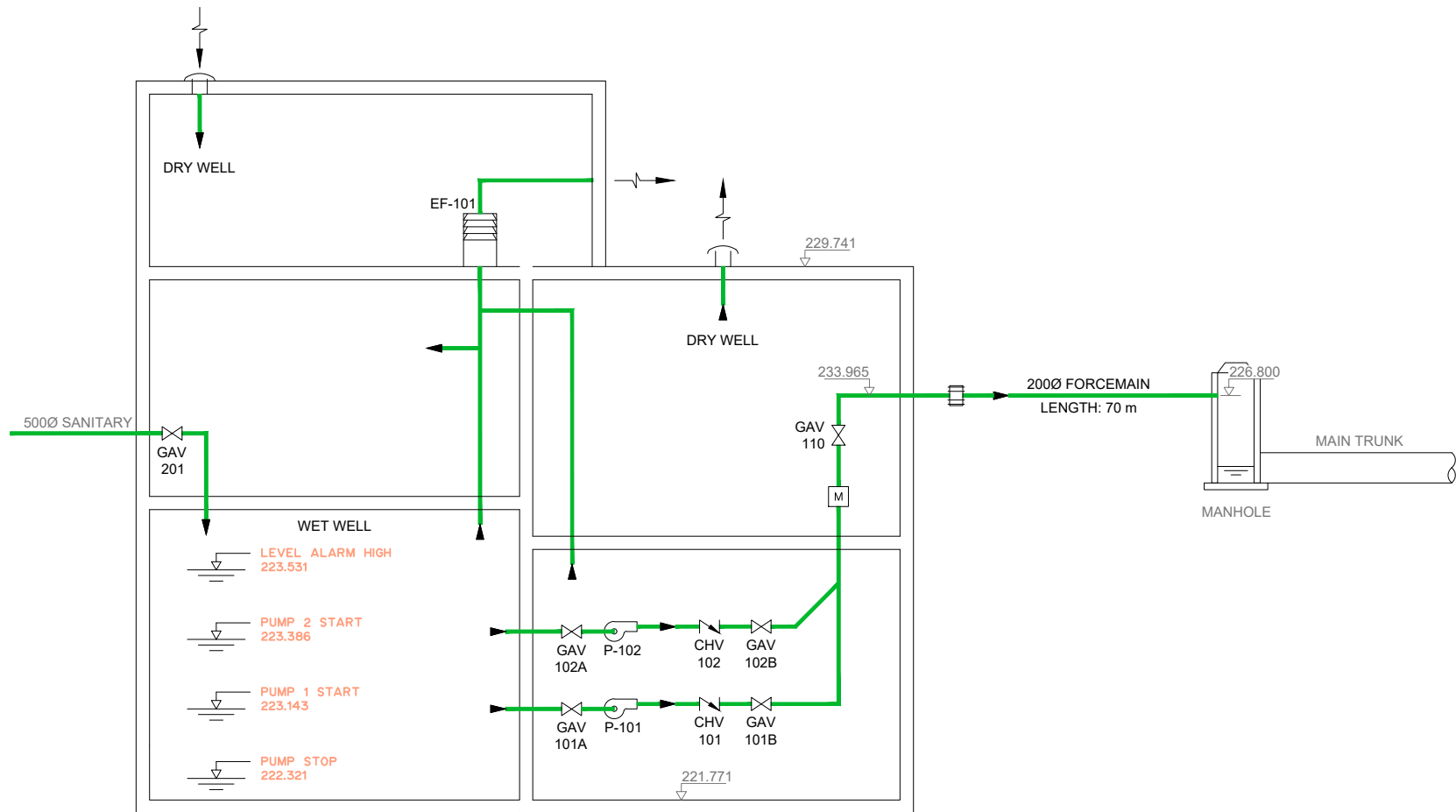
P-101 and P-102 are identical Cornell 6NHDH pumps rated for 65 L/sec at a Total Dynamic Head (TDH) of 8.5 m and operate at a constant speed. Operational staff noted that there are concerns that the pumps frequently plug from obstructive material and the system is not capable of back-flushing. The pumps frequently overheat if the room is warm and have long run times.

A 200 mm diameter steel force main is used to discharge sewage from the Cornish Lift Station. The force main connects to a manhole located at the intersection of Cornish Avenue and Langside Street.



5.1.1 Process Flow Diagram

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



P-101
 - DUTY POINT: 56.78 L/s @ 11.6 m
 - 15 HP, 1200 RPM
 - 575 VAC/3 PH/60 Hz

P-102
 - DUTY POINT: 56.78 L/s @ 11.6 m
 - 15 HP, 1200 RPM
 - 575 VAC/3 PH/60 Hz



LIFT STATION ASSESSMENTS 2018-2019

CORNISH
 PROCESS FLOW DIAGRAM

SCALE: NTS

DATE: SEPT 2019

JOB: 8400-001-00

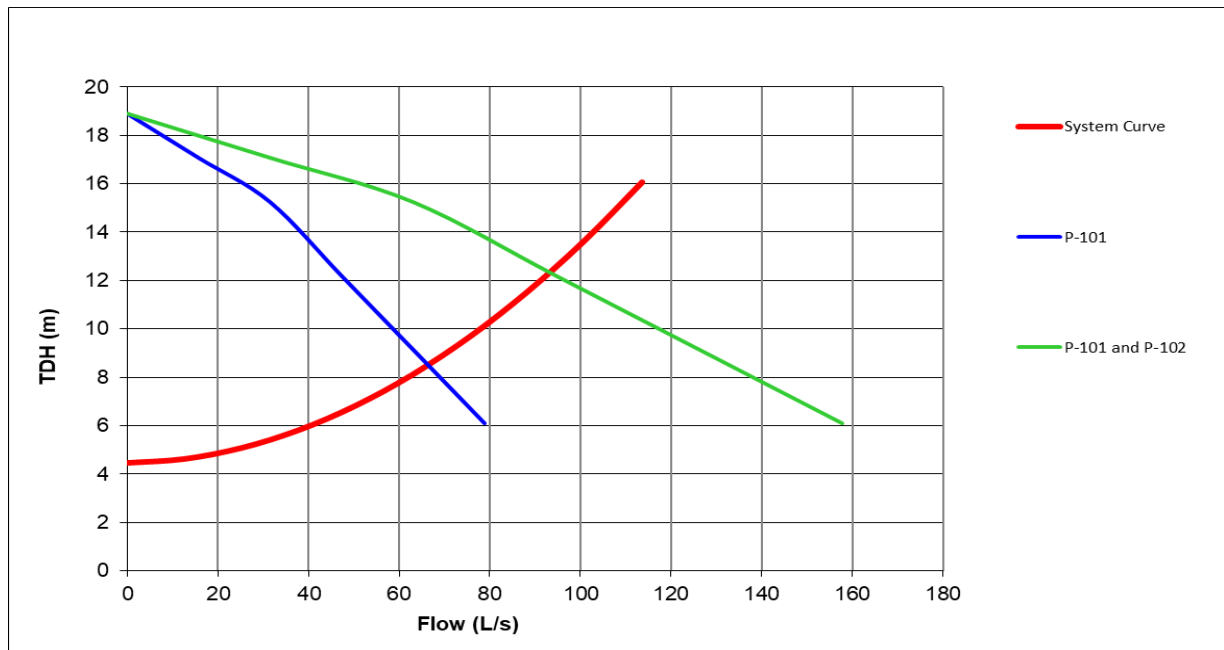
FIGURE: 5.1

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 66.2 L/s and 93.1 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 238.7 L/sec. The maximum pumping capacity of the lift station is approximately 93.1 L/s with both pumps in operation. The 'rated' capacity of the lift station with the largest pump being out of service is currently 66.2 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 STOP	550	100	66.2	0.92	4.88	8.63	3.76
PUMP 1 START	1372	100	66.2	0.92	4.88	9.46	4.58
PUMP 2 START	1615	100	66.2	0.92	4.88	9.70	4.82

5.2.4 Force Main Review

A 200 mm diameter steel force main is used to convey sewage from the Cornish Lift Station. The length of the force main is 70 m. The force main was installed in 1942. The force main has a volume of approximately 2.2 m³. Based on the estimated average and peak dry weather flows of 19.2 L/s and 60.3 L/s, the average retention time in the force main ranges from 36 seconds to 2 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 Cornish 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)	66.2	93.1
FORCE MAIN VELOCITY (m/s)	2.11	2.96

The force main was found to be undersized for the flows from the lift station and the velocities are slightly above the acceptable range of 0.6 m/sec to 1.6 m/sec. The force main size is not currently affecting the hydraulic performance of the pumping system.

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 8 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 five (5) 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 15 HP pump are 12 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 (VFDs) can be fitted to the pumps to mitigate this issue.

5.4 Wet Well Flow Path Review

Sewage enters the south east side of the wet well through a 500 mm diameter steel pipeline and is directed to the pump suction lines located on the south side at the west end of the wet well. The wet well is circular and prevents solids build up in the edges of the wet well. The 150 mm diameter pump suction lines are located at the bottom of the wet well. Operational staff noted that there are no major issues with solids buildup in the wet well and it is only cleaned as required.

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 duty pump will start when the level in the wet well rises above the “Pump 1 Start Level” of 1372 mm.
- Should the sewage level rise above the “Pump 2 Start Level” of 1615 mm, the second pump will start.
- 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 550 mm.

The control strategy used at the Cornish 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 Cornish 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 maximum fill time requirements and is adequately sized for incoming flows.
- The force main was found to be undersized for the flows from the lift station and the velocities are slightly above the acceptable range. The force main size is not currently affecting the hydraulic performance of the pumping system.

