



Engineering Ltd.

Report for:

CITY OF WINNIPEG

-WATER AND WASTE DEPARTMENT-

WASTEWATER LIFT STATION CONDITION ASSESSMENT PHASE II - 2020

Document XII: Tylehurst Lift Station Assessment



Date: 2021-04-29

City File No.: S-1095

MPE Project No.: 8400-002-02

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Corporate Authorization

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MPE ENGINEERING LTD.

Prepared By:



April 23, 2021

M. Jason Stusick, P.Eng.
Project Manager



April 23, 2021

Ryan Ursu, P.Eng.
Mechanical Engineer



April 23, 2021

Mark Baker, P.Eng.
Structural Engineer



April 23, 2021

Richard Ofstie, P.Eng.
Electrical Engineer



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1.0 Introduction

1.1 Background

MPE Engineering Ltd. (MPE) conducted a visual inspection of the Tylehurst Lift Station on July 16, 2020. City of Winnipeg (CoW) 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 CoW 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 Operation Staff in conjunction with life cycle estimations. Destructive testing methods were not conducted. Hydraulic assessments were limited to a cursory review using record drawings, geodetic information, and force main elevations provided by the CoW. The hydraulic assessments are considered a conservative, theoretical representation and should not be utilized for future design or assessment work.

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. CoW Staff accompanied MPE personnel and provided operational information, background, and the history of each facility. Additionally, CoW 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 Operation 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 indicators (Likelihood Indicators):

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

Note: The “Demand Condition” Indicator, used in previous assessments conducted by CoW, was removed from this assessment and incorporated into Fitness for Purpose.

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

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

1.6 Condition Assessment Forms

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

Figure 1.1 – Condition Assessment Form Sample

SECTION		ITEM	DATA	Current Physical Condition	Fitness For Purpose	Assessment Scores	YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
		GENERAL	Location: Drywell, Main Level Description: IC_101_Panel Function: Station Monitoring PLC Processor: SCADAPack 357 UPS Protection: Yes	3	1		2013	30	24	
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)				
						5				
			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 classified locations. Wiring methods do not follow provided raceway. Panduit cover is removed. No redundancy.			
			Canadian Electrical Code Issues Identified: <i>Issues for Discussion:</i>	Rating 1 (No issues) Rating 3 (Non compliant - current code)	5	0.4				
			Control Wiring Terminations Visual Inspection: <i>Issues for Discussion:</i>	Rating 2 (Missing Labels) Rating 3 (Loose / Disorganized wiring) Rating 4 (Inappropriate wiring) Rating 5 (Combination of above)	3	0.1				
			Occurrences of Maintenance Issues: <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	RECOMMENDATIONS: Incorporate redundant control for the lift station. Upgrade HVAC system. Install panduit cover.		COST ESTIMATE \$ 45,000.00	
			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				
			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								

2.0 General Overview

2.1 Location

The Tylehurst Lift Station is located at 1550 Wolseley Avenue. It is south of the intersection for Tylehurst Street and Wolseley Avenue, north of the Assiniboine River.

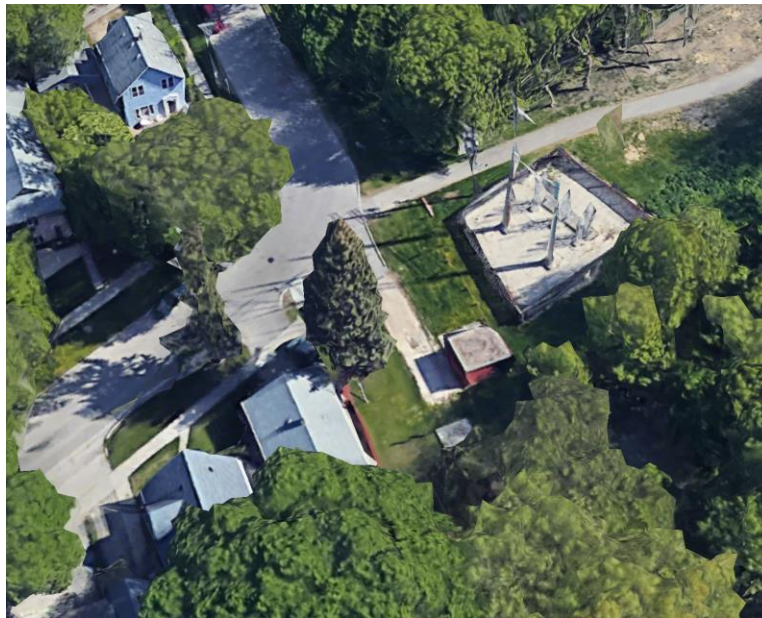
TABLE 2.1: TYLEHURST LIFT STATION OVERVIEW

YEAR CONSTRUCTED	1958	Major Reno: 1999
LOCATION	499 Tylehurst	
CONFIGURATION	Wet well / Dry Well	
PUMPING CAPACITY	231.8 L/s	
TYPE OF PUMPS	Dry Pits Solids Handling	
PUMP HORSEPOWER	P1: 30 HP, P2: 30 HP, P3: 30 HP	
BACKUP GENERATOR	N/A	
VENTILATION	Dry Well: Intermittent, Wet Well: N/A	



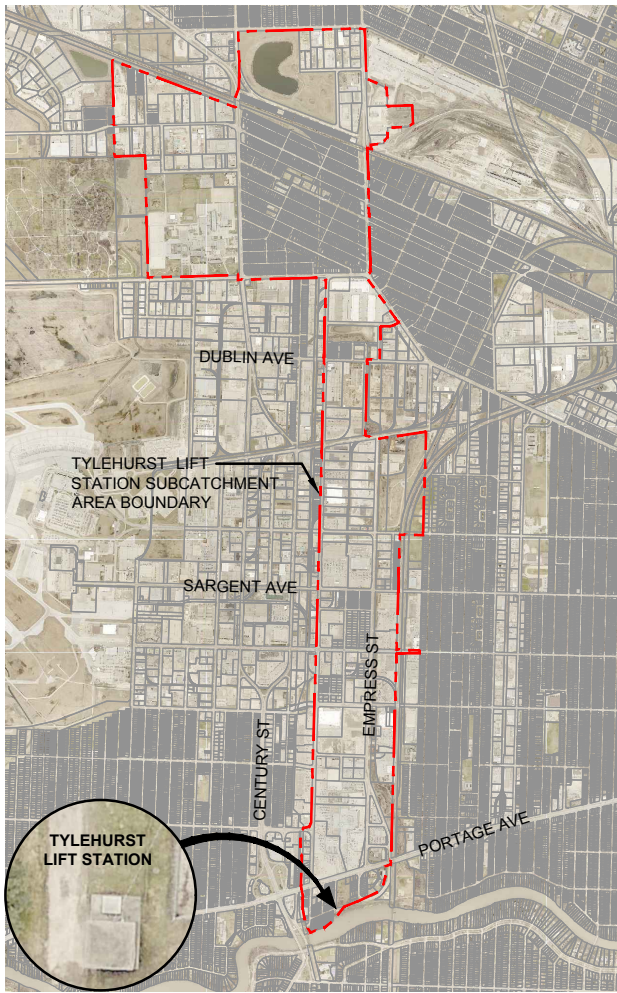
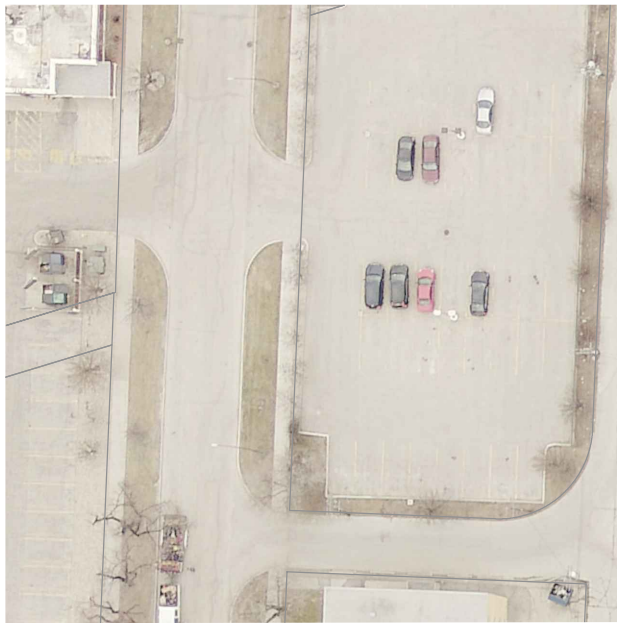
2.2 General

The lift station services a large area, primarily consisting of Commercial use. The drawings provided to MPE suggest that the lift station was originally constructed in 1958. Renovations to the lift station include new pumps, motors, and a drive shaft in 1999. The lift station includes a bypass line to the river allowing for excess discharge when the lift station has reached capacity. The station is generally in “Fair” to “Good” condition. The component with the greatest need for upgrades is the facility.



Tylehurst Site Location – Google Earth

Figure 2.1 provides an overall site location plan of the Tylehurst Lift Station facility.



NOTES:
 1. FORCE MAIN 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 2020
 TYLEHURST LIFT STATION
 LOCATION PLAN

SCALE: 1:750

DATE: OCTOBER 2020

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 Tylehurst Lift Station wet well. Estimated flows were provided by the CoW.

3.1.2 Record Drawings, Reports, & Manuals

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

- Tylehurst Comminutor & Pumping Station – Electrical – Ventilation – Piping & Eyebolt Installation
- Tylehurst Comminutor & Pumping Station – General Layout of Sub-Structure
- Tylehurst Comminutor & Pumping Station – Miscellaneous Details
- Tylehurst Comminutor & Pumping Station – Plan Profile of 14-inch Diameter Forcemain
- Tylehurst Lift Station – Electrical & Control
- Tylehurst Pumping Station – Upgrading – Electrical
- Tylehurst Pumping Station – Upgrading – Mechanical
- Tylehurst Wastewater Pumping Station Upgrading – Plan & Sections
- Tylehurst – GIS Capture
- Tylehurst - CSO Outfall Monitoring - 3D Isometric Plan
- Tylehurst Street Pumping Station.DWG R-127
- Tylehurst Comminutor & Pumping Station – Reinforcing Steel
- LIFT_STN_SERVICE_AREAS.gws – Lift Station Catchment Areas

3.1.3 Missing or Conflicting Data

MPE noted the following missing data:

- Missing from Electrical: Year of last automation upgrade (estimated 2014), Sump pump make, model, HP etc.
- The following was noted for pump flow rate:
 - Flowrate from SCADA data is approximately: P-101: 148.3 L/s, P-102: 126.0 L/s and P-103: 164.7 L/s
 - Flowmeter measurements collected by MPE: P-101: 247.5 L/s and P-102: 123.5 L/s.
 - Flowrate from the manufacturer's pump curve: 100.0 L/s.
 - Theoretical flowrate based on manufacturer's pump curve and site conditions: 149.8 L/s
- The theoretical flow rate was used for the purpose of this assessment.

4.0 Sewage Production

4.1 General

The service area and design flows were generated based on discussion with CoW 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 Tylehurst Lift Station was provided by the CoW from the LIFT_STN_SERVICE_AREAS.gws workspace and consists of primarily Light Industrial with areas of Single-Family Dwellings, Multi-Family Dwellings, Commercial, as well as Parks and Undeveloped Areas. The catchment area is located south of the Canadian Pacific Railway, east of King Edward Street, west of Empress Street, and north of Portage Avenue. Figure 4.1 illustrates the sub-catchment area for the lift station and gives a summary of the establishments that are serviced by the Tylehurst Lift Station.

4.1.2 Peaking Factor

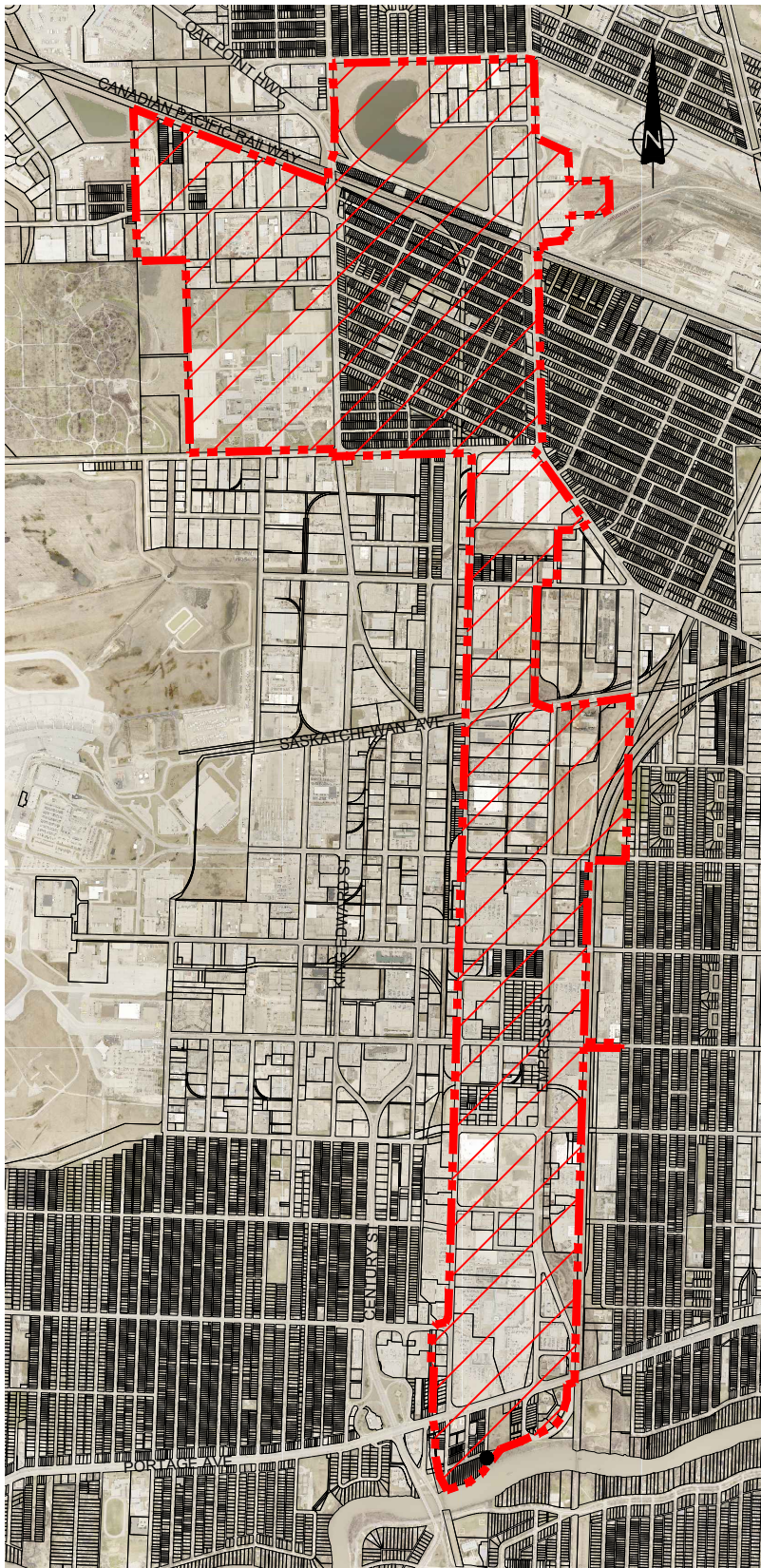
To account for the diurnal fluctuations in sewage flows, peak hourly flows are calculated based on the peaking factor derived from the Harmon equation:

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

where: P = design contributing population in thousands



Tylehurst Lift Station Wet Well



TYLEHURST	
ROW LABELS	COUNT
APARTMENTS	6
BANQUET/MEETING HALL	1
BEVERAGE HOTEL	2
CHURCH	5
COMM/RETAIL WH CTRE	25
COMMERCIAL MULTI USE	1
COMMUNITY CENTRE	1
COMPLETE AUTO DEALER	1
CONDO-COMPLEX	2
CONVENIENCE STORE	2
DETACHED SINGLE DWELLING	1006
DUPLEX	2
HOTEL	3
HYDRO SUB-STATIONS	5
INDSTRL HEAVY MANUFC	1
INDSTRL LIGHT MANUFC	9
INDSTRL MISCELLANEOUS	5
INDSTRL MULTI USE	1
MEDICL OFFICE CLINIC	2
MTS SWITCH STATIONS	1
MULTI FAMILY CONVRSN	8
MULTI RES BLDGS	1
NGHBRHD SHOP CENTRE	9
OFFICE	7
PARK WITH BUILDING	1
POOL	1
PUMP/SEWAGE/LIFTSTNS	1
RAILROAD	3
REGIONAL SHOP CENTRE	1
RES SECONDARY UNIT	2
RESIDENTIAL MULTI USE	1
RESIDENTIAL OUT BLDG	2
RESTAURANT	7
ROW HOUSING	1
SCHOOL	4
STAT RAILWAY ROADWAY	3
STORE	10
SUPER MARKET	1
UNIVERSITY/COLLEGE	1
VACANT COMMERCIAL	11
VACANT INDUSTRIAL	29
VACANT PARK	7
VACANT RESIDENTIAL 1	56
VACANT RESIDENTIAL 2	1
VEHICLE SERV RELATED	23
WAREHOUSE	117
GRAND TOTAL	1401

LEGEND



TYLEHURST SUBCATCHMENT
AREA=408.47ha (1009.3 acres)



LIFT STATION



CITY OF WINNIPEG

LIFT STATION ASSESSMENTS 2020
TYLEHURST LIFT STATION
SUBCATCHMENT AREA

SCALE: 1:30 000

DATE: OCTOBER 2020

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 Tylehurst 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, Commercial, Light Industrial, as well as and Parks and Undeveloped Areas.
- Catchment area is approximately 408.47 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	78.1	12.29	959.5	3.05	2,927	-	270	9.1
Multi-Family Dwelling	20.2	74.13	1,499.8	2.30	3,449	-	270	10.8
Subtotal	98.3				6,376	3.146	270	19.9
							(L/HA/DAY)	(L/SEC)
Commercial	116.0	-	-	-	-	-	16,800	22.6
Light Industrial	161.6	-	-	-	-	-	22,500	42.1
Parks & Undeveloped	32.5							
Subtotal	310.2						39,300	64.6
Total:	408.5	-	-	-	-	-	-	84.6
LAND USE	PEAK DRY WEATHER FLOW		EXTRANEOUS FLOW CONTRIBUTIONS				PEAK WET WEATHER FLOW	
	(LPCD)	(L/SEC)	GROUNDWATER	MANHOLE		WEEPING TILE		
			(L/SEC)	(MH/HA)	(L/SEC)	(L/SEC)		
Single Family Dwelling	-	-	2.0	1.6	25.0	72.8	-	
Multi-Family Dwelling	-	-	0.5	1.6	6.5	-	-	
Subtotal	849	62.7	2.0	-	31.5	72.8	168.9	
	(L/HA/DAY)	(L/SEC)	(L/SEC)	(MH/HA)	(L/SEC)	(L/SEC)	(L/SEC)	
Commercial	28,100	37.7	3.0	1.0	23.2	-	-	
Light Industrial	37,600	70.3	4.1	1.0	32.3	-	-	
Subtotal	65,700	108.1	7.1	-	55.5	-	170.7	
Total:	-	170.7	9.1	-	87.0	72.8	339.6	

The estimated average dry weather flow is 84.6 L/sec, the peak dry weather flow is 170.7 L/sec, and the peak wet weather flow is estimated to be 339.6 L/sec.

Flow values were generated based on a high-level assessment and should be further reviewed for any future upgrade or replacement work. As part of future work, flow values should be validated using observed data and/or model generated data. The CoW typically uses a flow multiplication factor of 2.75 for pump design due to existing infrastructure constraints. This may not be sufficient to convey the actual peak flows but should still be reviewed during any future design work.

4.2.2 Projected Flows

No further expansion is anticipated for the lift station catchment area.

5.0 Lift Station Hydraulic & Capacity Review

5.1 Background

The Tylehurst Lift Station houses three (3) dry pit solids handling pumps. The primary pump cycles between the pumps on an operational basis. Only one pump will operate under low flow conditions. Based on the level in the wet well, the pumping control system will allow for the second and third pump to operate if required. The primary pump starts at a level of 3800 mm, the second pump starts if the level exceeds 4100 mm and the third pump starts if the level exceeds 4200 mm. Table 5.1 provides a summary of the pumps utilized at the Tylehurst Lift Station.

TABLE 5.1: TYLEHURST 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	Ingersoll-Dresser Pump Co.	8MFV13-FR5T	30.0	1999	149.8	9.8	300
PUMP 2 - P-102	DRY PIT SOLIDS HANDLING	Ingersoll-Dresser Pump Co.	8MFV13-FR5T	30.0	1999	149.8	9.8	300
PUMP 3 - P-103	DRY PIT SOLIDS HANDLING	Ingersoll-Dresser Pump Co.	8MFV13-FR5T	30.0	1999	149.8	9.8	300

* Based on duty point in Pump Manufacturer's datasheet

Tylehurst Lift Station Dry Well

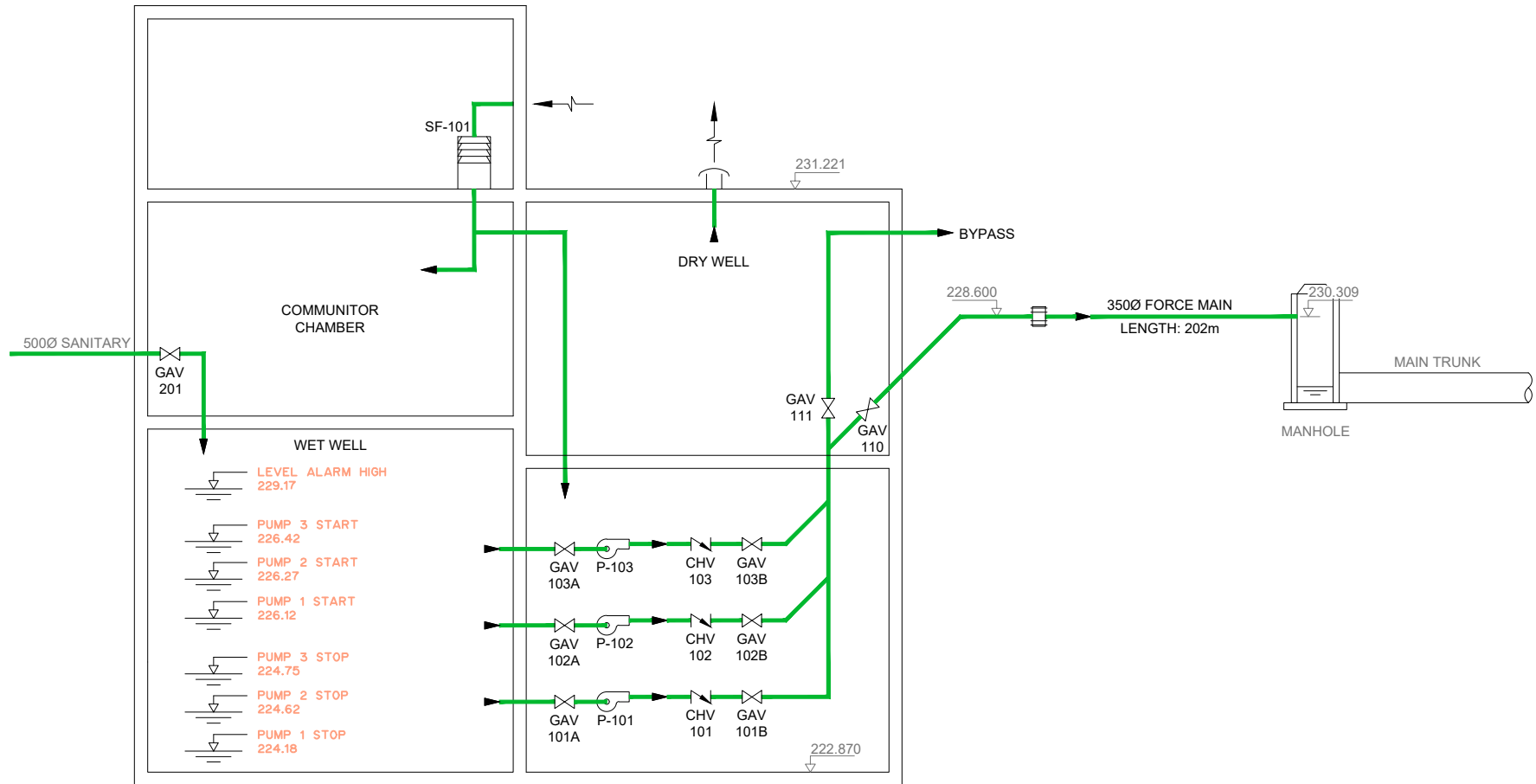


P-101 is a Flowserve and P-102, P103 are identical Ingersoll-Dresser pumps. Each pump is rated for 149.8 L/sec at a Total Dynamic Head (TDH) of 9.8 m, operating at a constant speed. Operation Staff noted bearing issues on the pumps.

A 350 mm diameter Asbestos Cement (AC) force main is used to discharge sewage from the Tylehurst Lift Station. The force main connects to a manhole located approximately 199 m north of the lift station.

5.1.1 Process Flow Diagram

Figure 5.1 provides an overall process flow diagram of the lift station.



P-101
 - DUTY POINT: 149.800 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz

P-102
 - DUTY POINT: 149.800 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz

P-103
 - DUTY POINT: 149.839 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz



LIFT STATION ASSESSMENTS 2020
 TYLEHURST
 PROCESS FLOW DIAGRAM

SCALE: NTS

DATE: DEC 2020

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 Tylehurst Lift Station system curve versus theoretical pump performance chart is illustrated below in Figure 5.2.

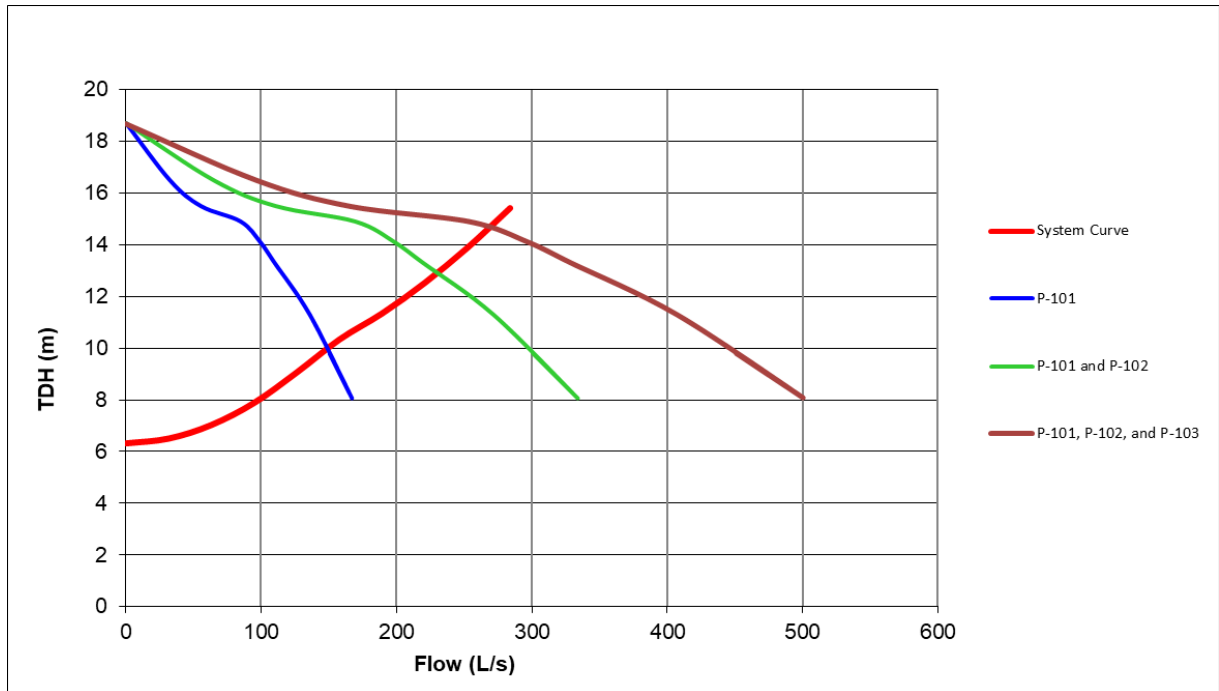


Figure 5.2– Tylehurst Lift Station Curve vs. Pump Performance Curve

The theoretical flows that can be obtained with one pump, two pumps, and three pumps in operation are 149.8 L/s, 231.8 L/s, and 270.5L/s, respectively. However, final assessment of the maximum pumping capacity requirements is outside the scope of the condition assessment and should be confirmed with CoW as the upstream and downstream systems were not considered as part of the assessment.

5.2.2 Pumping Requirements Review

The design of the lift station pumping system must incorporate standby capacity to ensure the station is capable of handling the peak inflow rate, even when the largest pump is out of service. The rated capacity should be equal to or greater than the peak wet weather flow rate of 339.6 L/s. The maximum pumping capacity of the lift station is approximately 270.5 L/s with all pumps in operation. With the largest pump out of service, the rated capacity of the lift station is 231.8 L/s. Based on the estimated peak wet weather flow, the pumping system is currently incapable of meeting the peak influent flow requirements.

5.2.3 Pump Performance Review

The theoretical flowrates and design flowrates from the pump data sheets were compared to the SCADA data provided by COW. The SCADA data was confirmed by flowmeter measurements collected by MPE using a Greyline Instruments PDFM Portable Doppler Flow Meter 5.1. The flowrate from SCADA data was found to be P-101: 148.3 L/s, P-102: 126.0 L/s and P-103: 164.7 L/s. The pump data sheet was found to be 100.0 L/s. The pumps are currently

providing a flowrate 25 to 50% above the design flow rate. P-101 and P-103 are currently providing +/- 10% of the theoretical flow rate. P-102 is currently providing +/- 25% of the theoretical flow rate.

5.2.4 NPSHA Analysis

A Net Positive Suction Head Available (NPSHA) analysis was performed to review the lift station suction piping system. NPSHA is the maximum absolute pressure available at the suction port of the pump above vapour pressure. Centrifugal pumps are not capable of handling large quantities of vapour, so it is critical that there is sufficient absolute pressure on the suction side of the pump to prevent vaporization or flashing in the impeller.