6.0 Facility Condition Assessment

6.1 Background

The following provides a condition assessment of the building facility for the Cornish 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 as **Appendix A**.

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: CORNISH LIFT STATION - CODE REVIEW			
YEAR CONSTRUCTED	1936		
BUILDING FOOTPRINT AREA (m2)	<25m2		
LOCATION	1 Cornish Avenue		
BUILDING CLASSIFICATION	Non Combustible / Combustible		
ROOFING MATERIAL	Asphalt Shingle		
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	Graffiti on building exterior

6.3 Site Conditions

The Cornish station is located in a public area near the red river at the end of Cornish Avenue. The station is old and vandalism/security has been an issue in the past.

6.3.1 Site Access and Parking Lot

The station is easily accessed from Cornish Avenue. There is sufficient parking for several vehicles. Emergency access is not an issue.

6.3.2 Site Grading & Landscaping

There are slope stability issues near the nearby outfall structure. The station is sufficiently far away that the slope stability issues pose no threat to the structure. No vegetation is currently in contact with the structure, but nearby trees should be monitored and trimmed as needed.

6.3.3 Security and Signage

There is no perimeter fencing around the station. The structure is secure. The electric meter located outside the structure could be subject to vandalism. The building has been spray painted and otherwise vandalized. There has been a recent break-in and a subsequent replacement of the door with a metal door and hardware. The station is not marked with signage that identifies it as a City of Winnipeg facility.

6.4 Foundations

6.4.1 Foundation Slab

There was a minor overflow in the dry well at the time of the inspection. The concrete slab appeared structurally sound. No concerns were noted.

6.4.2 Foundation Walls, Columns, and Beams

The concrete foundation walls were also found to be in sound structural condition.

6.4.3 Wet Well

The wet well is accessed through a manhole at ground level outside of the building. Operations staff noted that a wet well access historically existed within the structure, but was moved to the exterior.

The wet well was examined by camera. Concrete deterioration and significant grease buildup were noted. Despite the deterioration, no structural concerns were noted. The concrete rim at the entrance to the wet well is damaged and in need of replacement. The access vault is in "Good" structural condition, but access has been removed; either the ladder rungs have been corroded or they have been cut off.



6.5 Primary Structural Systems

6.5.1 Loadbearing Walls, Columns and Beams

The superstructure is a two-course brick structure with an exterior brick face. The walls were covered and not assessed. Below-grade load-bearing walls were discussed in section 6.4.2.

6.5.2 Suspended Floors, Trusses, and Joists

The mid-level suspended floor has been modified. Holes have been cut through it. The capacity may therefore be below the original design load. The current loads appear to be within acceptable limits. The roof structure was not accessible and was not assessed. Drawings indicate it is a 2x4 wood rafter system.

6.6 Secondary Structural Systems

6.6.1 Stairs, Ladders, Catwalks, Hatches, Rails

The toe clearance of the access ladder has been reduced below acceptable limits as a result of the added insulation to the walls. The current clearance is 3.5 inches while the Code requires 7 inches. There is no fall protection around the ladders and the steel frame around the opening is corroding. Insulation prevented the assessment of some ladder supports. Hatches are not hinged and the lids are subject to falling through the openings.

6.6.2 Interior Walls, Ceilings, Support Members, Equipment Pads

Pipe supports are corroded and should be replaced. The concrete equipment pads appear to be in sound condition.

6.6.3 Finishes

The paint on the floor surfaces has worn off. The paint on the walls and ceilings are in “Good” condition.

6.6.4 Monorails and Hoists

Some lifting lugs have been installed after the original construction. The lugs are properly labelled, though their arrangement is not ideal for equipment removal. Some hoist hooks are missing clasps.

6.7 Building Envelope

6.7.1 Exterior Siding, Roofing, Doors

The exterior siding is in good condition. The caulking around wall penetrations has begun to deteriorate and should be replaced. The new door is in “Good” condition and provides an adequate seal.

6.7.2 Insulation, Vapour Barrier, Interior Liner

The interior siding is equipped with insulation, but without a vapour barrier. Therefore, the interior walls are subject to condensation between the insulation and the wall.

6.7.3 Flashings, Soffits, Sealants, Weather-stripping

The soffits and weathers-stripping are new and in “Good” condition.



6.8 Roofing

6.8.1 Roof Membrane, Insulation, Decking

The shingle roof system appears to be installed within the past 5 years and is in good condition.

6.8.2 Skylights, Hatches, Penetrations

The penetrations are properly sealed.

6.8.3 Flashings, Trim, Gutters, Downspouts

There are no gutters or downspouts. The flashings and trim are in good condition.



6.9 Building Mechanical



6.9.1 Heating

Portable heaters are located on each floor providing sufficient heat to prevent freezing.

6.9.2 Interior Plumbing

Interior lines are aging but in functional condition.

6.9.3 Fire Suppression Systems

The building has no 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: CORNISH FACILITY IMPROVEMENT COST ESTIMATES			
Item	Facility Section	Action	Cost
1	Site Conditions	Short Term	\$ 1,500.00
2	Foundations	Short Term	\$ 1,500.00
3	Primary Structural Systems	-	\$ -
4	Secondary Structural Systems	Short Term	\$ 33,000.00
5	Building Envelope	Mid Term	\$ 10,700.00
6	Roofing		\$ -
7	Building Mechanical	Mid Term	\$ 3,500.00
Total:			\$ 50,200.00

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 Cornish Lift Station are summarized as follows:

- Additional exterior lighting may help reduce vandalism issues;
- Ladder access to lower levels require insulation to be removed between rungs and wall to ensure Code required clearances;
- Install Code compliant hatches and fall protection at ladder openings in floor;
- Install vapour barrier and liner over insulation;
- Install wall mounted unit heaters.

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: CORNISH RECOMMENDATIONS	
COMPONENT	RECOMMENDATION
SITE CONDITIONS	Review of site lighting for security
FOUNDATION / WET WELL	Replace wet well access vault concrete ring at entrance
PRIMARY STRUCTURAL SYSTEMS	
SECONDARY STRUCTURAL MEMBERS	Remove insulation to allow proper ladder rung clearance
	Pipe supports require replacing
	Replace hatches at ladder openings and add fall protection
	Re-finish floors
BUILDING ENVELOPE	Install vapour barrier and liner on interior walls
	Graffiti resistant coating to exterior
	Seal exterior penetrations
ROOFING	
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. Detailed assessment forms have been appended to this report.

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

TABLE 7.1: CORNISH LIFT STATION MECHANICAL OVERVIEW

YEAR CONSTRUCTED	1987
PUMPING CAPACITY	66.2 L/sec
LOCATION	1 Cornish Avenue
NUMBER OF PUMPS	Two (2)
PUMP HORSEPOWER	P-101: 15 HP, P-102: 15 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 1987. 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 the lift station pumps frequently plug from obstructive material and the system has no way to back-flush. The pump motors frequently overheat when the room temperature is warm and the pumps have long run times.

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	1987		
LOCATION	1 Cornish Avenue		
PUMPS			
TYPE	Dry Pit Solids Handling		
PUMP LOCATION	Dry Well		
SUCTION SOURCE	Wet Well - Direct Piped		
PIPING			
SUCTION/DISCHARGE DIAMETER	150 mm		
MATERIAL	Carbon Steel		
ITEM	REQUIREMENT	CODE COMPLIANCE	CODE REFERENCE / NOTES
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	NO	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 Cornell Model 6NHDH pumps. Each is equipped with a 15 HP, 575 VAC, 3 phase, 60 Hz electric motor. Both pumps are rated for 65 L/sec at a TDH of 8.5 m and operate at constant speed. P-101 and P-102 were installed in 1987 and are used regularly. Operational staff noted that there have been issues with obstructive material plugging the pumps and the motors overheating if the room temperature is warm.

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

TABLE 7.3: CORNISH LIFT STATION PUMP CONDITION ASSESSMENT						
PUMP	DESCRIPTION	MAKE	MODEL	CONDITION	IMPORTANCE	ACTION
P-101	15 HP DRY PIT SOLIDS HANDLING	CORNELL	6NHDH	FAIR	Important	Short Term
P-102	15 HP DRY PIT SOLIDS HANDLING	CORNELL	6NHDH	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 Cornish Lift Station.

TABLE 7.4: CORNISH LIFT STATION PUMP VIBRATION AND TEMPERATURE					
PUMP		VIBRATION (in/s)			TEMPERATURE (F)
		x	y	z	
P-101					
	Motor	0.17	0.15	0.13	119
	Volute	0.06	0.07	0.11	65
P-102					
	Motor	0.32	0.14	0.11	112
	Volute	0.28	0.20	0.10	60

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 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*.

7.4 Valves

The valves were installed in 1987. 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 “Fair” condition. Table 7.5 provides a summary of the condition of the valves at the Cornish Lift Station.

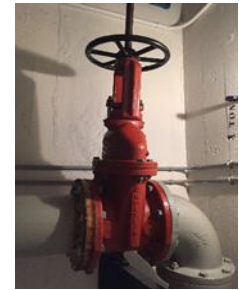


TABLE 7.5: CORNISH LIFT STATION VALVE CONDITION ASSESSMENT					
VALVE	DESCRIPTION	SIZE	CONDITION	IMPORTANCE	ACTION
GAV-101A	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-101B	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-102A	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-102B	Gate Valve	150 mm	FAIR	Intermediate	Mid Term
GAV-110	Gate Valve	200 mm	FAIR	Intermediate	Mid Term
CHV-101	Swing Check Valve	150 mm	FAIR	Important	Short Term
CHV-102	Swing Check Valve	150 mm	FAIR	Important	Short Term

7.5 Piping & Fittings

The lift station includes stainless 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 Cornish Lift Station.