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

TABLE 5.2: SUCTION LINE NPSHA ANALYSIS							
CONDITION	WET WELL LEVEL (mm)	PUMP SPEED (%)	FLOW (L/s)	SUCTION LINE TOTAL DYNAMIC HEAD (m)	NPSH REQUIRED (m)	NPSH AVAILABLE AT PUMP INLET (m)	NPSH EXCESS AVAILABLE (m)
PUMP 1 STOP	1313.00	100	149.8	0.28	2.26	9.79	7.54
PUMP 2 STOP	1750.00	100	149.8	0.28	2.26	10.23	7.97
PUMP 3 STOP	1875.00	100	149.8	0.28	2.26	10.35	8.10
PUMP 1 START	3250.00	100	149.8	0.28	2.26	11.73	9.47
PUMP 2 START	3400.00	100	149.8	0.28	2.26	11.88	9.62
PUMP 3 START	3550.00	100	149.8	0.28	2.26	12.03	9.77

5.2.5 Force Main Review

A 350 mm diameter AC force main is used to convey sewage from the lift station. The length of the force main is 202 m. The force main was installed in 1958 and has a volume of approximately 13.7m³. Based on the estimated average and peak dry weather flows of 84.6 L/sec and 170.7 L/sec, the average retention time in the force main ranges from 0.8 to 1.5 minutes, which is below the maximum recommended retention time of 4 hours. An analysis 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 Tylehurst Lift Station and are summarized in Table 5.3.

TABLE 5.3: FORCE MAIN VELOCITY			
DESCRIPTION	ONE PUMP THEORETICAL	TWO PUMPS THEORETICAL	THREE PUMPS THEORETICAL
FLOW (L/s)	149.8	231.8	270.5
FORCE MAIN VELOCITY (m/s)	2.10	3.25	3.80

The force main was found to be undersized for the flows from the lift station and the velocities are above the acceptable range of 0.6 m/s to 1.6 m/s. The force main size is not currently impacting the hydraulic performance of the pumping system. Further detail regarding the force main review is provided in **Appendix F**.

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 to assess the relationship between tank level and pump cycle time. Average dry weather flow results in approximately four (4) pump cycles per hour. Peak dry weather flow results in approximately one (1) pump cycle per hour. Peak wet weather flow will result in all pumps operating continuously for the duration of the storm event. A maximum of 8.2 cycles per hour is allowable for a 30 HP pump. The pump cycles are within the allowable limits and the pump capacity is acceptable for the volume of the wet well. If it is determined that the station exceeds the allowable pump cycles per hour, VFDs can be fitted to the pumps to mitigate this issue.

5.4 Wet Well Flow Path Review

Sewage enters the north side of the wet well through a 500 mm diameter influent pipeline and is directed to the pump suction lines located on the west side of the wet well. The wet well is circular on the bottom to prevent solids build up at the edges of the wet well. The 300 mm diameter pump suction lines are located at the bottom of the wet well. Operation Staff noted that there are no noticeable issues with solids buildup in the wet well.

5.5 Pump Control Strategy Review

The following provides a brief outline of the control narrative for the Tylehurst 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 (HOA) switch that can bypass the controller and operate the pump.

5.5.3 Automatic Mode

- In 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 3250 mm.
- Should the sewage level rise above the “Pump 2 Start Level” of 3400 mm, the second pump will start.
- Should the sewage level rise about the “Pump 3 Start Level” of 3550 mm, the third 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 third pump shuts down at the “Pump 3 Stop Level” of 1875 mm, the second pump shuts down at the “Pump 2 Stop Level” of 1750 mm, and the first pump shuts down at the “Pump 1 Stop Level” of 1313 mm.
- A High Level Alarm is triggered at a level of 229.17 mm.

The control strategy used at the lift station is similar to the control strategy used at other lift stations throughout the City. The control strategy is well understood by Operation Staff and has proven to be a successful method of operation.

5.6 Conclusions

The hydraulic and capacity assessment of the lift station yielded the following conclusions:

- There are no issues with NPSHA or excessive pump cycling in the pumping system.
- The pumping system is capable of meeting the peak dry weather influent flow requirements; however, the

pumping system is not currently capable of meeting the peak wet weather influent flow requirements.

- The existing wet well meets the maximum fill time requirements and is adequately sized for incoming flows.
- The force main was found to be undersized for the majority of flows from the lift station.
- The pumps are currently providing a flowrate 25 to 50% above the design flow rate.
- P-101 and P-103 are currently providing +/- 10% of the theoretical flow rate. P-102 is currently providing +/- 25% of the theoretical flow rate.

5.7 Recommendations

Based on the conclusions, MPE has prepared the following recommendation:

- It is recommended that the force main be upsized if any future capacity upgrades are conducted at the lift station.


6.0 Facility Condition Assessment

6.1 Background

The following provides a condition assessment of the building facility for the Tylehurst 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 assigned to the components to identify the condition and cost estimates have been developed. Recommendations have been developed in order to assist CoW 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 Tylehurst 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: TYLEHURST LIFT STATION - CODE REVIEW			
YEAR CONSTRUCTED	1958		
BUILDING FOOTPRINT AREA (m2)	< 25		
LOCATION	Intersection of Tylehurst St. and Wolseley Ave.		
BUILDING CLASSIFICATION	Combustible / Non-Combustible		
ROOFING MATERIAL	Built-up Tar Membrane and Rock Ballast		
MAJOR OCCUPANCY CLASSIFICATION	F-3 - Low Hazard Industrial		
OCCUPANT LOADING	5 max.		
			
ITEM	REQUIREMENT	CODE COMPLIANCE	CODE REFERENCE / NOTES
BARRIER FREE ACCESS	Not Required	N/A	NBC - 3.8- A3.8.1.1
MAIN FLOOR EXITS	N/A	N/A	NBC - 3.4.2.1 (A) - N/A: NBC - 3.4.1.1
TRAVEL DISTANCES	N/A	N/A	NBC - 3.4.2.1 (A) - N/A: NBC - 3.4.1.1
MEZZANINE EXIT	N/A	N/A	NBC - 3.4.2.2 - N/A: NBC - 3.4.1.1
GUARDRAILS	1 kN lateral load	Yes	NBC - 4.1.5.15
IMPORTANCE FACTOR	Post Disaster	No	NBC - 4.1.2
EGRESS PATHS	1100mm min. width	N/A	NBC - 3.4.3.2 - N/A: NBC - 3.4.1.1
MONORAIL CERTIFICATION	Certification	No	ANSI MH27.1, CSA B167-96 - No inspection certification
LADDERS & STAIRS	Compliance with Safety Codes	No	PIP STE05501, NBC
HATCHES	Guardrails & Load Capacity	No	SOR/86-304
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		N/A	Registration with Ministry of Environment is not required
DEISEL (Fuel Oil) - Pump Station		N/A	Registration with Ministry of Environment is not required
CHLORINE		N/A	
<i>-Hazardous Substances and Waste Dangerous Goods Regulations recommends registration for tank capacity > 4000 Litres-</i>			
SECURITY	SITE SECURE	BUILDING SECURE	NOTES
PUMP STATION	NO	YES	

6.3 Site Conditions

The Tylehurst lift station is located at 1550 Wolseley Avenue, near the intersection with Tylehurst Street.

6.3.1 Site Access and Parking Lot

The site is accessed easily from Tylehurst Street or Wolseley Avenue. There is sufficient parking and the parking lot is in "Good" condition. Vehicles leaving the site must back out into an intersection.



6.3.2 Site Grading & Landscaping

Most of the site is adequately sloped away from the building. Ponding occurs on the concrete pad outside the building, specifically around the hatch.

6.3.3 Fencing and Signage

There is no signage or fencing surrounding the site. Some wood posts on site are bent and broken. There is evidence of graffiti which has been painted over.



6.4 Foundations

6.4.1 Base Slab

The foundation consists of a cast-in-place concrete wet well and dry well. The dry well consists of a pump room and comminutor room. The comminutor has been removed and piped over to remove open sewage from the room. The concrete in the comminutor room has suffered some surface deterioration from the previous H₂S environment but is structurally sound.

The base slab in the pump room is structurally sound, though the finish has worn off. The slab is sloped adequately, and the sump is in "Good" condition.

6.4.2 Below Grade Exterior Walls, Columns, and Beams

The foundation walls are structurally sound, though some paint is peeling. The peeling paint and streaks on the walls may indicate minor infiltration.



6.4.3 Wet Well

The wet well is a concrete cylinder cast against the side of the dry well. The access vault has lost some surface paste but is structurally sound. The vault rim is corroded and should be replaced.

6.5 Primary Structural Systems

6.5.1 Loadbearing Walls, Columns and Beams

Load bearing concrete walls and beams have been significantly altered since the original placement. A wall has had a large pipe penetration drilled through that has exposed rebar. Two beams have been damaged in order to fit piping upgrades. Significant cross-sectional area has been lost from these beams and approximately half of the rebar has been damaged or cut. It is assumed that these modifications



received the approval of an engineer. The corner of the concrete wall supporting the superstructure has been damaged. Rebar is exposed in some areas of the comminutor room. This should minimally impact the structural integrity.

6.5.2 Trusses, and Joists

Assessment of similar structures revealed cracking in the tension face of the roof panels. The insulation on the ceiling of the superstructure should be removed to check for such cracking.

6.5.3 Suspended Floors

Suspended floors have also had new pipe penetrations drilled through. It is assumed that these modifications were approved by an engineer. Previous pipe penetrations have been patched.

6.6 Secondary Structural Systems

6.6.1 Stairs, Ladders, Catwalks, Hatches, Rails

A staircase support is loose and pulling away from the supporting concrete. Some stair hand rails lack required clearance and guard rails lack kick plates. On the mid-level, a pipe penetrates the floor through a square opening. The gaps around the pipe present a tripping/falling hazard. Several floor openings are covered only with wood, which is not Code-compliant. The ladder in the wet well has corroded and is not fit for use.



6.6.2 Interior Walls, Ceilings, Supports, Equipment Bases

The interior walls and ceilings are in functional condition. Metal equipment bases are corroded and should be replaced with concrete bases.



6.6.3 Finishes

Wall paint is peeling off in lower levels. Floor finishes have worn on all levels.

6.6.4 Monorails and Hoists

The monorail supports were not assessed because they were hidden behind insulation. Lifting lugs in the comminutor room are corroded and should be certified by a third party before use. MPE found no confirmation of monorail certification.

6.7 Building Envelope

6.7.1 Exterior Siding, Windows, Doors

The door is at the end of its useful life. Paint is peeling off the exterior brick face. This may indicate that water is leaking into the wall air space. Door hardware is rusting, which may also indicate leakage from the roof.



6.7.2 Insulation, Vapour Barrier, Interior Liner

The interior is lined with insulation and protective board. No vapour barrier was noted. Condensation behind the insulation is a risk. Streaks on lower level walls originate behind insulation and may be evidence of such condensation.

6.7.3 Flashings, Soffits, Sealants, Weather-stripping

The corroding door and peeling exterior paint indicate that the roof flashing may be leaking. It is aging and damaged. The door weather stripping is also damaged. There is no sealant around exterior penetrations. Sealants should be installed.

Leakage through the roof flashing is evident by the peeling wall paint. This moisture infiltration behind the veneer will freeze resulting in increasing damage to the veneer and block walls.



6.8 Roofing

6.8.1 Roof Membrane, Insulation, Decking

The gravel ballast has eroded in several areas, exposing the membrane to deterioration and damage. The ballast should be replaced. All leaks should be sealed.

6.8.2 Skylights, Hatches, Penetrations

The asphalt membrane is exposed near penetrations and should be protected. The flashing should be replaced.

6.8.3 Flashings, Trim, Gutters, Downspouts

The flashing is bent and damaged. Leaking is suspected.

6.9 Building Mechanical

6.9.1 Heating

The building includes wall mount electric heaters located in the building lower levels that are in “Fair” operational condition.

6.9.2 Interior Plumbing

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

Drain lines from the building are directed to sumps in the dry well lower level and comminutor chamber lower level. Sump pumps are used to discharge water from the sumps to the wet well. The drainage system is in “Fair” condition and no operational concerns were noted.

6.9.3 Fire Suppression Systems

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

6.9.4 Gas Distribution

There is no gas distribution system at the lift station.

6.10 Facility Assessment Cost Summary

Table 6.2 summarizes the cost estimates and recommended Action time for each recommendation for the facility assessment.

TABLE 6.2: TYLEHURST FACILITY IMPROVEMENT COST ESTIMATES			
Item	Facility Section	Action	Cost
1	Site Conditions	Mid Term	\$ 650.00
2	Foundations	Mid Term	\$ 2,500.00
3	Primary Structural Systems	Short Term	\$ 6,000.00
4	Secondary Structural Systems	Short Term	\$ 53,000.00
5	Building Envelope	Short Term	\$ 14,000.00
6	Roofing	Short Term	\$ 12,500.00
7	Building Mechanical	Short Term	\$ 500.00
Total:			\$ 89,150.00

The capital costs for the recommended improvements have been *estimated in 2020 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 CoW with budgetary planning purposes only and should not be used as actual quotes. The cost estimates are exclusive of taxes.

6.11 Conclusions

The major findings of the facility assessment of the lift station are summarized as follows:

- Concrete beams have been heavily modified to fit new piping. Current structural capacity is unknown.
- The ladders, hatches, and guardrails are not Code compliant.
- The exterior siding is compromised by a leak in the roof flashing.
- The roof requires some rehabilitation.
- The wet well ladder is not suitable for use.
- Wall paint is peeling off in lower levels. Floor finishes have worn on all levels.
- There is no apparent Fire Suppression System.

6.12 Recommendations

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


TABLE 6.3: TYLEHURST RECOMMENDATIONS	
COMPONENT	RECOMMENDATION
SITE CONDITIONS	Replace damaged wood posts
	Install contact information sign
FOUNDATION / WET WELL	Repair exterior damaged concrete curb
PRIMARY STRUCTURAL SYSTEMS	Perform a structural analysis to determine the structural capacity of the damaged beams and suspended slabs
	Remove ceiling insulation to check for damage to the roof panels
SECONDARY STRUCTURAL MEMBERS	Certify monorail / lifting hooks
	Refinish floors and walls
	Replace equipment bases
	Repair ladder support that has pulled away from the supporting concrete
	Install kick plates on guard rails
BUILDING ENVELOPE	Install a vapour barrier and interior liner
	Replace the door and frame
	Seal penetrations
ROOFING	Repair any damage to the membrane and restore ballast to fully cover membrane
	Replace roof flashing
BUILDING MECHANICAL	Install handheld fire extinguisher by building entrance

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 assigned to the equipment to identify priority of future upgrades. Recommendations have been developed in order to assist CoW in prioritizing future projects. Detailed assessment forms have been appended to this report as **Appendix B**. A brief mechanical overview of the Tylehurst Lift Station is provided in Table 7.1.

TABLE 7.1: TYLEHURST LIFT STATION MECHANICAL OVERVIEW		
YEAR CONSTRUCTED	1958	Upgrade: 1999
PUMPING CAPACITY	231.8 L/s	
LOCATION	1550 Wolseley Avenue	
NUMBER OF PUMPS	Three (3)	
PUMP HORSEPOWER	P-101: 30 HP, P-102: 30 HP, P-103: 30 HP	
TYPE OF PUMPS	Dry Pit Solids Handling	
PIPING MATERIAL	Carbon Steel	




The lift station houses sewage pumping equipment and associated piping and valves located in the dry well lower level. Pumps, piping, and valves were installed as part of a major lift station upgrade in 1999. Upgrades were recently conducted in the Comminutor Chamber. Operation Staff have performed tasks to prolong the usable life of the equipment, including routine servicing, preventative maintenance, and building cleanup. In general, the equipment is in “Fair” physical condition.

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	1958	Upgrade: 1999		
LOCATION	1550 Wolseley Avenue			
PUMPS				
TYPE	Dry Pit Solids Handling			
PUMP LOCATION	Dry Well			
SUCTION SOURCE	Wet Well - Direct Piped			
PIPING				
SUCTION/DISCHARGE DIAMETER	300 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	N/A	ANSI/HI 9.8-2012 Section 9.8.3.2.3.2	
SUCTION INTAKE WALL CLEARANCE	75 mm	N/A	ANSI/HI 9.8-2012 Section 9.8.3.2.3.1	
SUCTION BELL	Required	N/A	ANSI/HI 9.6.6-2016 Section 9.6.6.3.6	
SUCTION PIPING VELOCITY	2.4 m/s	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.3.1	
SUCTION STRAIGHT PIPE LENGTHS	5	YES	ANSI/HI 9.6.6-2016 Section 9.6.6.3.3	
PUMP VIBRATION	0.15 in/sec	YES	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 Tylehurst Lift Station houses three (3) dry pit solids handling pumps. P-101, P-102, and P-103 are equipped with a 30 HP, 575 VAC, 3 phase, 60 Hz electric motor. Please see Section 5.1 for more information regarding the pumps. The pumps were installed in 1999 and are used regularly. Operation Staff noted a history of bearing issues on the pumps. A new impeller and volute were recently installed on pump P-101.

Overall, the pumps are in “Fair” to “Good” condition and should continue to be serviced regularly to extend the usable life of the pumps. Table 7.3 provides a summary of the condition of the pumps at the lift station.

TABLE 7.3: TYLEHURST LIFT STATION PUMP CONDITION ASSESSMENT						
PUMP	DESCRIPTION	MAKE	MODEL	CONDITION	IMPORTANCE	ACTION
P-101	30 HP Dry Pit Solids Handling	Flowsolve	8MFV13-FR5T	Good	Important	Long Term
P-102	30 HP Dry Pit Solids Handling	Ingersoll-Dresser	8MFV14FR5T	Fair	Important	Mid Term
P-103	30 HP Dry Pit Solids Handling	Ingersoll-Dresser	8MFV14FR5T	Fair	Important	Mid 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 Tylehurst Lift Station.

TABLE 7.4: TYLEHURST LIFT STATION PUMP VIBRATION AND TEMPERATURE					
PUMP		VIBRATION (in/s)			TEMPERATURE (F)
		x	y	z	
P-101					
	Motor	0.03	0.04	0.08	89
	Volute	0.05	0.04	0.03	65
P-102					
	Motor	0.05	0.04	0.07	86
	Volute	0.08	0.03	0.07	65
P-103					
	Motor	0.03	0.02	0.01	80
	Volute	0.02	0.02	0.04	65

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*. Vibration readings in the x, y, and z axes were found to be within the tolerances as set out in *ANSI/HI 9.6.4-2009 Rotodynamic Pumps for Vibration Measurements and Allowable Values*.

7.4 Valves

The majority of the valves were installed as part of the lift station upgrade in 1999, with the exception of the recently installed gate valve in the comminutor chamber. The manually actuated gate valves that are used for isolation of

equipment for maintenance and are not regularly exercised. The check valves are critical to lift station operation and are exercised regularly. In general, valves are in “Fair” condition, with the exception of CHV-103. This valve was not fully seating during the time of inspection. A check valve not seating is of particular concern as sewage will flow backwards from the discharge header through the associated pump and will return to the wet well, which will decrease the capacity of the lift station when the associated pump is not in operation and could cause critical damage to the associated pump on start up. Table 7.5 provides a summary of the condition of the valves at the Tylehurst Lift Station.

TABLE 7.5: TYLEHURST LIFT STATION VALVE CONDITION ASSESSMENT

VALVE	DESCRIPTION	SIZE	CONDITION	IMPORTANCE	ACTION
GAV-101A	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-101B	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-102A	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-102B	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-103A	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-103B	Gate Valve	300 mm	Fair	Intermediate	Mid Term
GAV-110	Gate Valve	300 mm	Fair	Important	Mid Term
GAV-111	Gate Valve	300 mm	Fair	Important	Mid Term
GAV-201	Gate Valve	500 mm	Excellent	Intermediate	None
CHV-101	Ball Check Valve	300 mm	Fair	Important	Short Term
CHV-102	Ball Check Valve	300 mm	Fair	Important	Short Term
CHV-103	Ball Check Valve	300 mm	Poor	Important	Short Term



7.5 Piping & Fittings

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

TABLE 7.6: TYLEHURST LIFT STATION PIPING CONDITION ASSESSMENT				
PIPING	MATERIAL	CONDITION	IMPORTANCE	ACTION
Influent Line	Carbon Steel	Excellent	Important	None
P-101 Suction Line	Carbon Steel	Fair	Important	Mid Term
P-102 Suction Line	Carbon Steel	Fair	Important	Mid Term
P-103 Suction Line	Carbon Steel	Fair	Important	Mid Term
P-101 Discharge Line	Carbon Steel	Fair	Important	Mid Term
P-102 Discharge Line	Carbon Steel	Fair	Important	Mid Term
P-103 Discharge Line	Carbon Steel	Fair	Important	Mid Term
Backflush Line	Carbon Steel	Fair	Important	Mid Term
Bypass Line	Carbon Steel	Fair	Important	Mid Term

7.5.1 Non-Destructive Testing

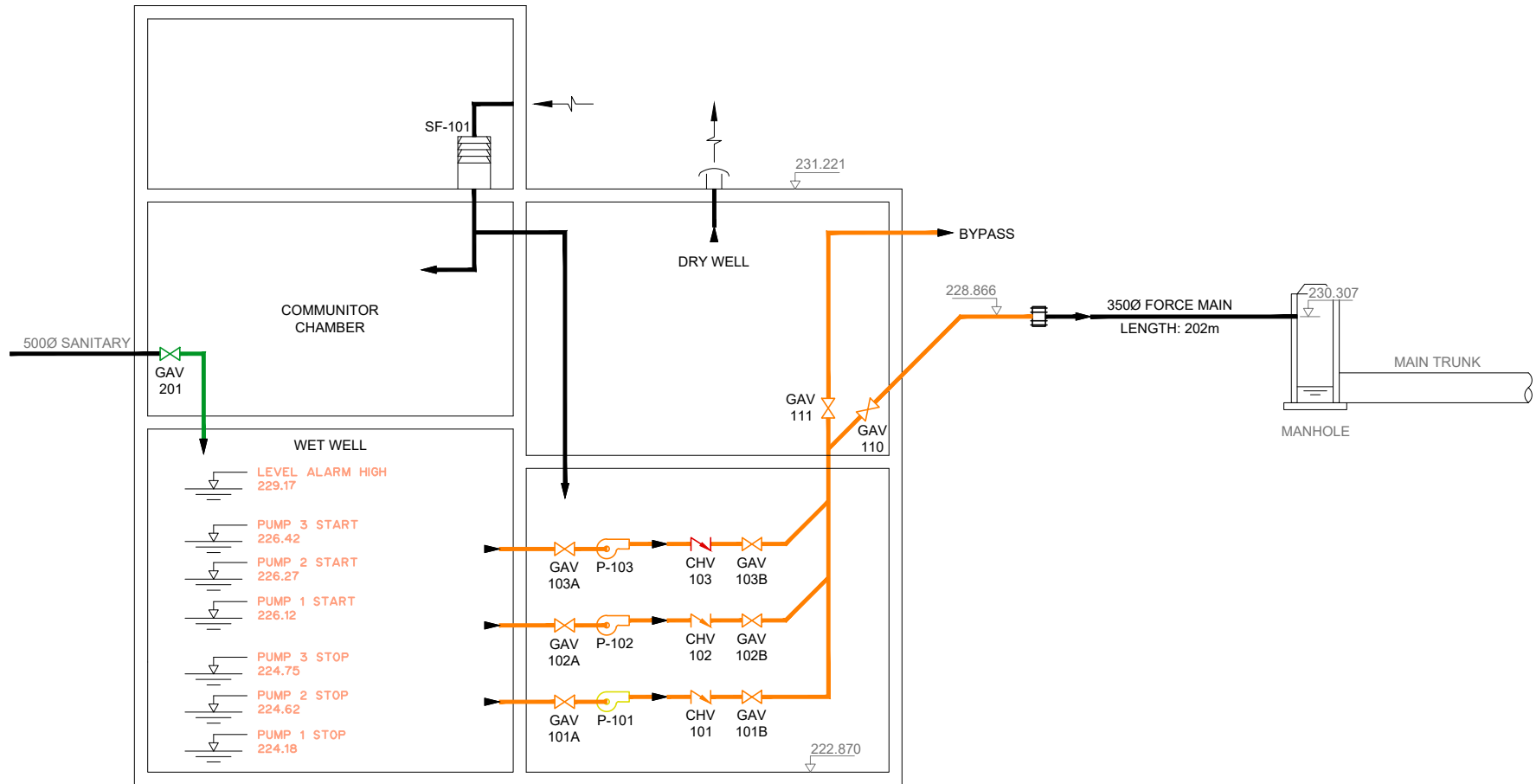
Non-destructive testing was not performed on the piping in the lift station.

7.5.2 Cathodic Protection

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

7.6 Summary of Condition Assessment

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



P-101
 - DUTY POINT: 149.800 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz

P-102
 - DUTY POINT: 149.800 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz

P-103
 - DUTY POINT: 149.839 L/s @ 9.8 m
 - 30 HP, 1175 RPM
 - 575 VAC/3 PH/60 Hz

LEGEND	
—	POOR
—	FAIR
—	GOOD
—	EXCELENT



LIFT STATION ASSESSMENTS 2020
 TYLEHURST
 CONDITION ASSESSMENT SUMMARY

SCALE: NTS

DATE: DEC 2020

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” physical condition and should continue to be serviced regularly to extend usable life.
- Check Valve CHV-103 was not seating during the time of inspection.
- The check valves in the lift station are nearing the end of their service life and should be upgraded with new equipment.

7.8 Recommendations

7.8.1 Check Valve Replacement (0-5 years)

Due to age, condition, and the critical importance of the check valves, it is recommended that replacement of all three (3) check valves in the lift station 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 costs reflect only the cost to address the items listed in the Condition Assessment Forms.

TABLE 7.7: TYLEHURST LIFT STATION MECHANICAL EQUIPMENT IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	CAPITAL COST
1	Short Term	Check Valve Replacement	\$24,000
TOTAL			\$24,000

The capital costs for the recommended improvements have been *estimated in 2020 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 timeframes have been developed in order to assist CoW in prioritizing future projects. The Condition Assessment Forms for the electrical equipment are provided in **Appendix E**.

The Tylehurst Lift Station houses electrical equipment such as pumps, motors, and full voltage starters. A portable emergency generator is available if required.

TABLE 8.1: TYLEHURST LIFT STATION ELECTRICAL OVERVIEW

YEAR CONSTRUCTED	1958 (Electrical Upgrade in 1999)
LOCATION	1550 Wolseley Avenue
SERVICE	250 A
VOLTAGE	600 VAC
STANDBY GENERATOR SIZE	N/A
NUMBER OF PUMPS	3
PUMP MOTOR HORSEPOWER	30



8.2 Code Review

As part of the condition assessment of the equipment and installation methods at the CoW lift stations, 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 particularly relevant 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 unventilated 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 should 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) air space. This lift station is unable to meet the required number of air changes per hour and is classified as a Zone 1 air space.

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	1958 (Electrical Upgrade in 1999)			
LOCATION	1550 Wolseley Avenue			
WET WELL				
HAZARDOUS LOCATION CLASSIFICATION	Zone 1			
CORROSIVE ENVIRONMENT CATEGORY	C2			
DRY WELL				
HAZARDOUS LOCATION CLASSIFICATION	Zone 2			
CORROSIVE ENVIRONMENT CATEGORY	C1			
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, 250 Amp, 60 Hz service. The service is fed overhead to a service entrance mast at the control building. The control room and dry well are in the same building, with the control room on ground level and the dry well below. The safety latch on the main disconnect was not functional, it is recommended that the latch be repaired or replaced. The Tylehurst Lift Station’s main service uses a Klockner Moeller Motor Control Centre (MCC). The metering cabinet is located on the exterior of the building without a protective enclosure. Station grounding is complete with fault detection and the water line is grounded. However, some ground lines are severely corroded, and a ground resistance test is recommended to ensure the system is properly grounded. Table 8.3 provides a summary of the condition of the electrical service equipment at the Tylehurst Lift Station.

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

8.4 Cable and Conduit

The wiring style in the Tylehurst Lift Station is run using a combination of RPVC, threaded stiff conduit, and EMT. Conduit and cabling do not meet CEC section 18-152 Zone 2 requirements.

8.5 Motors

The lift station is equipped with three (3) dry pit solids handling pumps. Each pump is equipped with a 575 VAC, 3 phase, 30 HP U.S. electric motor. The pump motors show minor surface corrosion. This is likely a result of inadequate ventilation to clear the corrosive gasses present in this station. For that reason, the life expectancy of these motors has been reduced. P-103 spins backwards if not turned on, its check valve is not seating properly and needs to be serviced or replaced. The pump motors are in “Fair” condition, the vent motor is in “Good” condition, and the sump

pump appears to be in “Fair” condition. The vent motor and sump pump nameplates were not visible at the time of inspection. The motor for pump P-101 exceeds its Full Load Amperage (29A) by 17%, causing increased wear and heat in the motor. Considering the corrosive atmosphere, age of the motors, and high current draw from P-101 it is recommended that the motor for P-101 be replaced and motors for pumps P-102 and P-103 be monitored for signs of accelerated wear. Ventilation and wet well access concerns should be addressed before any electrical upgrades. Table 8.4 provides a summary of the condition of the motors at the Tylehurst Lift Station.

TABLE 8.4: TYLEHURST LIFT STATION MOTOR CONDITION ASSESSMENT				
DESCRIPTION	HORSEPOWER	CONDITION	IMPORTANCE	ACTION
P-101 Motor	30	Fair	Important	Short Term
P-102 Motor	30	Good	Important	Mid Term
P-103 Motor	30	Fair	Important	Short Term
HVAC Motor	1	Good	Important	Mid Term
Sump Pump	Fractional	Fair	Important	Short 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 were upgraded with the control room electrical in 1999. Operators report frequent starter failures; starters more appropriate for the equipment and environment are required but have not been installed due to space limitations. Therefore, despite appearing relatively new and undamaged, the starters are considered to be in “Poor” condition. Table 8.5 provides a summary of the condition of the starters at the Tylehurst Lift Station.