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

7.5.1 Non-Destructive Testing

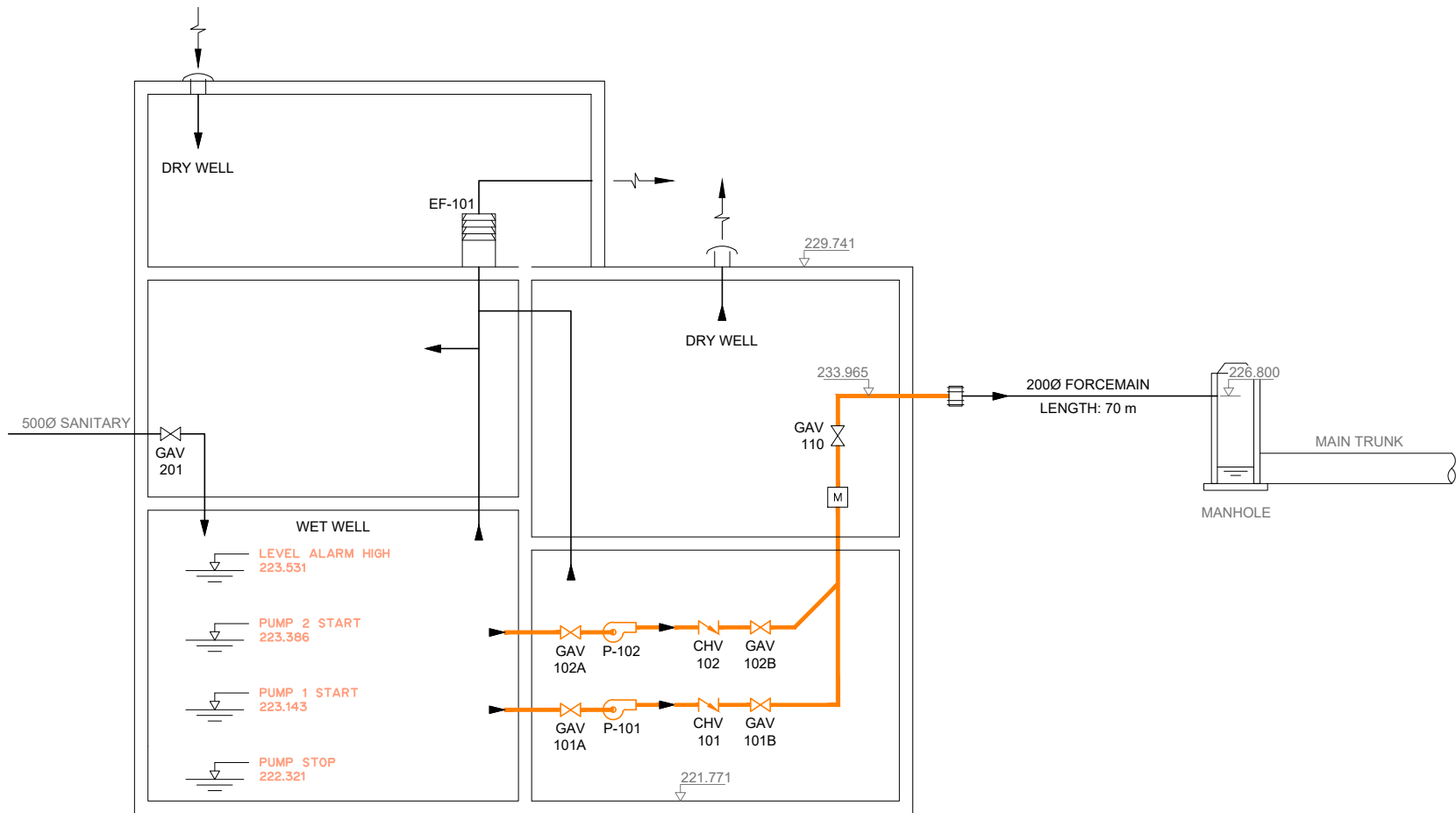
Non-destructive testing was not performed on the piping in the lift station.

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 Cornish Lift Station.



P-101
 - DUTY POINT: 65.00 L/s @ 8.5 m
 - 10 HP, 1170 RPM
 - 575 VAC/3 PH/60 Hz

P-102
 - DUTY POINT: 65.00 L/s @ 8.5 m
 - 10 HP, 1170 RPM
 - 575 VAC/3 PH/60 Hz

LEGEND

—	POOR
—	FAIR
—	GOOD
—	EXCELENT



LIFT STATION ASSESSMENTS 2018-2019

CORNISH
 CONDITION ASSESSMENT SUMMARY

SCALE: NTS

DATE: SEPT 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 is generally in “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 clogging with obstructive material.
- 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	\$110,000
TOTAL			\$110,000

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. Detailed assessment forms have been appended to this report.

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

TABLE 8.1: CORNISH LIFT STATION ELECTRICAL OVERVIEW

YEAR CONSTRUCTED	1936	Electrical Upgrade: 2001
LOCATION	1 Cornish Ave	
SERVICE	100 AMP	
VOLTAGE	600 VAC	
STANDBY GENERATOR SIZE	N/A	
NUMBER OF PUMPS	Two (2)	
PUMP HORSEPOWER	P-101: 15HP, P-102: 15HP	



8.2 Code Review

As part of the condition assessment of the equipment and installation methods, 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 is unable to meet the required number of air changes per hour and is therefore classified as a Zone 1 space. Along with ventilation requirements, the access hatch to the wet well would require "Physical Separation" as per NFPA 820 definitions 3.3.43 and A3.3.43.

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, or 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	1936	Electrical Upgrade:2001	
LOCATION	1 Cornish Ave		
WET WELL			
HAZARDOUS LOCATION CLASSIFICATION	Zone 1		
CORROSIVE ENVIRONMENT CATEGORY	Category 1		
DRY WELL			
HAZARDOUS LOCATION CLASSIFICATION	Zone 1		
CORROSIVE ENVIRONMENT CATEGORY	Category 1		
ITEM	REQUIREMENT	CODE COMPLIANCE	CODE REFERENCE / NOTES
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. Cornish lift station's main service utilizes a Klockner Moeller Motor Control Centre (MCC). An electrical upgrade was noted to have taken place in 2001. Metering cabinet is located on the exterior of the building and not located within a protective enclosure. With substantial graffiti to the building it is recommended that an enclosure be mounted to protect the meter from vandals. Currently there are no provisions at the Cornish Lift Station for a temporary generator connection in the event of power outages. Table 8.3 provides a summary of the condition of the service entrance equipment at the Cornish Lift Station.

TABLE 8.3: CORNISH LIFT STATION SERVICE ENTRANCE EQUIPMENT CONDITION ASSESSMENT				
DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
Motor Control Centre	600 VAC	Good	Important	Mid Term
Meter	600 VAC	Fair	Important	Mid Term

8.4 Cable and Conduit

The wiring style in Cornish Lift Station is primarily run using RPVC and threaded rigid conduit. RPVC does not meet Zone 1 requirements.



8.5 Motors

The lift station is equipped with two (2) pumps. Both P-101 and P-102 are equipped with a 15HP, 575VAC 3 phase, U.S Electric motor. The Vent motor nameplate was not visible at time of inspection. The pump motors for P-101 and P-102 appear to have been previously painted, likely to reduce corrosion affecting the motors. Some 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. P-101 has passed a Hipot test, completed on November 1, 2016, by Integrated Power Services. City staff has raised concerns with the motors shutting down due to over heating. The two motors are in “Fair” condition. The vent motor appears to be in “Good” condition. Considering the age of the motors and the harmful atmosphere they have endured throughout the years, it is recommended that motors for P-101 and P-102 be replaced once ventilation and wet well access concerns have been addressed. Table 8.4 provides a summary of the condition of the motors at the Cornish Lift Station.

TABLE 8.4: CORNISH LIFT STATION MOTOR CONDITION ASSESSMENT

DESCRIPTION	HORSEPOWER	CONDITION	IMPORTANCE	ACTION
P-101 Motor	15HP	Fair	Important	Short Term
P-102 Motor	15HP	Fair	Important	Short Term
Vent Motor	N/A	Good	Important	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 are assumed to have been part of the 2001 electrical upgrade. The starter's components appear to be in "Good" condition although corrosion is evident on wiring at the termination points leading to potential failure. Table 8.5 provides a summary of the condition of the starters at the Cornish Lift Station.

TABLE 8.5: CORNISH LIFT STATION MOTOR STARTER CONDITION ASSESSMENT				
DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
P-101 FVNR	600 VAC	Good	Important	Mid Term
P-102 FVNR	600 VAC	Good	Important	Mid Term
P-103 FVNR	600 VAC	Good	Important	Mid Term

8.7 Transformers, Panelboards, and Distribution Equipment

Distribution Equipment is internal to the MCC. Distribution equipment appears to be in "Good" condition. The main lighting panel is fed from a 600VAC:120/240VAC step down transformer. The transformer has been replaced and appears to be in "Good" condition. The transformer used as a replacement has different dimensions than was meant for the cubicle, meaning it could only be affixed on one side. As a result, the other fastening bracket does not line up with the mounting holes correctly. The lighting panel is in "Good" condition. Corrosion is evident on wiring at the termination points for both the transformer and lighting panel. Table 8.6 provides a summary of the condition of the transformers, panelboard, and distribution equipment at Cornish Lift Station.

8.7.1 Lighting

Lighting at the Cornish 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. Fixtures in use are original incandescent style fixtures with LED replacement luminaires. Exterior lighting above man doors is recommended.

8.7.2 Emergency Lighting

No emergency lighting was present in the Cornish Lift Station. Winnipeg Design Guide calls for emergency lighting in all facilities. Addition of adequate emergency lighting to each level of the lift station is recommended.

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

8.8 Standby Power Generators and Engines

There is currently no connection means for standby power. It would be recommended to install a manual transfer switch 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 Cornish Lift Station are summarized as follows:

- In general, the electrical equipment at this site is in “Good” condition.
- The dry well requires a ventilation upgrade along with the wet well hatch needing to be permanently sealed off and relocated in order for the existing electrical equipment to meet the Canadian Electrical Code.

8.10 Recommendations

8.10.1 Project 1: Motor Replacement (0-5 years)

The two pump motors have endured considerable corrosion and overheating throughout their life span. Although appearing in “Fair” condition their reliability would be uncertain. Prior to motor replacement it would be recommended to address ventilation and overheating concerns raised by City staff.

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

Currently city staff connects their temporary generator by terminating directly to the main breaker. This raises safety concerns, as there is potential for exposed live electrical parts for the duration of temporary power requirements. It is recommended the City install a manual transfer switch to allow City staff to connect temporary power in a safe and efficient manner.

8.10.3 Project 3: Lighting and Grounding Upgrade (0-5 years)

Upgrade lighting incorporating into the upgrade emergency lighting requirements.

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	Main Service	\$7,900
2	Short-Term	Motors	\$24,000
3	Short-Term	Distribution Panel	\$500
4	Short-Term	Transformer	\$1,000
Total:			\$33,400

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

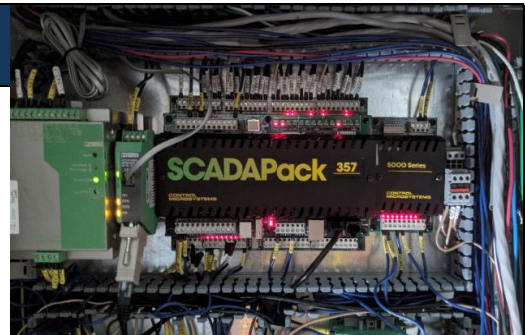
9.1 Background

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. Detailed assessment forms have been appended to this report.

The Cornish Lift Station control system consists of a Schneider SCADAPack 357 and a Pressure Based Level Transmitter with a Float Level Switch.

TABLE 9.1: CORNISH LIFT STATION CONTROLS & INSTRUMENTATION OVERVIEW

YEAR CONSTRUCTED	1936
LOCATION	1 Cornish Ave
LAST AUTOMATION UPDATE	2014
CONTROLLER	SCADAPack 357
PROGRAMMING SOFTWARE	Telepace
COMMUNICATION TYPE	Public Service Telephone Network (PSTN)
SCADA SOFTWARE	N/A



9.2 Control Systems

A SCADAPack 357 monitors the lift station. The Remote Telemetry Unit (RTU) is used for monitoring and reporting only. Monitoring is done using a Public Switched Telephone Network (PSTN), which has become obsolete within the City of Winnipeg Lift Stations. Current Lift Station upgrades utilize MTS 4G cellular communication. Pump control is achieved using a Precision Digital. Currently, the station does not have control redundancy. This has been added to prior Lift Station upgrades and is a recommended upgrade at the Cornish Lift Station. Field devices include a Pressure Based Level Transmitter and a Float Level Switch.

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 cubicle. Manual control is achieved by turning the local switch to the Hand position and the motor becomes locally controlled by Operations. 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 used only to monitor the lift station, meaning that 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 integration, providing Operators with the ability to adjust set points and operate pumps remotely if used for pump control. The City should evaluate if these functions are desired and options for securing communications should be explored. 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)

Cornish 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 375 as well as all of the equipment required for reporting 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 to 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 the PSTN line.

9.2.6 Communication Hardware

Communications to the Cornish Lift Station are accomplished using PSTN communication. The station reports alarms to the McPhillips Control Centre SCADA application via the communication link.

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

TABLE 9.2: CORNISH LIFT STATION CONTROL PANEL CONDITION ASSESSMENT				
CONTROL PANEL	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
Control Panel	Pump Controls and Monitoring	Good	Important	Short Term
Termination Panel	Weir and Flap Gate Monitoring	Good	Important	N/A
Communications Equipment	PSTN	Fair	Important	Short Term

9.3 Instrumentation

Instrumentation at the Cornish Lift Station includes one Pressure Based Level Transmitter, a float level switch, and a Flow Transmitter. In general, the instrumentation is in "Good" condition. Table 9.3 provides a summary of the condition of the instrumentation at the Cornish Lift Station.

TABLE 9.3: CORNISH LIFT STATION INSTRUMENTATION CONDITION ASSESSMENT				
INSTRUMENTATION	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
LT-101	Level Transmitter	Fair	Important	Mid Term
LSHH-101	Building Flood Detector	Good	Low	Long Term
FIT-101	Flow Transmitter	Good	Important	Long Term

9.3.1 Process Control

9.3.1.1 Pumping

The primary process control device used at the Cornish Lift Station is a pressure based level sensor. The level transmitter appears to be in “Fair” condition. 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 is installed to mitigate the risk of environmental damage and damage to property resulting from a flood situation.

9.3.2 Gas Monitoring

Cornish Lift Station does not have continuous gas monitoring. Within the lift station, City Staff utilize personal gas detection monitors.

9.3.3 Process Monitoring

The wet well level is monitored continuously using the pressure based 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 with a Rosemount Flow Transmitter, allowing Operations the ability to see pump performance. This also provides 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 that are off set such that the additional pump is enabled as the level becomes higher. 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 Cornish Lift Station are summarized as follows:

- The automation platform in use at this lift station does not meet current City Lift Station upgrades. It also 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 with low building temperature sensors would provide advanced warning of fire, along with 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 the lift station experiences an instrument failure.

9.6.3 Project 3: Install MTS 4G Communication (0-5 years)

To meet the communication requirements being complete throughout the City of Winnipeg Lift Stations, it is recommended to upgrade from the current PSTN to MTS 4G Communication utilizing the PSTN as a backup for the lift station.

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 AND INSTRUMENTATION IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Mid Term	Control Panel	\$4,600
2	Mid Term	Transmitter	\$16,800
Total:			\$21,400

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 Cornish Lift Station ventilation system includes one exhaust fan located in the main floor of the building. The ventilation system is used intermittently when the building and dry well are occupied. The exhaust fan pulls air from the dry well and comminutor chamber through separate pipes to create a negative pressure in the spaces. Fresh air is brought into the building and dry well through ducting through the building wall and roof. No major ventilation upgrades have been carried out at the lift station since the mechanical and electrical upgrades in 1987. In general, the equipment is showing signs of aging, and is in “Poor” condition. Detailed assessment forms have been appended to this report.

TABLE 10.1: CONWAY LIFT STATION VENTILATION OVERVIEW		
YEAR CONSTRUCTED	1987	
ODOUR CONTROL	No	
DRY WELL		
VENTILATION TYPE	Intermittent	
VENTILATION RATE	580 m³/hr	
WET WELL		
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 Cornish Lift Station.

TABLE 10.2: CORNISH LIFT STATION VENTILATION REQUIREMENTS						
VENTILATED AREA	VOLUME (m ³)	VENTILATION FREQUENCY	REQUIRED AIR CHANGES PER HOUR	REQUIRED VENTILATION RATE (m ³ /hr)	CURRENT VENTILATION RATE (m ³ /hr)	VENTILATION TYPE
Dry Well	102	Intermittent	30	3,058	580	Exhaust Fan
Wet Well	17	Intermittent	30	507	N/A	N/A

As illustrated in Table 10.2, 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 1987. MPE tested the airflow from the dry well exhaust damper using a portable anemometer and found that the airflow provided by the unit matched the manufacturer's published data. In general, the exhaust fan is in "Poor" condition. Table 10.3 provides a summary of the condition of the fans at the Cornish Lift Station.

TABLE 10.3: CORNISH LIFT STATION FAN CONDITION ASSESSMENT

EQUIPMENT	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
EF-101	Centrifugal Exhaust Fan	Poor	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 System Upgrades	\$40,000
TOTAL:			\$40,000

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.

TABLE 11.1: SUMMARY OF RECOMMENDED IMPROVEMENTS - CORNISH LIFT STATION			
Item	Project Type	Action	Cost
Facility Condition Assessment			
Site Conditions	Maintenance	Short Term	\$1,500
Foundations	Capital	Short Term	\$1,500
Primary Structural Systems		-	\$0
Secondary Structural Systems	Capital	Short Term	\$33,000
Building Envelope	Maintenance	Mid Term	\$10,700
Roofing			\$0
Building Mechanical	Capital	Mid Term	\$3,500
Subtotal:			\$50,200
Mechanical Equipment Condition Assessment			
Pump Replacements	Capital	Short Term	\$46,000
Valve Replacements	Capital	Short Term	\$32,000
Pipe Replacements	Capital	Short Term	\$32,000
Subtotal:			\$110,000
Electrical Equipment Condition Assessment			
Main Service	Capital	Short Term	\$7,900
Motors	Capital	Short Term	\$24,000
Distribution Panel	Capital	Short Term	\$500
Transformer	Capital	Short Term	\$1,000
Subtotal:			\$33,400
Controls & Instrumentation Condition Assessment			
Control Panel	Capital	Mid Term	\$4,600
Transmitter	Capital	Mid Term	\$16,800
Subtotal:			\$21,400
Dry & Wet Well Ventilation Review			
Dry Well Ventilation System Replacement	Capital	Short Term	\$40,000
Subtotal:			\$40,000
Total			
Total Estimated Cost - All Recommended Improvements:			\$255,000

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 prioritized list of the recommended improvements for the sewage lift station are presented in Table 11.2.