TABLE 8.5: TYLEHURST LIFT STATION MOTOR STARTER CONDITION ASSESSMENT				
DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
Pump 1 FVNR	600 VAC	Poor	Important	Mid Term
Pump 2 FVNR	600 VAC	Poor	Important	Mid Term
Pump 3 FVNR	600 VAC	Poor	Important	Mid Term

8.7 Transformers, Panelboards, and Distribution Equipment

The lighting transformer, 120/240 VAC panelboard, and motor starters are fed by the 600VAC service within the MCC. Wiring shows signs of minor corrosion; otherwise, electrical within the control building is generally in “Good” condition. Table 8.6 provides a summary of the condition of the transformers, panelboards, and distribution equipment at the Tylehurst Lift Station.

TABLE 8.6: TYLEHURST LIFT STATION TRANSFORMERS, PANELBOARDS, AND DISTRIBUTION EQUIPMENT CONDITION ASSESSMENT

DESCRIPTION	RATED VOLTAGE	CONDITION	IMPORTANCE	ACTION
Distribution Panel	120 VAC	Good	Intermediate	Mid Term
Transformer	600 : 120/240 VAC	Good	Intermediate	Mid Term
Lift Station Disconnect	600 VAC	Good	Intermediate	Mid Term
Emergency Lighting	N/A	N/A	Intermediate	Mid Term

8.7.1 Lighting

Lighting at the lift station is outdated and does not comply with the recommended fixtures of LED or F32T8 set forth in the CoW Design Guide.

8.7.2 Emergency Lighting

No emergency lighting was present in the Tylehurst Lift Station. The CoW Design Guide calls for emergency lighting in all facilities. Addition of adequate emergency lighting to each level of the lift station is recommended, as required.

8.8 **Standby Power Generators and Engines**

A portable power generator is available if required. There is currently no connection means for standby power. It is recommended that CoW install a manual transfer switch for Operation Staff to connect their temporary generator to in the event of a power outage.

8.9 **Conclusions**

The major findings for the Tylehurst Lift Station are summarized as follows:

- In general, the electrical equipment at this site is in “Good” condition.
- Emergency lighting should be installed.
- A ground resistance test should be performed.
- The dry well requires a ventilation upgrade in order for the existing electrical equipment to meet the Canadian Electrical Code.

8.10 **Recommendations**

8.10.1 Project 1: Test Ground Grid (0-5 years)

The grounding system appeared corroded. A ground resistance test is recommended to ensure the station has a solid and high-quality grounding system. Prior to any electrical upgrades, it is recommended the CoW solve all heating and ventilation concerns so any new electrical equipment will not have shortened life expectancy.

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

Operation Staff currently connect their temporary generator by terminating directly to the main breaker. This raises safety concerns due to the exposed live electrical parts while temporary power is connected. It is recommended that the CoW install a manual transfer switch to allow Operators to connect temporary power in a safe and efficient manner.

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

Upgrade lighting to meet CoW guidelines, including emergency lighting requirements.

8.10.4 Project 4: Motor Replacement (0-5 years)

Pump motors P-101 and P-103 have endured considerable corrosion and overheating throughout their life span. Although appearing in “Fair” condition, their reliability is uncertain. Therefore, it is recommended that both motors are replaced. Prior to motor replacement, it is recommended that concerns regarding ventilation and overheating be addressed.

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: TYLEHURST LIFT STATION ELECTRICAL IMPROVEMENT COST ESTIMATES			
Item	Action	Description	Capital Cost
1	Short Term	Manual transfer Switch	\$8,000
2	Short Term	Ground Resistance Test	\$2,200
3	Short Term	Lighting Upgrade	\$1,100
4	Short Term	Motors	\$10,600
Total:			\$21,900

The capital costs for the recommended improvements have been **estimated in 2020 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 assigned to the equipment, identifying future upgrades. Recommendations and project time frames are presented to assist in prioritizing future projects. The Condition Assessment Forms are provided in **Appendix C**.

The Tylehurst Lift Station control system consists of a Schneider SCADAPack 357, pressure-based level sensor, and Redlion Sixnet cellular modem.

TABLE 9.1: TYLEHURST LIFT STATION CONTROLS & INSTRUMENTATION OVERVIEW

YEAR CONSTRUCTED	1958 (Electrical Upgrade in 1999)
LOCATION	1550 Wolseley Avenue
LAST AUTOMATION UPDATE	2014
CONTROLLER	Scadapack 357
PROGRAMMING SOFTWARE	Telespace
COMMUNICATION TYPE	Cellular
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 MTS cellular communication. Pump control is achieved using a Precision Digital Level Meter. Currently, the station does not have control redundancy. This has been added to prior lift station upgrades and is a recommended upgrade at the Tylehurst Lift Station. Field devices include a Pressure Based Level Transmitter, Magnetic Flow Transmitter, and three Float Level Switches.

9.2.1 Manual Control

Manual controls are located on the MCC in the control room. Hand-Off-Auto switched are located on the front panel of each motor starter. Manual control is achieved by turning the local switch to the Hand position. 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 Smart RTU. A PLC or RTU controller allows for custom lift station operation that can be programmed by any local integrator, providing the ability to adjust setpoints and operate pumps remotely. The CoW should evaluate if these functions are desired. Options for securing communications should be explored at that time. The condition of the RTU controller is “Good”. No physical degradation of the controller was noted.

9.2.3 Human Machine Interface (HMI)

The Tylehurst Lift Station is not equipped with an HMI.

9.2.4 Control Panel

The RTU control panel is located in the control building and contains the SCADAPack 357, as well as all equipment required for pump controls and reporting back to the SCADA system at the McPhillips Station. The RTU control panel

is in “Good” condition. Wiring is partially run with cable management devices such as 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 used.

9.2.5 SCADA

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

9.2.6 Communication Hardware

Communications to the Tylehurst Lift Station are accomplished using MTS cellular communication. Alarms are reported 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 the Tylehurst Lift Station.

TABLE 9.2: TYLEHURST LIFT STATION CONTROL PANEL CONDITION ASSESSMENT				
CONTROL PANEL	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
Control Panel	Pump Controls and Monitoring	Good	Important	N/A
Termination Panel	Wier Flap and Gate Monitoring	Good	Important	N/A
Communications Equipment	MTS Cellular	Good	Important	N/A

9.3 Instrumentation

Instrumentation at the Tylehurst Lift Station includes one pressure level transmitter, three float level switches, and a flow Transmitter. In general, the instrumentation is in “Fair” condition. However, the flow transmitter display shows a constant 0 regardless of actual flow. Table 9.3 provides a summary of the condition of the instrumentation at the Tylehurst Lift Station.

TABLE 9.3: TYLEHURST LIFT STATION INSTRUMENTATION CONDITION ASSESSMENT				
INSTRUMENTATION	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
LT-101	Level Transmitter	Fair	Important	Mid Term
LSHH-101	Flood Detection Switch	Fair	Low	Long Term
LSHH-102	Flood Detection Switch	Fair	Low	Long Term
LSHH-103	Flood Detection Switch	Fair	Low	Long Term
FIT-101	Flow Transmitter	Poor	Important	Short Term

9.3.1 Process Control

9.3.1.1 *Pumping*

The primary process control device used at the Tylehurst Lift Station is the Precision Digital Level Meter, which appears to be in “Good” condition. There is currently no redundancy in case of instrument failure. Pumps start and stop based on the wet well level determined by the Rosemount level transmitter. The flood level switches are installed to mitigate the risk of environmental and/or property damage resulting from a flood situation.

9.3.2 Gas Monitoring

The Tylehurst Lift Station does not have continuous gas monitoring. Within the lift station, Operation Staff utilize personal gas detection monitors.

9.3.3 Process Monitoring

The wet well level is monitored continuously using the pressure level transmitter. The wet well level is transmitted back to the central SCADA application where it is monitored by Operation Staff. Issues arising from abnormal values are highlighted with alarms and Operation Staff are notified to act. Flow is continuously monitored with a Rosemount Flow Transmitter, allowing Operation Staff to see pump performance. This also provides CoW with additional flow output data 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 can then take action to correct the alarm. No heat detector or low building temperature sensor is installed at this station; it is recommended that both 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.

9.5 Conclusions

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

- The lack of a redundant level detector presents an environmental risk if the primary level detector fails.
- The building contains no heat detectors or low building temperature sensors. 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.
- The flow transmitter display reads a constant 0 regardless of actual flow.

9.6 Recommendations

9.6.1 Project 1: 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 there is an instrument failure.

9.6.2 Project 2: Install Building Alarm Instruments (0-5 years)

A heat detector and low temperature building alarm should be installed to alert Operators of fire or freezing conditions at the lift station. The alarms would be transmitted back to the central SCADA system to notify Operators to take corrective actions.

9.6.3 Project 3: Repair or Replace Flow Transmitter (0-5 years)

The Rosemount flow transmitter displays a constant 0.0 regardless of actual flow. The unit should be replaced to ensure actual flow is visible to Operation Staff.

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 sewage system operations. The cost estimates include contingency and engineering but do not include taxes.

TABLE 9.4: TYLEHURST LIFT STATION CONTROLS & INSTRUMENTATION IMPROVEMENT COST ESTIMATES			
ITEM	ACTION	DESCRIPTION	COST
1	Mid Term	Redundant Level Transmitter	\$16,800
2	Mid Term	Building Alarms	\$1,400
3	Mid Term	Replace Flow Transmitter	\$6,600
Total:			\$24,800


The capital costs for the recommended improvements have been *estimated in 2020 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 Tylehurst Lift Station dry well ventilation system includes an inline supply fan located inside the building. The supply fan pulls fresh air from outside through an intake louver. The ventilation system is used intermittently when the dry well is occupied. There is no permanent wet well ventilation system in place. No major ventilation upgrades have been carried out at the lift station since its original construction. In general, the equipment shows signs of aging and is in “Poor” condition.

TABLE 10.1: TYLEHURST LIFT STATION VENTILATION OVERVIEW		
YEAR CONSTRUCTED	1958	Upgrade: 1988
ODOUR CONTROL	No	
DRY WELL		
VENTILATION TYPE	Intermittent	
VENTILATION RATE	700 m ³ /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 Tylehurst Lift Station.

TABLE 10.2: TYLEHURST 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	218	Intermittent	30	6,548	700	Supply Fan
Wet Well	32	Intermittent	30	948	N/A	N/A

As illustrated in Table 10.2, the dry well and wet well ventilation systems are undersized to meet NFPA 820 and Ten States ventilation requirements of 30 air changes per hour when used intermittently.

10.3 Ventilation Equipment

10.3.1 Fans, Blowers, & Blower Heaters

The supply fan was installed in 1988. MPE tested the airflow from the supply duct using a UEI CFM Anemometer to confirm building airflows. In general, the supply fan is in “Poor” condition. Table 10.3 provides a summary of the condition of the fan at the Tylehurst Lift Station.

TABLE 10.3: TYLEHURST LIFT STATION FAN CONDITION ASSESSMENT				
EQUIPMENT	DESCRIPTION	CONDITION	IMPORTANCE	ACTION
SF-101	Centrifugal Supply Fan	Poor	Important	Short Term

10.3.2 Intake and Exhaust Louvres and Dampers

The lift station includes a supply louvre in the main level of the building which connects to the supply fan and also includes an exhaust line outside the building. The louvre and exhaust line are in “Fair” operating condition.

10.3.3 Ventilation System Balancing

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

10.4 Odour Control System

The lift station is 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 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 Dry Well Ventilation System Upgrades (0-5 years)

In order to provide a ventilation system that meets the required air changes per hour and reduces dry well corrosion and condensation, it is recommended that the existing ventilation system be upgraded to increase capacity. The upgrades would include installation of blower heater that would connect to the existing ducting entering the dry vault to provide heated fresh air to the spaces to code requirements.

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: TYLEHURST LIFT STATION 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 2020 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 A** for the complete details of the capital cost estimate.

11.0 Recommendations

11.1 Recommended Projects

A list of recommended improvements has been prepared. Based on an established methodology, each recommended item, an “Action” was assigned, 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 CoW 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 - TYLEHURST LIFT STATION			
Item	Project Type	Action	Cost
Facility Condition Assessment			
Site Conditions	Maintenance	Mid Term	\$650
Foundations	Maintenance	Mid Term	\$2,500
Primary Structural Systems	Study	Short Term	\$6,000
Secondary Structural Systems	Capital	Short Term	\$53,000
Building Envelope	Capital	Short Term	\$14,000
Roofing	Maintenance	Short Term	\$12,500
Building Mechanical	Capital	Short Term	\$500
Subtotal:			\$89,150
Mechanical Equipment Condition Assessment			
Pump Replacements			
Valve Replacements	Capital	Short Term	\$24,000
Pipe Replacements			
Subtotal:			\$24,000
Electrical Equipment Condition Assessment			
Main Service	Capital	Short Term	\$11,300
Motors	Capital	Short Term	\$10,600
Subtotal:			\$21,900
Controls & Instrumentation Condition Assessment			
Control Panel (Building Alarms)	Capital	Short Term	\$1,400
Instruments	Capital	Short Term	\$23,400
Subtotal:			\$24,800
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:			\$199,850

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

11.2 Code Compliance & Safety Concerns

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

TABLE 11.2: CODE COMPLIANCE & SAFETY CONCERNS - TYLEHURST LIFT STATION	
Item Description	Type
Site Conditions	
Foundations	
Primary Structural Systems	
Secondary Structural Systems	
Wood hatch lids are being used	Code Compliance
Improper cables have been used for lifting	Code Compliance
Guard rails lack kick plates and some lack required hand clearance	Code Compliance
Stair treads are very small	Code Compliance
Monorail and lifting hooks lack certification	Code Compliance
Compromised stair support	Safety
Hatch lid does not fully cover an opening around a pipe penetration	Safety
Building Envelope	
Roofing	
Building Mechanical	
No apparent fire suppression system	
Building Ventilation	
Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements.	
Building Electrical	
Installation is not explosion-proof	Code Compliance
Wiring is not suitable for corrosive environments	Code Compliance

Appendix A – Facility Condition Assessment Forms

**FACILITY CONDITION ASSESSMENT
 SITE CONDITIONS**



SECTION	ITEM	DATA	ASSESSMENT SCORES				AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life	
Tag: STR_Site_Conditions	GENERAL	CODE COMPLIANCE ISSUES: SAFETY ISSUES: Parked vehicles must back out into an intersection	3.3	2.8	1.0	N/A	N/A	N/A	
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5	
	Current Physical Condition	A: Site Access Road & Parking Lot: <i>Issues for Discussion:</i> - Condition of surface -potholes, mud, etc. - Proper bollards in place to protect infrastructure 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: -Sufficient Parking Available -No security fencing surrounding site -Site is sufficiently sloped away from the building Ponding was noted in the concrete around the exterior hatch. -There is evidence of graffiti -Parked vehicles back out into an intersection C, F: -Some wood bollards on site are broken and bent over -No bollards protect the building or exterior hatch. Two bollards on site were broken. -No signage identifying emergency contact information				
		B: Site Grading & Landscaping: <i>Issues for Discussion:</i> - Ponding water on site - Ground sloped away from the building - Condition of vegetation on site - Trees overhanging powerlines or building - Trees blocking sight lines for access / exit Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	3	0.3					
		C: Fencing & Signage: <i>Issues for Discussion:</i> - Signage in place / visible - Fence and gate condition - Warning signage appropriate Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	4	0.3					
		D: Site Access Road & Parking Lot: <i>Issues for Discussion:</i> - Sight lines entering and exiting the site - Sufficient parking space - Emergency vehicle accessibility Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	2	0.4					
		E: Site Grading & Landscaping: <i>Issues for Discussion:</i> - Suitability of landscaping for the community - Grading sufficient to drain site 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	0.2	RECOMMENDATIONS: Repair bollards \$ 500.00 Install contact info sign \$ 150.00 COST ESTIMATE				
		F: Fencing & Signage: <i>Issues for Discussion:</i> - Signage reflect important information, emergency # - Fencing and gate appropriate or needed for security Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.4					
		G: Public and Operator Safety: <i>Issues for Discussion:</i> - Historical safety incidents, or potential conditions - Evacuation of personnel (davit, gear, hatch locations) Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	1	1					
	PHOTOGRAPHS								