TABLE 11.2: CODE COMPLIANCE & SAFETY CONCERNS - CORNISH LIFT STATION	
Item Description	Type
Site Conditions	
Foundations	
Primary Structural Systems	
Secondary Structural Systems	
Access ladders to lower levels not Code Compliant	Code Compliance
Hatch openings do not include guard rails and gates.	Code Compliance
Building Envelope	
Roofing	
Building Mechanical	
There is no current fire suppression system.	Code Compliance
Building Ventilation	

Appendix A

Facility Condition Assessment Forms

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:		3.4	3.0	3.0			0		
		SAFETY ISSUES:		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: - Buildup of grease and solids noted in the base of the wet well. - Wet well concrete access vault is aged but remains in structurally sound condition. Ladder rungs have corroded or been cut off. - Camera inspection of the wet well chamber showed concrete deterioration and grease buildup. No immediate structural issues were visible. - Concrete collar at manhole lid is fractured, and at the end of its service life. - Concrete foundation walls are aged but appear to be in sound condition.					
		Below Grade Exterior Walls, Columns and Beams: <i>Issues for Discussion:</i> - Cracking, spalling, moisture infiltration - Evidence of movement - 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)	3	0.3						
		Wet Wells: <i>Issues for Discussion:</i> - Cracking, spalling, corrosion - Degredation at base of columns - Damage from equipment operation / removal	Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	4	0.4						
	Fitness for Purpose	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	RECOMMENDATIONS: Replace concrete collar at wet well lid.					
		Below Grade Exterior Walls, Columns and Beams: <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					COST ESTIMATE \$ 1,500.00	
		Wet Wells: <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)	3	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:							
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		3	
	Current Physical Condition	Loadbearing walls, columns, beams: <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	NOTES & COMMENTS: - Above grade walls are 2-course brick with an exterior brick face. The wall interior was covered with rigid insulation and no visual assessment was made. No evidence of structural issues were noted. - Holes through the mid level floor may reduce the capacity of the slab below original design. Current floor loading appears to be within acceptable limits. - 2x4 rafters and joists were not assessed due to lack of access.			
		Trusses and Joists: <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				
		Suspended Floors: <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	Loadbearing walls, columns, beams: <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	RECOMMENDATIONS: COST ESTIMATE			
		Trusses and Joists: <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				
		Suspended Floors: <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	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
 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	Secondary Structural Components: - Stairs, ladders, handrails, guardrails, catwalks, mezzanines, hatches, davits, support brackets, equipment bases.							
		CODE COMPLIANCE ISSUES: - Ladder rung clearances (OH&S, PIP STE-05501) - Chain Hoist hooks	4.0	3.5		4.0			0
		SAFETY ISSUES:							
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3	
	Current Physical Condition	Stairs, Ladders, Catwalks, Rails, Hatches: <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	NOTES & COMMENTS: - Insulation applied to walls has decreased the clearance between the wall and ladder rung to 3.5". Code requires 7". - Chain Hoist hooks missing clasps - Ladder openings missing fall protection. Openings should have hinged covers to prevent falls. Steel frame is corroding. - Floor finishes are worn off - Wall and ceiling finishes are generally good in lower levels. - removing pumps from lower level is difficult due to the hoist lug arrangement.			
		Interior walls, Ceiling, Supports, Equipment Base: <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				
		Finishes: <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				
		Monorails and Hoists: <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)	4	0.2				
		Stairs, Ladders, Catwalks, Rails, Hatches: <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				
	Fitness for Purpose	Interior walls, Ceiling, Supports, Equipment Base: <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	COST ESTIMATE Remove insulation to allow proper ladder rung clearance \$ 500.00 Replace Hoists with Code compliant models \$ 1,500.00 Replace Pipe supports \$ 2,500.00 Replace hatches at ladder openings. Add fall protection railing \$ 3,500.00 Refinish floors \$ 25,000.00			
		Finishes: <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)	3	0.1				
		Monorails and Hoists: <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)	3	0.2				
		Public and Operator Safety: <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	4	1				
	PHOTOGRAPHS								



FACILITY CONDITION ASSESSMENT FORM BUILDING ENVELOPE



Assessor: Mark Baker
 Date Assessed: 17-Jul-19

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:		3.0	3.4	3.0			0
		SAFETY ISSUES:		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3
	Current Physical Condition	Exterior Siding, Windows, Doors: <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)	2	0.4	NOTES & COMMENTS: - Rigid insulation applied to interior of building. No vapour barrier or interior liner. Potential condensation between insulation and exterior wall. - Caulking at exterior penetrations has deteriorated - Painted brick veneer exterior provides a suitable barrier for weatherproofing the building. - New door and weatherstripping seal entrance. - Excessive graffiti on building exterior. - Newer soffits in good condition			
		Insulation, Vapour Barrier, Interior Liner: <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)	4	0.4				
		Flashings, Soffits, Sealants, Weatherstripping: <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)	3	0.2				
	Fitness for Purpose	Exterior Siding, Windows, Doors: <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	RECOMMENDATIONS: Install vapour barrier and liner on interior of above grade walls \$ 8,000.00 Install graffiti resistant coating on exterior \$ 1,500.00 seal exterior penetrations \$ 1,200.00			
		Insulation, Vapour Barrier, Interior Liner: <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)	4	0.4				
		Flashings, Soffits, Sealants, Weatherstripping: <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	Public and Operator Safety: <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								

SECTION	ITEM	DATA	ASSESSMENT SCORES				AGE		
		Current Physical Condition	Fitness For Purpose		Safety	Year Installed	Expected Service Life	Remaining Service Life	
		Roofing Components: - Decking, insulation, membrane, skylights, hatches, penetrations, gutters, flashings, trim							
Tag: STR_Roofing	GENERAL	<u>CODE COMPLIANCE ISSUES:</u>	3.0	2.5		3.0		0	
		<u>SAFETY ISSUES:</u>							
			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)	3	0.5	NOTES & COMMENTS: - Asphalt shingle roof and flashings are in fair condition. - no gutter or downspouts.			
		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)	3	0.2				
	Fitness for Purpose	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)	2	0.5	RECOMMENDATIONS: COST ESTIMATE			
		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				
		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)	3	0.2				
	Safety	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									



**FACILITY CONDITION ASSESSMENT FORM
BUILDING MECHANICAL**



SECTION	ITEM	DATA		ASSESSMENT SCORES				AGE		
				Current Physical Condition	Fitness For Purpose		Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Building_Mechanical	GENERAL	CODE COMPLIANCE ISSUES:		3.6	3.6		3.0	1987	25	0
		SAFETY ISSUES:		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	Current Physical Condition	Heating and Ventillation Systems: <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	NOTES & COMMENTS: No apparent Fire Suppression System. Portable heaters on floor and tied to wall in dry well.				
		Interior Plumbing: <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	0.4					
		Fire Supression Systems: <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)	5	0.3					
	Fitness for Purpose	Heating and Ventillation Systems: <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: Install handheld fire extinguisher \$ 500.00 Install wall mount unit heaters c/w in dry well. \$ 3,000.00				
		Interior Plumbing: <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					
		Fire Supression Systems: <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)	5	0.3					
	Safety	Public and Operator Safety: <i>Issues for Discussion:</i> - Monitors, Alarms	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									

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	Ventilation Systems: - Wet Well, Dry Well											
		CODE COMPLIANCE ISSUES:		3.0	3.0		3.0	1987	25	0			
	Current Physical Condition	SAFETY ISSUES:		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5				
		Wet Well Ventilation Issues for Discussion:		Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	5	0	NOTES & COMMENTS: - No wet well ventilation system in place. - Dry well ventilation system has exceeded its expected service life. - Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements of 30 air changes per hour when used intermittently.						
		Dry Well Ventilation Issues for Discussion:		Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	3	1							
		Wet Well Ventilation Issues for Discussion:		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)	5	0					RECOMMENDATIONS: - Replace Dry Well Ventilation System		COST ESTIMATE \$ 40,000.00
	Dry Well Ventilation Issues for Discussion:		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	1								
	Safety	Operator Safety Issues for Discussion: - 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: Cornish Lift Station
 Assessment Page 1 of 1



PUMP CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 12-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
GENERAL	Location:	Dry Well Lower Level	3.7	3.0	3.3	1987	25	0
	Type:	15 HP Dry Pit Solids Handling Pump						
	Description:	Dry Pit Solids Handling						
	Manufacturer:	Cornell						
	Model:	GNHDDH						
	RPM:	1170						
	Rated Voltage:	575						
	Rated Current:	15.6						
			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 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	VIBRATION (in/s) Motor 0.17 0.15 0.13 Volute 0.06 0.07 0.11		
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)	4	0.2	Pump is at the end of its service life. Severe corrosion noted on pump.			
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)	4	0.1	Pump is worn and regularly overheats. Access restrictions cause difficulty for pump maintenance and removal.			
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)	5	0.2	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.			
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	Pump models are dated and spare parts are not readily available.			
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				
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)	2	0.1				
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				
Fitness for Purpose	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)	4	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 (No - Piping/equipment interference prevents safe removal of pumps)	4	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)	3	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)	4	0.25				
	RECOMMENDATIONS	Replace Pump			COST ESTIMATE \$ 23,000.00			
	PHOTOGRAPHS							

Project No.: 8400-001-00
 Tag: P_102
 Facility: Lift Station
 Assessment Page 1 of 1



PUMP CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 12-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				
GENERAL	Location:	Dry Well Lower Level	3.7	3.0	3.3		1987	25	0				
	Type:	15 HP Dry Pit Solids Handling Pump											
	Description:	Dry Pit Solids Handling											
	Manufacturer:	Cornell											
	Model:	GNHDDH											
	RPM:	1170											
	Rated Voltage:	575											
	Rated Current:	15.6	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 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	VIBRATION (in/s) Motor 0.32 0.14 0.11 Volute 0.28 0.20 0.10							
		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)	4	0.2	Pump is at the end of its service life. Severe corrosion noted on pump.							
		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)	4	0.1	Pump is worn and regularly overheats. Access restrictions cause difficulty for pump maintenance and removal.							
		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)	5	0.2	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.							
		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	Pump models are dated and spare parts are not readily available.							
		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	RECOMMENDATIONS Replace Pump COST ESTIMATE \$ 23,000.00							
		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									
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)	2	0.1									
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)	4	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)	4	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)	3	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)	4	0.25									
	PHOTOGRAPHS												

Appendix C

Electrical & Communication Condition Assessment Forms

Project No.: 8400-001-00
Tag: IC_101_Panel
Facility: Cornish Lift Station
Assessment Page 1 of 1

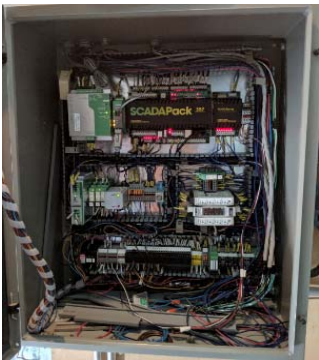


CONTROL PANEL CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
Date: 15-May-19

Asset ID:

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: Dry Well, Main Level	3.4	1.6			2010	30	21
		Description: IC_101_Panel							
		Function: Station Monitoring							
		PLC Processor: SCADAPack 357							
		UPS Protection: Yes							
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition. Wire management is poor and not maintained within the provided raceway. Not rated for Zone 1 locations. No level redundancy. Lift Station communication is still done through a PSTN line.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> Rating 1 (Connections tight, labelled) Rating 2 (Missing Labels) Rating 3 (Loose / Disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	5	0.1					
		Occurrences 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)	2	0.4					
		Controls Functioning as Expected: <i>Issues for Discussion:</i> 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					
	Fitness for Purpose	Panel is Appropriately Designed: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1	RECOMMENDATIONS: Address wiring methods and contain them within raceway. Incorporate redundant level control for the lift station. Upgrade communication with MTS 4G cellular communication.				
		Control Logic is Appropriate for Installation: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3					
		Communications Equipment is Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1					
		Equipment Remaining Service Life: <i>Issues for Discussion:</i> 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	  								
	COST ESTIMATE \$ 4,600.00								

Project No.: 8400-001-00
Tag: IC_102_Panel
Facility: Cornish Lift Station
Assessment Page 1 of 1

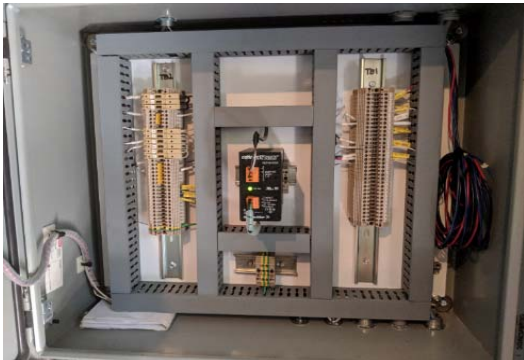


CONTROL PANEL CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
Date: 15-May-19

Asset ID:

SECTION	ITEM	DATA	Assessment Scores				Component Age		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: IC_102_Panel Description: IC_102_Panel	GENERAL	Location: Dry Well, Main Level	1.4	1.2			2014	30	25
		Description: IC_102_Panel							
		Function: Weir and Flap Gate Monitoring							
		PLC Processor: N/A							
		UPS Protection: No							
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
		Controls Functioning as Expected: <i>Issues for Discussion:</i> 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					
	Fitness for Purpose	Panel is Appropriately Designed: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1	RECOMMENDATIONS: COST ESTIMATE				
		Control Logic is Appropriate for Installation: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3					
		Communications Equipment is Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1					
		Equipment Remaining Service Life: <i>Issues for Discussion:</i> 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	 								

Project No.: 8400-001-00
Tag: IC_101_UPS
Facility: Cornish Lift Station
Assessment Page 1 of 1



UPS CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
Date: 16-May-19

Asset ID:

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	1.4	1.8			2010	25	16	
		Description: IC_101_UPS								
		Make: Phoenix								
		Model: Quint DC-UPS 10 A								
		Rated VA:								
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipments appears to be in "Good" condition. Battery was last replaced November 2010.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4					
					RECOMMENDATIONS: Maintain routine maintenance checks and replace battery as required.					COST ESTIMATE
		Fitness for Purpose	UPS system is Present & Designed Appropriately: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.2				
			UPS External Maintenance Bypass is Installed: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 5 (No)	5	0.1				
			UPS Redundancy is Required / Installed: <i>Issues for Discussion:</i>	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1				
			UPS is Sized Appropriately: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	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										

Project No.: 8400-001-00

Tag: IC_101_Level_Unit

Facility: Cornish Lift Station

Assessment Page 1 of 1



INSTRUMENTATION CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant

Date: 15-May-19

Asset ID:

SECTION	ITEM	DATA	Assessment Scores				AGE				
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE		
Equipment Tag: IC_101_Level_Unit Description: IC_101_Level_Unit	GENERAL	Location: Dry Well, Main Level	1.4	2.0			2010	20	11		
		Description: IC_101_Level_Unit									
		Make: Precision Digital									
		Model: PD6000-7R7									
		Device Span:									
		Input/Output: Output									
		Signal Type: 4-20mA									
	Current Physical Condition	Rated Voltage: 24 VDC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4			
		Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.					
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4						
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4						
		Fitness for Purpose	Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3	RECOMMENDATIONS: COST ESTIMATE				
			Instrument Redundancy is Required/Installed: <i>Issues for Discussion:</i>	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1					
	Instrument Range is Appropriate: <i>Issues for Discussion:</i>		Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1						
Instrument Remaining Service Life: <i>Issues for Discussion:</i>	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)		3	0.5							
PHOTOGRAPHS	 										

Project No.: 8400-001-00

Tag: IC_101_Level_Transmitter

Facility: Cornish Lift Station

Assessment Page 1 of 1



INSTRUMENTATION CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant

Date: 15-May-19

Asset ID:

SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_101_Level_Transmitter Description: IC_101_Level_Transmitter	GENERAL	Location: Dry Well, Sub Grade	1.5	2.4					0	
		Description: IC_101_Level_Transmitter								
		Make: Rosemount								
		Model: 1151 Pressure based level transmitter								
		Device Span: 0-150 in H2O								
		Input/Output: Input								
		Signal Type: 4-20mA								
	Rated Voltage: 24VDC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4			
	Current Physical Condition	Equipment Visual Inspection: <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)	2	0.1	NOTES & COMMENTS: Equipment is starting to show signs of surface corrosion and is in "Fair" Condition. Currently no level redundancy in the case of equipment failure.					
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4						
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4						
		Fitness for Purpose	Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3	RECOMMENDATIONS: Have a redundant Ultrasonic Level Transmitter installed.				
			Instrument Redundancy is Required/Installed: <i>Issues for Discussion:</i> Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	5	0.1					
			Instrument Range is Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1					
Instrument Remaining Service Life: <i>Issues for Discussion:</i> Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)			3	0.5						
			COST ESTIMATE \$ 16,800.00							
PHOTOGRAPHS	 									

Project No.: 8400-001-00

Tag: IC_101_Flow

Facility: Cornish Lift Station

Assessment Page 1 of 1



INSTRUMENTATION CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant

Date: 15-May-19

Asset ID:

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	1.4	2.4			2010	20	11
		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: 115 VAC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.			
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4				
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4				
	Fitness for Purpose	Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.3	RECOMMENDATIONS: COST ESTIMATE			
		Instrument Redundancy is Required/Installed: <i>Issues for Discussion:</i>	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	5	0.1				
		Instrument Range is Appropriate: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1				
Instrument Remaining Service Life: <i>Issues for Discussion:</i>		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.5					
PHOTOGRAPHS	  								

Project No.: 8400-001-00

Tag: IC_101_FLYGT

Facility: Cornish Lift Station

Assessment Page 1 of 1



INSTRUMENTATION CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant

Date: 15-May-19

Asset ID:

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	1.5	2.0			2010	20	11
		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)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	2	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.			
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4				
		Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.4				
	Fitness for Purpose	Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (Yes or Not Required) Rating 3 (Required, non standard) Rating 5 (Required, not installed)	1	0.1				
		Instrument Range is Appropriate: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.1				
Instrument Remaining Service Life: <i>Issues for Discussion:</i>		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.5					
PHOTOGRAPHS	 								

Appendix D

Pipe Work & Valves Condition Assessment Forms

Project No.: 8400-001-00
 Tag: GAV_101A
 Facility: Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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_101A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.5	1	2		1987	25	0
		Description: Gate Valve							
		Size: 150 mm							
		Valve Make: Mueller							
		Valve Model: 2360							
		Actuation: Manual - Handwheel							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its service life.			
		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)	3	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	RECOMMENDATIONS:		COST ESTIMATE	
		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	Replace Valve		\$ 5,000.00	
	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	0.6				
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)	2	0.4					
PHOTOGRAPHS									

Project No.: 8400-001-00
 Tag: GAV_101B
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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_101B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.3	1.0	2.0		1987	25	0
		Description: Gate Valve							
		Size: 150 mm							
		Valve Make: Mueller							
		Valve Model: 2360							
		Actuation: Manual - Handwheel							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its service life.			
		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)	3	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)	3	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	RECOMMENDATIONS:		COST ESTIMATE	
		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	Replace Valve		\$ 5,000.00	
	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	0.6				
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)	2	0.4					
PHOTOGRAPHS									