FACILITY CONDITION ASSESSMENT FORM
 FOUNDATION



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Foundations	GENERAL	CODE COMPLIANCE ISSUES: SAFETY ISSUES:	3.3	3.0	3.0	1959	70	9
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5
	Current Physical Condition	A: Base Slab: <i>Issues for Discussion:</i> - Cracking, spalling, moisture infiltration - Evidence of settlements - Sump and Pump - Groundwater seepage deterioration - Efflorescence, 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: -The base slab is generally in good condition, though the finish has worn off -The sump pit is in good condition and the floor is sloped adequately -Concrete in the wet well access vault has lost some surface paste but is structurally sound. The top rim is corroded and must be replaced.			
		B: 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)	4	0.3	B - Some evidence of minor infiltration -Exterior curb has cracked out section of the corner -Comminutor chamber concrete shows surface deterioration but is structurally sound. Deterioration is from previous H2S environment. Some cracking was noted.			
		C: Wet Wells: <i>Issues for Discussion:</i> - Cracking, spalling, corrosion - Degradation 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)	3	0.4				
		D: 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: Repair exterior concrete curb			
		E: 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 \$ 2,500.00			
		F: 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				
		G: 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: SAFETY ISSUES:	3.7	3.4	3.0	1959	35	0			
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	A: Loadbearing walls, columns, beams: <i>Issues for Discussion:</i> - Deterioration of concrete - Corrosion of steel (beams, column base, anchors...)	4	0.4	NOTES & COMMENTS: A, D: -Loadbearing walls and beams are generally in good condition. A hole has been drilled through the mid level floor for equipment. This minimally affects the structural capacity. -Two beams have been significantly modified in order to install pipework in the 1999 upgrade. The capacity of the suspended floor is affected, and the floor still bears the weight of the motors. The capacity of the floor should be reviewed if further loading is anticipated. - Half the rebar appears to have been removed in the mid-span of one beam, and the other half of the rebar is exposed but painted. The beam capacity has been reduced from its original design capacity. The capacity will continue to reduce if the remaining rebar is allowed to corrode. - Approximately 50mm of concrete has been removed from the side of another beam. Rebar was exposed and damaged. The beam should be considered to have half its original design capacity. -Rebar is exposed in some areas in the comminutor room and has corroded. This minimally affects structural capacity. B: -Roof panels were not assessed because they were covered with insulation. Assessment of similar structures has suggests the roof system is composed of precast concrete panels. Similar structures have had cracking in the tension face of these panels. C: -Previous pipe penetrations in concrete slabs have been patched. RECOMMENDATIONS: Remove the ceiling insulation to check for cracking in the roof panels \$ 1,000.00 Structural analysis to determine the capacity of the modified beam and floor system. \$ 5,000.00						
		B: Trusses and Joists: <i>Issues for Discussion:</i> - Corrosion	3	0.3							
		C: Suspended Floors: <i>Issues for Discussion:</i>	4	0.3							
		D: Loadbearing walls, columns, beams: <i>Issues for Discussion:</i> - Suitable access to equipment, levels - Compliance with Codes and Standards	4	0.4							
		E: Trusses and Joists: <i>Issues for Discussion:</i> - Clearance	3	0.3							
		F: Suspended Floors: <i>Issues for Discussion:</i> - Sufficient Space for layout	3	0.3							
		G: Public and Operator Safety: <i>Issues for Discussion:</i> - Potential safety hazards - Evacuation of personnel (davit, gear, hatch locations)	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	<p>Secondary Structural Components: - Stairs, ladders, handrails, guardrails, catwalks, mezzanines, hatches, davits, support brackets, equipment bases.</p> <p>CODE COMPLIANCE ISSUES: No third party certification was noted for the monorail or lifting hooks. It appears that cables have been used for lifting. Guard rails lack kick plates</p> <p>SAFETY ISSUES: Tripping/injury hazard where a pipe penetrates the suspended slab through a square opening</p>	3.9	3.1	3.0	1959	35	0
	Current Physical Condition	<p>A: Stairs, Ladders, Catwalks, Rails, Hatches: Issues for Discussion: - Corrosion of material, anchors - Hatch seals, operability, locks</p>	Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	4	0.5	<p>NOTES & COMMENTS:</p> <p>A -A stair support has pulled away from the concrete, reducing the capacity of the ladder. -Some floor openings are covered with wood. A square floor opening has a pipe coming through but no hatch around it. This is a safety hazard. -The ladder in the wet well access has corroded and is not fit for use.</p> <p>B -Metal equipment bases have corroded.</p> <p>C, G -The base floor finish is completely worn off. Wall paint is peeling off.</p> <p>D -Some lifting lugs are corroded and should be certified by a third party -The monorail supports were not assessed as they were covered by insulation. No third party certification was evident.</p> <p>E -Several stair handrails lack the required clearance. -The stair landings are very small. Guard rails lack kick plates.</p>		
		<p>B: Interior walls, Ceiling, Supports, Equipment Base: Issues for Discussion:</p>	Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	3	0.2			
		<p>C: Finishes: Issues for Discussion: - Floor, wall, ceiling paint. Finishes on doors, etc.</p>	Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	5	0.1			
		<p>D: Monorails and Hoists: Issues for Discussion: - Corrosion, anchor bolts, labels - Corrosive atmosphere</p>	Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	4	0.2			
		<p>E: Stairs, Ladders, Catwalks, Rails, Hatches: Issues for Discussion: - Corrosion resistance of material - Suitable access to equipment, levels - Compliance with Codes and Standards</p>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.5			
		<p>F: Interior walls, Ceiling, Supports, Equipment Base: Issues for Discussion:</p>	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			
		<p>G: Finishes: Issues for Discussion: - Floor and wall protection.</p>	Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	4	0.1			
		<p>H: Monorails and Hoists: Issues for Discussion: - Transport of equipment to accessible area - Certificated by others</p>	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	<p>I: Public and Operator Safety: Issues for Discussion: - Potential safety hazards - Evacuation of personnel (davits, gear, hatch locations)</p>	Rating 1: No Public Safety issues Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1	<p>RECOMMENDATIONS:</p> certify monorail / lifting hooks Refinish floors Refinish walls Replace equipment bases Repair stair support that has pulled away from concrete Install kick plates on guard rails	<p>COST ESTIMATE</p> \$ 3,000.00 \$ 25,000.00 \$ 12,000.00 \$ 10,000.00 \$ 500.00 \$ 2,500.00	
PHOTOGRAPHS								

FACILITY CONDITION ASSESSMENT FORM
 BUILDING ENVELOPE



SECTION	ITEM	DATA		ASSESSMENT SCORES			AGE		
				Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Building_Envelope	GENERAL	CODE COMPLIANCE ISSUES:		4.0	2.6	1.0	1958	N/A	N/A
	GENERAL	SAFETY ISSUES:		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5
	Current Physical Condition	A: 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)	4	0.4	NOTES & COMMENTS: A: -The door is at the end of its useful life. The door, frame, and weather stripping are worn and damaged. -Corrosion around door and paint peeling off the exterior are evidence that water is entering the void space between the brick face and the structure behind. The water is likely entering through the damaged roof flashing. B: -Interior walls are lined with rigid insulation and protective board in most areas. No vapour barrier was noted. There is potential for condensation behind the insulation. There is evidence that condensation is forming behind the insulation in lower levels and dripping out. No interior liner. C: -Aging flashing and sealants -Roof flashing is old and deteriorating. Some is bent up and does not seal against water. -Several penetrations are no longer properly sealed. Sealants should be replaced.			
	Current Physical Condition	B: 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				
	Current Physical Condition	C: 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)	4	0.2				
	Fitness for Purpose	D: 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)	2	0.4	RECOMMENDATIONS: Install a vapour barrier and liner \$ 10,000.00 Replace door and frame \$ 3,500.00 Seal penetrations \$ 500.00		COST ESTIMATE	
	Fitness for Purpose	E: 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)	3	0.4				
	Fitness for Purpose	F: 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	G: 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	1	1				
	PHOTOGRAPHS								

FACILITY CONDITION ASSESSMENT FORM
 ROOFING



SECTION	ITEM	DATA	ASSESSMENT SCORES			AGE		
			Current Physical Condition	Fitness For Purpose	Safety	Year Installed	Expected Service Life	Remaining Service Life
Tag: STR_Roofing	GENERAL	CODE COMPLIANCE ISSUES: SAFETY ISSUES:	3.9	3.0	1.0	1958	20	0
			Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5
	Current Physical Condition	A: Roof Membrane, Insulation, Decking: <i>Issues for Discussion:</i> Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	4	0.5	NOTES & COMMENTS: A: -Tar and gravel roofing system. Drawings and analyses of similar lift stations suggest the roof system is composed of haydite precast panels. Similar lift stations have shown cracking in the tension face of these panels. Insulation should be removed to check for similar cracking. -Gravel ballast has been displaced in areas. The asphalt membrane is exposed and is deteriorating due to UV exposure and physical damage. -The asphalt membrane is also exposed and deteriorating at roof drain penetrations. -A nearby tree has grown into contact with the roof. C: Flashings are no longer sealed to roof membrane and are allowing water infiltration behind the brick veneer. Paint is delaminating, and mortar is falling due to the freeze thaw cycles.			
		B: 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				
		C: 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)	5	0.2				
		D: Roof Membrane, Insulation, Decking: <i>Issues for Discussion:</i> Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	3	0.5				
		E: 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				
		F: 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				
		G: 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	1	1	RECOMMENDATIONS: Restore rock ballast to fully cover membrane. \$ 2,500.00 Remove and replace perimeter flashing and seal to roof membrane. \$ 10,000.00 COST ESTIMATE			
	Safety							
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: - No apparent fire suppression system	3.6	3.6	3.0	1988	25	0			
		SAFETY ISSUES:	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	Heating and Ventilation 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. RECOMMENDATIONS: Install handheld fire extinguisher by building entrance COST ESTIMATE \$ 500.00					
		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 Suppression 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 Ventilation 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						
		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 Suppression 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: - Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements. SAFETY ISSUES:	3.0	3.0	3.0	1988	25	0
	Current Physical Condition	Wet Well Ventilation <i>Issues for Discussion:</i> Rating 1 (Excellent Condition) Rating 2 (Good Condition) Rating 3 (Functional Condition) Rating 4 (Poor Condition) Rating 5 (Not Functional)	0	0	NOTES & COMMENTS: No wet well ventilation system Dry well ventilation system is undersized to meet NFPA 820 ventilation requirements of 30 air changes per house when used intermittently.	RECOMMENDATIONS: Replace Dry Well Ventilation System COST ESTIMATE \$ 40,000.00		
	Current Physical Condition	Dry Well Ventilation <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	1				
	Fitness for Purpose	Wet Well Ventilation <i>Issues for Discussion:</i> Rating 1 (Excellent - performs for intended purpose) Rating 2 (Good - well suited for intended purpose) Rating 3 (Functional - performs adequately) Rating 4 (Poor - not suitable for intended purpose) Rating 5 (Fail - does not meet any requirements)	0	0				
	Fitness for Purpose	Dry Well Ventilation <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	1				
	Safety	Operator Safety <i>Issues for Discussion:</i> - Monitors, Alarms Rating 1: No safety hazard conditions Rating 3: No record of incidents, possible concerns Rating 5: Historic incidents or probable safety risks	3	1				
PHOTOGRAPHS								

Appendix B – Pump Condition Assessment Forms

Project No.: 8400-001-02
 Tag: P_101
 Facility: Tylehurst Lift Station
 Assessment Page 1 of 1

PUMP CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 06-Oct-20
 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	2.3	1.5	2.3	1999	25	4
	Type:	30 HP Vertical End Suction						
	Description:	Dry Pit Solids Handling						
	Manufacturer:	Flowsolve						
	Model:	8MFV13-FR5T						
	RPM:	1175						
	Rated Voltage:	575						
	Rated Current:	29						
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		
						3		
Current Physical Condition	Equipment Visual Inspection: <i>Issues for Discussion:</i>	Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.2	VIBRATION (in/s) Motor 0.03 0.04 0.08 Volute 0.05 0.04 0.03			
	Equipment 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)	2	0.2	NOTES & COMMENTS: New impeller and volute installed recently History of bearing issues on pump			
	Condition of Pump Accessories: <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				
	Rebuild Potential of Pump: <i>Issues for Discussion:</i>	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)	2	0.2				
	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				
	Design Flow Rate: <i>Issues for Discussion:</i>	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)	2	0.2				
	Pump Redundancy: <i>Issues for Discussion:</i>	Rating 1 (100% Redundancy) Rating 3 (50% Redundancy) Rating 5 (No Redundancy. Risk of Critical Failure)	1	0.2				
	Appropriate Pump Type for Application: <i>Issues for Discussion:</i>	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): <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 2 (No - Not required for installed pumping equipment) Rating 3 (Yes - Flow / pressure inadequate for installed pumping equipment) Rating 4 (No - Available source on site but not connected) Rating 5 (No - No available source)	1	0.1				
	Pump Capacity: <i>Issues for Discussion:</i>	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)	2	0.3				
Fitness for Purpose	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	0.25				
	Piping/Equipment Interference with Pump Removal: <i>Issues for Discussion:</i>	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)	3	0.2				
	Provision of Direct Lift Spot for Pump Removal: <i>Issues for Discussion:</i>	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: <i>Issues for Discussion:</i>	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)	2	0.2				
	Availability of Spare Parts: <i>Issues for Discussion:</i>	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)	2	0.25				
					RECOMMENDATIONS			
					COST ESTIMATE			
	Maintainability and Operability							
PHOTOGRAPHS								



Project No.: 8400-001-02
 Tag: P_102
 Facility: Tylehurst Lift Station
 Assessment Page 1 of 1

PUMP CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 06-Oct-20
 Asset ID:

SECTION	ITEM	DATA	CONDITION RATING			AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation	YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_102 Description: Dry Pit Solids Handling	GENERAL	Location: Dry Well Lower Level	3.0	1.5	2.6	1999	25	4
		Type: 30 HP Vertical End Suction						
		Description: Dry Pit Solids Handling						
		Manufacturer: Ingersoll-Dresser Pump Co.						
		Model: 8MFV14-FR5T						
		RPM: 1175						
		Rated Voltage: 575						
	Rated Current: 29	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			3	
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	VIBRATION (in/s) Motor 0.05 0.04 0.07 Volute 0.08 0.03 0.07		
		Equipment Corrosion Noted: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on pump volute History of bearing issues 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)	3	0.1			
		Rebuild Potential of Pump: Issues for Discussion:	Rating 1 (N/A - Pump is New) Rating 2 (Pump Re-Build Feasible) Rating 3 (Pump Rebuild / Replace Equally Feasible) Rating 4 (Approaching End of Useful Life) Rating 5 (At or Surpassed Useful Life)	3	0.2			
		Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3			
	Fitness for Purpose	Design Flow Rate: Issues for Discussion:	Rating 1 (Pump consistently provides design flow rate) Rating 2 (Pump consistently provides +/- 10% of design flow rate) Rating 3 (Pump consistently provides +/- 25% of design flow rate) Rating 4 (Pump performance a potential issue during high flow events) Rating 5 (Pump performance a critical issue)	2	0.2			
		Pump Redundancy: Issues for Discussion:	Rating 1 (100% Redundancy) Rating 3 (50% Redundancy) Rating 5 (No Redundancy. Risk of Critical Failure)	1	0.2			
Appropriate Pump Type for Application: Issues for Discussion:		Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper pump selection for application. Risk of Critical Failure)	1	0.2	RECOMMENDATIONS			
Available Water Supply for Pumps (If Required): Issues for Discussion:		Rating 1 (Yes) Rating 2 (No - Not required for installed pumping equipment) Rating 3 (Yes - Flow / pressure inadequate for installed pumping equipment) Rating 4 (No - Available source on site but not connected) Rating 5 (No - No available source)	1	0.1	COST ESTIMATE			
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)	2	0.3				
Maintainability and Operability		Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.25			
	Piping/Equipment Interference with Pump Removal: Issues for Discussion:	Rating 1 (No interference) Rating 2 (Yes - Some minor piping/equipment interference with pump removal) Rating 3 (Yes - Piping/equipment interference causes minor alteration of work method) Rating 4 (Yes - Piping/equipment interference causes major alteration of work method) Rating 5 (Yes - Piping/equipment interference prevents safe removal of pumps)	3	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)	2	0.2				
	Availability of Spare Parts: Issues for Discussion:	Rating 1 (Yes - Spare parts readily available with < 6 week lead time) Rating 2 (Yes - Spare parts readily available with 6-8 week lead time) Rating 3 (Yes - Spare parts readily available with > 8 week lead time) Rating 4 (Yes - Select spare parts available with varying lead times) Rating 5 (No - Spare parts no longer available for this equipment)	3	0.25				
PHOTOGRAPHS								

Project No.: 8400-001-02
 Tag: P_103
 Facility: Tylehurst Lift Station
 Assessment Page 1 of 1

PUMP CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 06-Oct-20
 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	3.0	1.5	2.6	1999	25	4	
	Type:	30 HP Vertical End Suction							
	Description:	Dry Pit Solids Handling							
	Manufacturer:	Ingersoll-Dresser Pump Co.							
	Model:	8MFV14FRST							
	RPM:	1175							
	Rated Voltage:	575							
	Rated Current:	29							
				Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			
						VIBRATION (in/s)			
						X	Y	Z	
						Motor	0.03	0.02	0.01
						Volute	0.02	0.02	0.04
						NOTES & COMMENTS:			
						New impeller and volute installed recently			
					History of bearing issues on pump				
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					
	Equipment Corrosion Noted: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.2					
	Condition of Pump Accessories: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.1					
	Rebuild Potential of Pump: Issues for Discussion:	Rating 1 (N/A - Pump is New) Rating 2 (Pump Re-Build Feasible) Rating 3 (Pump Rebuild / Replace Equally Feasible) Rating 4 (Approaching End of Useful Life) Rating 5 (At or Surpassed Useful Life)	3	0.2					
	Occurrence of Maintenance Issues: Issues for Discussion:	Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3					
	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)	2	0.2					
	Pump Redundancy: Issues for Discussion:	Rating 1 (100% Redundancy) Rating 3 (50% Redundancy) Rating 5 (No Redundancy. Risk of Critical Failure)	1	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)	1	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)	2	0.3					
	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.25					
	Piping/Equipment Interference with Pump Removal: Issues for Discussion:	Rating 1 (No interference) Rating 2 (Yes - Some minor piping/equipment interference with pump removal) Rating 3 (Yes - Piping/equipment interference causes minor alteration of work method) Rating 4 (Yes - Piping/equipment interference causes major alteration of work method) Rating 5 (Yes - Piping/equipment interference prevents safe removal of pumps)	3	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)	2	0.2					
	Availability of Spare Parts: Issues for Discussion:	Rating 1 (Yes - Spare parts readily available with < 6 week lead time) Rating 2 (Yes - Spare parts readily available with 6-8 week lead time) Rating 3 (Yes - Spare parts readily available with > 8 week lead time) Rating 4 (Yes - Select spare parts available with varying lead times) Rating 5 (No - Spare parts no longer available for this equipment)	3	0.25					
PHOTOGRAPHS									

RECOMMENDATIONS COST ESTIMATE

Appendix C – Electrical & Communication Condition Assessment Forms

CONTROL PANEL CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	Assessment Scores				Component Age							
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE					
Equipment Tag: IC_Panel_101 Description: Telemetry Panel	GENERAL	Location: Control Building	3.1	1.5			2014	25	19					
		Description: Telemetry Panel												
		Function: Monitoring												
		PLC Processor: SCADAPack 357												
		UPS Protection: Yes												
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5							
	Current Physical Condition	Equipment Visual Inspection: <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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. Wires have labels but are messy with too much slack.									
	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)	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											
	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)	2	0.3											
	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											
	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											
				RECOMMENDATIONS:						COST ESTIMATE				
				Building Alarms						\$ 1,400.00				
PHOTOGRAPHS														

CONTROL PANEL CONDITION ASSESSMENT FORM



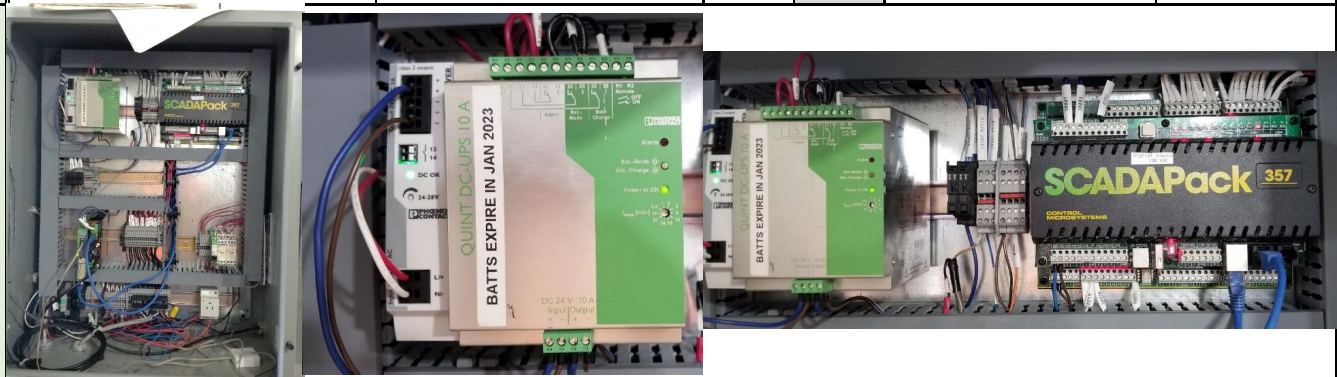
SECTION	ITEM	DATA	Assessment Scores				Component Age			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_Termination_Panel Description: Termination Panel	GENERAL	Location: Dry Well, Main Level	3.1	1.5			2014	25	19	
		Description: Termination Panel								
		Function: Level Monitor Displays								
		PLC Processor: N/A								
		UPS Protection: 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: Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
		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)	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					
		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)	2	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										

UPS CONDITION ASSESSMENT FORM





SECTION	ITEM	DATA	Assessment Scores				Component Age							
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE					
Equipment Tag: IC_UPS_101 Description: UPS 101	GENERAL	Location: Control Building	3.0	2.2			2014	15	9					
		Description: UPS 101												
		Make: Phoenix Contact												
		Model: Quint DC-UPS 10A												
		Rated VA: 240												
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5							
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. UPS redundancy not required.									
		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)	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:									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)	3	0.4											

PHOTOGRAPHS



**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_FIT_101 Description: Flow Meter	GENERAL	Location: Dry Well	3.4	3.0			1999	20	0	
		Description: Flow Meter								
		Make: Foxboro								
		Model: 9312A-SIBA-TSO-GL								
		Device Span:								
		Input/Output: Input								
		Signal Type: 4-20 mA								
	Rated Voltage: 24VDC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5				
	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)	4	0.1	NOTES & COMMENTS: Ventilation does not provide sufficient air changes to qualify for an unrated zone. Redundancy not required. Significant corrosion					
		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)		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							
RECOMMENDATIONS:		COST ESTIMATE								
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							
	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)	5	0.5							
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**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_FIT_102 Description: Flow Meter	GENERAL	Location: Control Building	4.2	3.0			1999	20	0	
		Description: Flow Meter								
		Make: Rosemount								
		Model: 8712ESR1A1N0M4								
		Device Span:								
		Input/Output: Input								
		Signal Type: 4-20 mA								
	Rated Voltage: 90-250 VAC	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. Flow meter display not working, only reads 0.0. Redundancy not required.					
		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)		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)		5	0.4							
RECOMMENDATIONS:		COST ESTIMATE								
Flow Meter		\$ 6,600.00								
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							
	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)	5	0.5							
PHOTOGRAPHS										

**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: IC_Level_Transmitter_101 Description: Level Sensor	GENERAL	Location: Dry Well	3.3	3.0			1999	20	0	
		Description: Level Sensor								
		Make: Rosemount								
		Model: 3051L2AA0FD21AAM5C6								
		Device Span: 250 in H2O								
		Input/Output: Input								
		Signal Type: 4-20 mA								
	Rated Voltage: 10.5 - 30 VDC	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: Corrosion on pipe carrying electrical wires. Ventilation does not provide sufficient air changes to qualify for an unrated zone. Redundancy not necessary.					
		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)		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							
RECOMMENDATIONS: Ultrasonic Level Transmitter		COST ESTIMATE \$ 16,800.00								
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							
Fitness for Purpose	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)	5	0.5							

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**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: IC_Float_101_Flood Description: Dry Well Flood Float	GENERAL	Location: Dry Well	1.5	3.0			1999	20	0
		Description: Dry Well Flood Float							
		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)			5		
	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: Redundancy not required.				
		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)	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					
		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					
	Fitness for Purpose	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	RECOMMENDATIONS: COST ESTIMATE				
		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)		5	0.5						
PHOTOGRAPHS									

**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: IC_Float_102_High Description: Wet Well High Float	GENERAL	Location: Dry Well	1.9	3.8			1999	20	0
		Description: Wet Well High Float							
		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)	3	0.1	NOTES & COMMENTS: Wiring and mounting are inappropriate. Float switch is placed higher than equipment and a live receptacle. Redundant switch is present.				
		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)	4	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					
		Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.3					
		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					
	Fitness for Purpose	Instrument Range is Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.1	RECOMMENDATIONS: COST ESTIMATE				
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)		5	0.5						
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**INSTRUMENTATION CONDITION
 ASSESSMENT FORM**



SECTION	ITEM	DATA	Assessment Scores				AGE				
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE		
Equipment Tag: IC_Float_103_Low Description: Wet Well Low Float	GENERAL	Location: Dry Well	1.9	3.8			1999	20	0		
		Description: Wet Well Low Float									
		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)	3	0.1	NOTES & COMMENTS: Wiring is unsecured and instrument is inappropriately mounted. Redundant switch is present.						
		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)	4	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:		COST ESTIMATE							
		Instrument/Measurement is Designed Appropriately: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.3							
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								
Fitness for Purpose	Instrument Range is Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	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)	5	0.5								
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Appendix D – Pipe Work & Valves Condition Assessment Forms

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_101A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 mm								
		Valve Make: Mueller								
		Valve Model: A2360								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve Corrosion Noted: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.2					
Valve Operation: Issues for Discussion:		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	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:		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						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_101B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 mm								
		Valve Make: Mueller								
		Valve Model: A2360								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
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VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_102A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
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VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_102B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
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VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_103A Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 mm								
		Valve Make: Mueller								
		Valve Model: A2360								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_103B Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 mm								
		Valve Make: Mueller								
		Valve Model: A2360								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Surface corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_110 Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.5	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 mm								
		Valve Make: Mueller								
		Valve Model: A2360								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Minor corrosion noted on valve				
		Valve 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)	2	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: GAV_111 Description: Gate Valve	GENERAL	Location: Dry Well Lower Level	2.5	1.0	1.6		1999	25	4	
		Description: Gate Valve								
		Size: 300 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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Minor corrosion noted on valve				
		Valve 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)	2	0.2					
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	2	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i>		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE			
	Valve Capacity: <i>Issues for Discussion:</i>	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: GAV_201 Description: Gate Valve	GENERAL	Location: Dry Well	1.0	1.0	1.0	2015	25	20	
		Description: Gate Valve							
		Size: 500 mm							
		Valve Make: Clow							
		Valve Model: Series 50							
		Actuation: Manual - Hand Wheel c/w Valve Extension							
		Actuator Make: Rotork							
	Actuator Model: 4A2028P	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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	1	0.2	NOTES & COMMENTS: Valve in excellent condition			
		Valve 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)	1	0.2				
Valve Operation: <i>Issues for Discussion:</i>		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	1	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)	1	0.3					
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i>	Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS:		COST ESTIMATE		
	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)	1	0.6					
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i>	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4					
PHOTOGRAPHS									

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: CHV_101 Description: Check Valve	GENERAL	Location: Dry Well Lower Level	3.0	1.0	1.6		1999	25	4
		Description: Check Valve							
		Size: 300							
		Valve Make: Hillen De Lelie							
		Valve Model: Series 53							
		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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Valve nearing the end of its service life Corrosion noted on valve				
		Valve 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	0.2					
Valve Operation: <i>Issues for Discussion:</i> Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)		3	0.3						
Occurrence of Maintenance Issues: <i>Issues for Discussion:</i> Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)		3	0.3						
Fitness For Purpose	Appropriate Valve Configuration: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 8,000.00			
	Valve Capacity: <i>Issues for Discussion:</i> Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: <i>Issues for Discussion:</i> Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS									

VALVE CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: CHV_102 Description: Check Valve	GENERAL	Location: Dry Well Lower Level	3.0	1.0	1.6		1999	25	4	
		Description: Check Valve								
		Size: 300								
		Valve Make: Hillen De Lelie								
		Valve Model: Series 53								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	3	0.2	NOTES & COMMENTS: Valve nearing the end of its service life Corrosion noted on valve				
		Valve Corrosion Noted: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.2					
Valve Operation: Issues for Discussion:		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	3	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 \$ 8,000.00			
	Valve Capacity: Issues for Discussion:	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

Project No.: 8400-001-02
 Tag: CHV_103
 Facility: Tylehurst Lift Station
 Assessment Page 1 of 1