Project No.: 8400-001-00
 Tag: GAV_102A
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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	2.0		1987	25	0
		Description: Gate Valve							
		Size: 150 mm							
		Valve Make: Mueller							
		Valve Model: 2360							
		Actuation: Manual - Handwheel							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its service life.			
		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)	3	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)	3	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	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 5,000.00	
		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)	2	0.4					
PHOTOGRAPHS	  								

Project No.: 8400-001-00
 Tag: GAV_102B
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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_102B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.3	1.0	2.0		1987	25	0
		Description: Gate Valve							
		Size: 150 mm							
		Valve Make: Mueller							
		Valve Model: 2360							
		Actuation: Manual - Handwheel							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its service life.			
		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)	3	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)	3	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	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 5,000.00	
		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)	2	0.4					
PHOTOGRAPHS									

Project No.: 8400-001-00
 Tag: GAV_110
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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_110 Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	3.3	1.0	2.0		1987	25	0
		Description: Gate Valve							
		Size: 200 mm							
		Valve Make: Mueller							
		Valve Model: 2360							
		Actuation: Manual - Handwheel							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its 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 2 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 6,000.00		
		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)		2	0.4						
PHOTOGRAPHS									
									

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		3.3	1.0	2.0		1987	25	0	
		Description: Check Valve									
		Size: 150 mm									
		Valve Make: Val-Matic									
		Valve Model: Swing-Flex									
		Actuation: N/A									
		Actuator Make: N/A									
	Actuator Model: N/A		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	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	NOTES & COMMENTS: Valve is at the end of its service life.					
		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)	3	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)	3	0.3						
	Fitness For Purpose	Appropriate Valve Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 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)	2	0.4						
	PHOTOGRAPHS										
											
											

Project No.: 8400-001-00
 Tag: CHV_102
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 11-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	3.3	1.0	2.0		1987	25	0
		Description: Check Valve							
		Size: 150 mm							
		Valve Make: Val-Matic							
		Valve Model: Swing-Flex							
		Actuation: N/A							
		Actuator Make: N/A							
		Actuator Model: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	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	NOTES & COMMENTS: Valve is at the end of its service life.			
		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)	3	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)	3	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	RECOMMENDATIONS:		COST ESTIMATE	
		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	Replace Valve		\$ 3,000.00	
	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	0.6				
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)	2	0.4					
PHOTOGRAPHS									

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								
		Description:	P-101 Suction Line								
		Size:	150 mm								
		Material:	Carbon Steel								
		Service:	Sewage								
		Coating:	Epoxy								
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)				5		
	Current Physical Condition	Piping Visual Inspection: Issues for Discussion:	Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.3	NOTES & COMMENTS: Piping is nearing the end of its service life.					
		Piping 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	0.4						
		Condition of Potable Water Piping and Backflow 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)	0	0						
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3						
	Fitness for Purpose	Forcemain Shut Off Valve: Issues for Discussion:	Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3	RECOMMENDATIONS: Replace Piping					COST ESTIMATE \$ 4,000.00
		Flow Meter Installed: Issues for Discussion:	Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2						
		Appropriate Piping Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1						
		Piping Capacity: Issues for Discussion:	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						
	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						
		Isolation Valves Installed: Issues for Discussion:	Rating 1 (Yes) Rating 5 (No)	1	0.4						
	PHOTOGRAPHS										

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		1987	50	18		
		Description: P-102 Suction Line									
		Size: 150 mm									
		Material: Carbon Steel									
		Service: Sewage									
		Coating: Epoxy									
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5				
	Current Physical Condition	Piping Visual Inspection: Issues for Discussion:	Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.3	NOTES & COMMENTS: Piping is nearing the end of its service life.					
		Piping 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	0.4						
		Condition of Potable Water Piping and Backflow 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)	0	0						
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3						
	Fitness for Purpose	Forcemain Shut Off Valve: Issues for Discussion:	Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3	RECOMMENDATIONS: Replace Piping					COST ESTIMATE \$ 4,000.00
		Flow Meter Installed: Issues for Discussion:	Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2						
		Appropriate Piping Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1						
		Piping Capacity: Issues for Discussion:	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						
	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						
		Isolation Valves Installed: Issues for Discussion:	Rating 1 (Yes) Rating 5 (No)	1	0.4						
	PHOTOGRAPHS										
											

Project No.: 8400-001-00
 Tag: P_P101_Discharge
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



PIPING CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 16-May-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_P101_Discharge Description: P-101 Discharge Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1987	50	18
		Description: P-101 Discharge Line							
		Size: 150 mm							
		Material: Carbon Steel							
		Service: Sewage							
		Coating: Epoxy / Uncoated Stainless Steel	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	Current Physical Condition	Piping Visual Inspection: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.3	NOTES & COMMENTS: Piping is nearing the end of its service life.				
		Piping Corrosion Noted: <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					
		Condition of Potable Water Piping and Backflow <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					
		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)	2	0.3					
	Fitness for Purpose	Forcemain Shut Off Valve: <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3	RECOMMENDATIONS: Replace Piping				COST ESTIMATE \$ 7,000.00
		Flow Meter Installed: <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					
		Appropriate Piping Configuration: <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					
		Piping Capacity: <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					
	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					
Isolation Valves Installed: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 5 (No)		1	0.4						
PHOTOGRAPHS	  								

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		2.7	1.0	1.6		1987	50	18		
		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)				5			
	Current Physical Condition	Piping Visual Inspection: Issues for Discussion:		Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.3	NOTES & COMMENTS: Piping is nearing the end of its service life.					
		Piping 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	0.4						
		Condition of Potable Water Piping and Backflow 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)	0	0						
		Occurrence of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3						
		Forcemain Shut Off Valve: Issues for Discussion:		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3						
	Fitness for Purpose	Flow Meter Installed: Issues for Discussion:		Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2	RECOMMENDATIONS: Replace Piping		COST ESTIMATE \$ 7,000.00			
		Appropriate Piping Configuration: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1						
		Piping Capacity: Issues for Discussion:		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						
		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						
	Maintainability and Operability	Isolation Valves Installed: Issues for Discussion:		Rating 1 (Yes) Rating 5 (No)	1	0.4						
	PHOTOGRAPHS											
												
												

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	1.0	1.6		1987	50	18	
		Description:	Discharge Header									
		Size:	200 mm									
		Material:	Carbon Steel									
		Service:	Sewage									
		Coating:	Epoxy									
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)				5			
	Current Physical Condition	Piping Visual Inspection: Issues for Discussion:	Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.3	NOTES & COMMENTS: Piping is nearing the end of its service life.						
		Piping 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	0.4							
		Condition of Potable Water Piping and Backflow 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)	0	0							
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	2	0.3							
	Fitness for Purpose	Forcemain Shut Off Valve: Issues for Discussion:	Rating 1 (Yes - Valve functions) Rating 3 (Yes - Valve does not operate) Rating 5 (No)	1	0.3	RECOMMENDATIONS: Replace Piping						COST ESTIMATE \$ 10,000.00
		Flow Meter Installed: Issues for Discussion:	Rating 1 (Yes - Flow meter is accurate) Rating 3 (Yes - Flow meter not accurate) Rating 5 (No)	1	0.2							
		Appropriate Piping Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper piping configuration for application. Risk of Critical Failure)	1	0.1							
		Piping Capacity: Issues for Discussion:	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							
	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							
		Isolation Valves Installed: Issues for Discussion:	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	3.1	2.1			2001	40	22	
		Description:	E_E101_Service								
		Phase:	3 Phase								
		Rated Voltage:	600 VAC								
		Rated Current:	100A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4		
	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	NOTES & COMMENTS: Electrical upgrades was completed in 2001. Overall condition of the equipment appears to be "Good". Corrosion is evident on the cabling at the termination points, along with the ground showing signs of deterioration. Metering enclosure is located on the exterior of the envelope in a high traffic area, with clear vandalism concerns. Currently there is no adequate connection means for the temporary generator. Equipment is not rated for Zone 1 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 Guide: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.2	RECOMMENDATIONS: Addressing wet well access along with ventilation requirements would be recommended prior to any new electrical installs within the building envelope. Affix a lockable enclosure around the meter to prevent potential graffiti/damage. Install a manual transfer switch for temporary generator connection.					
		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						COST ESTIMATE \$ 7,900.00
		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						
		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						
		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										

Project No.: 8400-001-00
 Tag: E_E101_Starter
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



FNVR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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	3.1	2.0			2001	40	22
		Description: E_E101_Starter							
		Manufacturer: Klockner Moeller							
		Model: DIL-1-22-NA							
		Phase: 3 Phase							
		Rated Voltage: 600 VAC							
		Rated Horsepower: 25 HP							
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		4			
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment is not rated for Zone 1 locations. Termination points show signs of deterioration and are not labelled.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> Rating 1 (Connections tight, labelled) Rating 2 (Missing Labels) Rating 3 (Loose / Disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	2	0.1					
		Occurrences 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)	2	0.4					
	Fitness for Purpose	Meets City Electrical Design Standards: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Address wet well access along with ventilation requirements.				
		Has the Breaker Capacity been Reached? <i>Issues for Discussion:</i> 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					
		Equipment Remaining Service Life: <i>Issues for Discussion:</i> Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.5					
PHOTOGRAPHS	 								

Project No.: 8400-001-00
 Tag: E_E102_Starter
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



FVNR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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_E101_Starter	GENERAL	Location: Dry Well, Main Level	3.1	2.0			2001	40	22
		Description: E_E101_Starter							
		Manufacturer: Klockner Moeller							
		Model: DIL-1-22-NA							
		Phase: 3 Phase							
		Rated Voltage: 600 VAC							
		Rated Horsepower: 25 HP	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		4		
	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 is not rated for Zone 1 locations. Termination points show signs of deterioration and are not labelled.			
		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)	2	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	RECOMMENDATIONS: Address wet well access along with ventilation requirements.			
		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				
		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	0.5				
	PHOTOGRAPHS								

Project No.: 8400-001-00
 Tag: E_E101_Motor
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



MOTOR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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	3.2	2.3			1980	40	1
		Description: E_E101_Motor							
		Manufacturer: U.S. Motors							
		Model: 284VP-TVC-TE							
		Horsepower: 15 HP							
		Rated Voltage: 575 VAC							
		Phase: 3 Phase							
		Rated Current: 15.6 A							
	RPM: 1170	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		4			
	Current Physical Condition	Equipment Visual Inspection: <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	0.1	NOTES & COMMENTS: Motor has been painted making a accurate visual inspection difficult. As is the motor appears to be in "Fair" condition. Equipment is not rated for Zone 1 locations. Pecker heads were not open during inspections. City staff noted that the motor will shut down due to overheating. Motor appears to have had a Hipot test completed November 1, 2016. Equipment is at the end of its expected service life.			
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4				
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Replace motor once cooling and ventilation requirements have been met.			
		Has the Capacity been Reached? <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>		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	  								
	COST ESTIMATE \$ 12,000.00								

Project No.: 8400-001-00
 Tag: E_E102_Motor
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



MOTOR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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_E101_Motor	GENERAL	Location: Dry Well, Sub Grade	3.2	2.3			1980	40	1
		Description: E_E101_Motor							
		Manufacturer: U.S. Motors							
		Model: 284VP-TVC-TE							
		Horsepower: 15 HP							
		Rated Voltage: 575 VAC							
		Phase: 3 Phase							
		Rated Current: 15.6 A							
	RPM: 1170	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		4			
	Current Physical Condition	Equipment Visual Inspection: <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	0.1	NOTES & COMMENTS: Motor has been painted making a accurate visual inspection difficult. As is the motor appears to be in "Fair" condition. Equipment is not rated for Zone 1 locations. Pecker heads were not open during inspections. City staff noted that the motor will shut down due to overheating. Equipment is at the end of its expected service life.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Replace motor once cooling and ventilation requirements have been met.				
		Has the Capacity been Reached? <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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	 								
	COST ESTIMATE \$ 12,000.00								

Project No.: 8400-001-00
 Tag: E_E103_Motor
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



MOTOR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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, Main Level	1.4	2.0			2010	20	11
		Description: E_E103_Motor							
		Manufacturer: N/A							
		Model: N/A							
		Horsepower: N/A							
		Rated Voltage: N/A							
		Phase: N/A							
		Rated Current: N/A							
		RPM: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Name plate was not visible at time of inspection. Equipment appears to be in "Good" condition. Equipment is not rated for Zone 1 locations.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Replace the motor as part of the ventilation upgrade.				
		Has the Capacity been Reached? <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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	 								

Project No.: 8400-001-00
 Tag: E_E101_Sump_Pump
 Facility: Cornish Lift Station
 Assessment Page 1 of 1

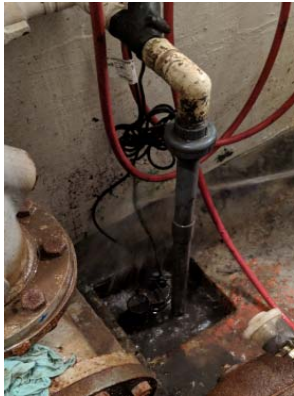


MOTOR CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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	1.4	1.8			2015	15	11
		Description: E_E101_Sump_Pump							
		Manufacturer: Myers							
		Model: MS33PV10							
		Horsepower: 1/3 HP							
		Rated Voltage: 115 VAC							
		Phase: Single Phase							
		Rated Current: 3.9 A							
		RPM: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	1	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Maintain regular maintenance checks to ensure pump is operational. Replace pump as needed.				
		Has the Capacity been Reached? <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)		2	0.25						
PHOTOGRAPHS	 								

Project No.: 8400-001-00
 Tag: E_E101_Dist_Panel
 Facility: Cornish Lift Station
 Assessment Page 1 of 1



PANELBOARD CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 15-May-19

Asset ID:

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	3.1	2.3		2001	40	22		
		Description: E_E101_Dist_Panel								
		Manufacturer: Federal								
		Model: 108-12								
		Phase: Single Phase								
		Rated Voltage: 120/240 VAC								
		Rated Current: 100 A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		4			
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition. Equipment is not rated for Zone 1 locations. Wiring at the termination point is showing signs of corrosion. Circuits are not properly labelled.				
		Canadian Electrical Code Issues <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (Connections tight, labelled) Rating 2 (Missing Labels) Rating 3 (Loose / Disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	2	0.1					
Occurrences 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)	2	0.4						
Fitness for Purpose	Meets City Electrical Design Standards: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25	RECOMMENDATIONS: Address wet well access along with ventilation requirements. Properly label circuit with a panel directory.					
	Has the Capacity been Reached? <i>Issues for Discussion:</i>	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)	2	0.25				COST ESTIMATE \$ 500.00		
	Equipment Remaining Service Life: <i>Issues for Discussion:</i>	Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.5						
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	3.0	1.4			2012	40	33
		Description: E_E101_Transformer							
		Manufacturer: Marcus							
		Model: WM							
		Phase: Single Phase							
		Rated Voltage: 600V:120/240							
		Rated kVA: 10 kVA							
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: The transformer appears to have been replaced since the 2001 electrical upgrade and is in "Good" condition. Equipment is not rated for Zone 1 locations. Wiring at the termination point is showing signs of corrosion. Frame does not line up with existing mounting holes, therefore the transformer has only been fastened on one side.			
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4				
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.2				
		Has the Capacity been Reached? <i>Issues for Discussion:</i>	Rating 1 (<75%) Rating 2 (<85%) Rating 3 (<95%) Rating 4 (At capacity) Rating 5 (Above capacity)	1	0.4				
	Fitness for Purpose	Equipment Remaining Service Life: <i>Issues for Discussion:</i>	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	RECOMMENDATIONS: Address wet well access along with ventilation requirements. Properly affix frame to the mounting bracket.			
COST ESTIMATE \$ 1,000.00									
PHOTOGRAPHS									

Project No.: 8400-001-00
 Tag: E_E101_Main_BKR
 Facility: Cornish Lift Station
 Assessment Page 1 of 1

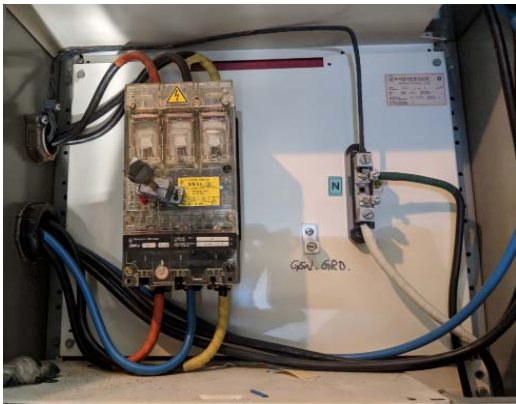


BREAKER CONDITION ASSESSMENT FORM



Assessor: Richard Ofstie/Doug Grant
 Date: 12-Jun-19

Asset ID: 0

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_E101_Main_BKR Description: E_E101_Main_BKR	GENERAL	Location: Dry Well, Main Level	2.6	2.0			2001	40	22
		Description: E_E101_Main_BKR							
		Phase: 3 Phase							
		Rated Voltage: 600 VAC							
		Rated Current: 100 A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			4	
	Current Physical Condition	Equipment Visual Inspection: <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)	1	0.1	NOTES & COMMENTS: Equipment appears to be in "Good" condition. Equipment is not rated for Zone 1 locations. Wiring along with the ground are showing signs of corrosion. RECOMMENDATIONS: Address wet well access along with ventilation requirements.				
		Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i> Rating 1 (No issues) Rating 3 (Non compliant - current code) Rating 5 (Non compliant - legacy code)	5	0.4					
		Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> 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: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	1	0.25					
		Has breaker capacity been Reached? <i>Issues for Discussion:</i> Rating 1 (Appropriately sized) Rating 5 (Undersized)	1	0.25					
		Equipment Remaining Service Life: <i>Issues for Discussion:</i> Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	3	0.5					
	PHOTOGRAPHS	  							

Appendix F

Force Main Condition Assessment Forms



FORCE MAIN PIPING CONDITION ASSESSMENT FORM



Asset ID:

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: Along Wellington Crescent	3.8	1.0		1.6	1942	75	0
		Description: Sanitary Force Main							
		Size: 150 - 200 mm							
		Material: Steel							
		Service: Sewage							
		Coating: N/A							
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5			
	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)	3	0.6	NOTES & COMMENTS: Force Main has surpassed its expected service life. Force main has sufficient capacity for the majority of flows from the station.				
		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)	5	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								



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_Piping Description:	GENERAL	Location:							
		Description:							
		Size:							
		Material:							
		Service:							
		Coating:							
	Current Physical Condition	Forcemain 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)		0.6	NOTES & COMMENTS:			
		Forcemain 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)		0.4				
	Fitness for Purpose	Compatibility with Pumps and Motors: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper forcemain selection for application. Risk of Critical Failure)		1	RECOMMENDATIONS: COST			
	3rd Party & Environmental Damage	Forcemain Attached to a Bridge: <i>Issues for Discussion:</i>	Rating 1 (No) Rating 5 (Yes)		0.2				
		Forcemain Near Other Underground Utilities: <i>Issues for Discussion:</i>	Rating 1 (No) Rating 3 (Yes - Minor nearby utilities) Rating 5 (Yes - Major nearby utilities)		0.3				
		Forcemain 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)		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