VALVE CONDITION ASSESSMENT FORM



Assessor: Ryan Ursu
 Date: 06-Oct-20

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_103 Description: Check Valve	GENERAL	Location: Dry Well Lower Level	4.0	1.0	1.6		1999	25	4	
		Description: Check Valve								
		Size: 300								
		Valve Make: Hillen De Lelie								
		Valve Model: Series 53								
		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 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	5	0.2	NOTES & COMMENTS: Valve was not fully seating during time of inspection Operational staff noted that this valve was replaced after the time of assessment on January 20, 2021.				
		Valve Corrosion Noted: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	3	0.2					
Valve Operation: Issues for Discussion:		Rating 1 (Yes - Valve functions) Rating 3 (Yes - Functions but with difficulty) Rating 5 (No - Valve inoperable)	4	0.3						
Occurrence of Maintenance Issues: Issues for Discussion:		Rating 1 (None) Rating 2 (Intermittent) Rating 3 (Consistent but Occasional) Rating 4 (Frequent) Rating 5 (Constant)	4	0.3						
Fitness For Purpose	Appropriate Valve Configuration: Issues for Discussion:	Rating 1 (Yes) Rating 2 (No - Station still functional) Rating 5 (No - Improper valve configuration for application. Risk of Critical Failure)	1	0.3	RECOMMENDATIONS: Replace Valve		COST ESTIMATE \$ 8,000.00			
	Valve Capacity: Issues for Discussion:	Rating 1 (Valve size sufficient for current and projected demand conditions) Rating 2 (Valve size sufficient for current demand conditions with minor surplus) Rating 3 (Valve size sufficient) Rating 4 (Valve size does not meet current demand condition) Rating 5 (Valve is critically undersized and likelihood of station backup is high)	1	0.7						
Maintainability and Operability	Sufficient Access to Perform O&M Activities Safely: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of work method) Rating 4 (No - Access restrictions cause significant alteration of work method) Rating 5 (No - Access restrictions prevent safe completion of O&M activities)	2	0.6						
	Sufficient Access to Exercise Valve: Issues for Discussion:	Rating 1 (Yes - No access restrictions) Rating 2 (Yes - Some minor access restrictions) Rating 3 (Yes - Access restrictions that cause minor alteration of valve operation) Rating 4 (No - Access restrictions cause significant alteration of valve operation) Rating 5 (No - Access restrictions prevent safe operation of valve)	1	0.4						
PHOTOGRAPHS										

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_Influent Description: Influent Line	GENERAL	Location: Dry Well	1.0	1.0	1.0		2015	50	45
		Description: Influent Line							
		Size: 500 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	1	0.3	NOTES & COMMENTS: Piping in excellent condition RECOMMENDATIONS: COST ESTIMATE				
		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)	1	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)	1	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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)	1	0.6						
	Isolation Valves Installed: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 5 (No)	1	0.4						
PHOTOGRAPHS									

PIPING CONDITION ASSESSMENT FORM





Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P_101_Suction Description: P-101 Suction Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	50	29
		Description: P-101 Suction Line							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P_102_Suction Description: P-102 Suction Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	50	29
		Description: P-102 Suction Line							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE											
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE									
Equipment Tag: P_P_103_Suction Description: P-103 Suction Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	50	29									
		Description: P-103 Suction Line																
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS:													
		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)	3	0.3														
Fitness for Purpose	Force Main 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:														
	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							COST ESTIMATE								
	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																		

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P_101_Discharge Description: P-101 Discharge Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6	1999	50	29	
		Description: P-101 Discharge Line							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE																
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE														
Equipment Tag: P_P_102_Discharge Description: P-102 Discharge Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6		1999	50	29														
		Description: P-102 Discharge Line																					
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS:																		
		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)	3	0.3																			
	Fitness for Purpose	Force Main 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:													
		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											COST ESTIMATE								
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																				
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																				
Maintainability and Operability	Isolation Valves Installed: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 5 (No)	1	0.4																				
PHOTOGRAPHS																							

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_P_103_Discharge Description: P-103 Discharge Line	GENERAL	Location: Dry Well Lower Level	2.7	1.0	1.6	1999	50	29	
		Description: P-103 Discharge Line							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_Discharge_HDR Description: Discharge Header	GENERAL	Location: Dry Well	2.7	1.0	1.6	1999	50	29	
		Description: Discharge Header							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

PIPING CONDITION ASSESSMENT FORM



Asset ID:

SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	Maintenance & Operation		YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: P_Bypass Description: Bypass Line	GENERAL	Location: Dry Well	2.7	1.0	1.6	1999	50	29	
		Description: Bypass Line							
		Size: 300 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: <i>Issues for Discussion:</i> Rating 1 (Like New) Rating 3 (Minor Leaks) Rating 5 (Risk of Critical Failure)	2	0.3	NOTES & COMMENTS: Corrosion noted on piping RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.3					
Fitness for Purpose	Force Main 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						
	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						
Maintainability and Operability	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						
	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									

Appendix E – Power Condition Assessment Forms

ELECTRICAL SERVICE 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_Service_101 Description: Service Entrance Equipment	GENERAL	Location: Control Building	3.3	2.8			1997	40	17							
		Description: Service Entrance Equipment														
		Phase: 3														
		Rated Voltage: 600 VAC														
		Rated Current: 250 A														
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5									
	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: Wires blackened where exposed. Ground wire is corroded. Signs of moisture inside MCC. Ventilation does not provide sufficient air changes to qualify for an unrated zone.											
		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 Guide: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.2												
		Standby Generator Needed & Present: <i>Issues for Discussion:</i> Rating 1 (Yes / Not needed) Rating 3 (Needed / Portable Generator) Rating 5 (Needed / Not Available)	3	0.2							RECOMMENDATIONS:		COST ESTIMATE			
		Is Main Breaker Present & Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (Present, not appropriate) Rating 5 (Not Present)	1	0.05							Include lighting upgrade when installing emergency lighting		\$ 1,100.00			
		Is Grounding System Present & Appropriate: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (Present, not appropriate) Rating 5 (Not Present)	3	0.1												
		Is Utility Service appropriate: (600V/3PH) <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 5 (No)	1	0.1												
Has the Service Capacity Been Reached? <i>Issues for Discussion:</i> 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: <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																

PANELBOARD CONDITION ASSESSMENT FORM



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_Dist_Panel_101 Description: Distribution Panelboard	GENERAL	Location: Control Building	3.3	3.3		1997	40	17	
		Description: Distribution Panelboard							
		Manufacturer: Klockner - Moeller							
		Model: Series 200							
		Phase: 3							
		Rated Voltage: 600 VAC							
		Rated Current: 600 A							
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5			
	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: Wires blackened where exposed. Loose/Disorganized. Ventilation does not provide sufficient air changes to qualify for an unrated zone. RECOMMENDATIONS: COST ESTIMATE			
		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)	3	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)	3	0.25					
	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					
	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	0.5					

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TRANSFORMER CONDITION ASSESSMENT FORM



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_Transformer_101 Description: Transformer	GENERAL	Location: Control Building	3.4	2.6			1997	40	18	
		Description: Transformer								
		Manufacturer: Klockner - Moeller								
		Model: Series 200								
		Phase: 3								
		Rated Voltage: 600 VAC								
		Rated kVA: 600 A								
		Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	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: Wires blackened where exposed. Loose/Disorganized. Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
		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)	3	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)	3	0.2	RECOMMENDATIONS:		COST ESTIMATE			
	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						
	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	0.4						
PHOTOGRAPHS										
	<p> KLOCKNER-MOELLER TYPE : CODE DE COMMANDE NZM6b / ZM6a LINE TENSION 600 V PH 1 HZ 60 MAX AMP 20 CONTRÔLE 20 240 V HP. AMP. 20 CONTRÔLE 20 ORDER No. 19-4381 UNIT No. 6 N° de COMMANDE UNITÉ N° WIRING DIAGRAM N° de DIAGRAMME 4 </p>									

FVNR 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_Starter_101 Description: Pump 1 FVNR	GENERAL	Location: Control Building	3.1	3.0			1997	40	17
		Description: Pump 1 FVNR							
		Manufacturer: Allen Bradley							
		Model: AF65-30-00-13							
		Phase: 3							
		Rated Voltage: 600 VAC							
	Rated Horsepower: 60	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.25						
	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)	4	0.5						
PHOTOGRAPHS									

FVNR 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_Starter_102 Description: Pump 2 FVNR	GENERAL	Location: Control Building	3.1	3.0			1997	40	17
		Description: Pump 2 FVNR							
		Manufacturer: Allen Bradley							
		Model: AF65-30-00-13							
		Phase: 3							
		Rated Voltage: 600 VAC							
	Rated Horsepower: 60	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.25						
	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)	4	0.5						
PHOTOGRAPHS									

FVNR 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_Starter_103 Description: Pump 3 FVNR	GENERAL	Location: Control Building	3.1	3.0			1997	40	17
		Description: Pump 3 FVNR							
		Manufacturer: Allen Bradley							
		Model: AF65-30-00-13							
		Phase: 3							
		Rated Voltage: 600 VAC							
	Rated Horsepower: 60	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. RECOMMENDATIONS: COST ESTIMATE				
		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)	3	0.25						
	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)	4	0.5						
PHOTOGRAPHS									

FVNR 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_Starter_104 Description: Vent Fan	GENERAL	Location: Control Building	3.2	3.0			1997	40	17
		Description: Vent Fan							
		Manufacturer: Klockner Moeller							
		Model: DIL 0-22-NA							
		Phase: 1							
		Rated Voltage: 600 VAC							
	Rated Horsepower: 10	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Wires blackened where exposed. Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
		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)	3	0.25	RECOMMENDATIONS: COST ESTIMATE					
	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)	4	0.5						
PHOTOGRAPHS									

MOTOR CONDITION ASSESSMENT FORM

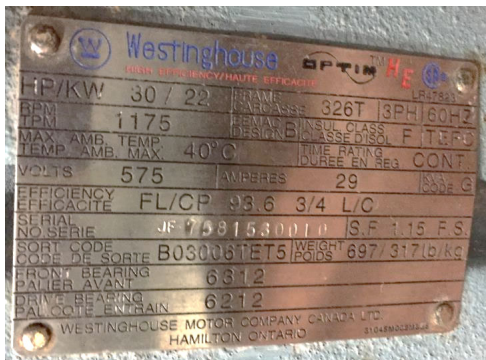


SECTION	ITEM	DATA	CONDITION RATING				AGE			
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE	
Equipment Tag: E_Motor_101 Description: P101 Motor	GENERAL	Location: Control Building	3.2	2.3			1997	40	17	
		Description: P101 Motor								
		Manufacturer: Westinghouse								
		Model: High Efficiency								
		Horsepower: 30 HP								
		Rated Voltage: 575 VAC								
		Phase: 3								
		Rated Current: 29 A								
	RPM: 1175	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5			
	Current Physical Condition	Equipment Visual Inspection: Issues for Discussion:	Rating 1 (Like New) Rating 2 (Minor Surface Corrosion) Rating 3 (Surface & Internal Corrosion) Rating 4 (Severe Corrosion) Rating 5 (Safety Concern)	2	0.1	NOTES & COMMENTS: Ventilation does not provide sufficient air changes to qualify for an unrated zone. Current draw is over Full Load Amperage. Expected service life reduced due to increased wear and heating.				
		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					
		Meets City Electrical Design Standards: Issues for Discussion:	Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.25					
	Fitness for Purpose	Has the Capacity been Reached? Issues for Discussion:	Rating 1 (Below service factor) Rating 2 (Occasional within service factor) Rating 3 (Frequent within service factor) Rating 4 (Always Within Service Factor) Rating 5 (> Service Factor)	1	0.5	COST ESTIMATE Motor Replacement \$ 10,600.00				
Equipment Remaining Service Life: Issues for Discussion:		Rating 1 (> 90% lifecycle remain) Rating 2 (> 75% lifecycle remain) Rating 3 (> 50% lifecycle remain) Rating 4 (> 25% lifecycle remain) Rating 5 (obsolete)	4	0.25						
PHOTOGRAPHS										

MOTOR CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_Motor_102 Description: P102 Motor	GENERAL	Location: Control Building	3.2	2.3			1997	40	17
		Description: P102 Motor							
		Manufacturer: Westinghouse							
		Model: High Efficiency							
		Horsepower: 30 HP							
		Rated Voltage: 575 VAC							
		Phase: 3							
		Rated Current: 29 A							
	RPM: 1175	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5			
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
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						
Meets City Electrical Design Standards: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)		3	0.25						
Fitness for Purpose	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)	1	0.5	RECOMMENDATIONS: COST ESTIMATE					
	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						



MOTOR CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_Motor_103 Description: P103 Motor	GENERAL	Location: Control Building	3.2	2.3			1997	40	17
		Description: P103 Motor							
		Manufacturer: Westinghouse							
		Model: High Efficiency							
		Horsepower: 30 HP							
		Rated Voltage: 575 VAC							
		Phase: 3							
		Rated Current: 29 A							
	RPM: 1175	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
		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					
		Meets City Electrical Design Standards: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.25					
	Fitness for Purpose	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)	1	0.5	RECOMMENDATIONS: COST ESTIMATE				
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									

MOTOR CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose			YEAR INSTALLED	EXPECTED SERVICE LIFE	REMAINING SERVICE LIFE
Equipment Tag: E_Sump_Pump_101 Description: Sump Pump	GENERAL	Location: Dry Well	3.2	2.5			1997	15	0
		Description: Sump Pump							
		Manufacturer:							
		Model:							
		Horsepower:							
		Rated Voltage: 120 V							
		Phase: 1							
		Rated Current:							
	RPM:	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		5			
	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: Ventilation does not provide sufficient air changes to qualify for an unrated zone. RECOMMENDATIONS: COST ESTIMATE				
		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					
		Meets City Electrical Design Standards: <i>Issues for Discussion:</i> Rating 1 (Yes) Rating 3 (No - current standards) Rating 5 (No - legacy standards)	3	0.25					
	Fitness for Purpose	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)	1	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)		5	0.25						
PHOTOGRAPHS									

**AUTOMATIC TRANSFER SWITCH 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_Ground_Fault_Indicator Description: Ground Fault Indicator	GENERAL	Location: Control Building	3.2	2.5			1997	40	17
		Description: Ground Fault Indicator							
		Manufacturer: Limitron							
		Model: KTK - 1/2							
		Phase: 3							
		Rated Voltage: 600							
		Rated Current: 0.5A							
	Rated KW 200kA	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)			5		
	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: Fuses showing signs of age, labels barely legible. Wires blackened where exposed. Ventilation does not provide sufficient air changes to qualify for an unrated zone.				
		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: COST ESTIMATE					
	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	0.25						
	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)	4	0.5						
PHOTOGRAPHS									

Appendix F – Force Main Condition Assessment Forms

FORCE MAIN PIPING CONDITION ASSESSMENT FORM



SECTION	ITEM	DATA	CONDITION RATING				AGE		
			Current Physical Condition	Fitness For Purpose	3rd Party & Environmental Damage	Year Installed	Expected Service Life	Remaining Service Life	
Equipment Tag: FM_Pipe Description: Sanitary Force Main	GENERAL	Location: Along Tylehurst Street to Portage Avenue	3.4	1.0	1.0	1958	75	13	
		Description: Sanitary Force Main							
		Size: 300 mm							
		Material: Asbestos Cement / Steel							
		Service: Sewage							
	Coating: N/A	Rating	Weight	Recommended Frequency of Review: (In years, specify between 1-15)		10			
	Current Physical Condition	Force Main Breaks or Leaks in the Past: <i>Issues for Discussion:</i>	Rating 1 (Like New) Rating 2 (Minor Repairs) Rating 3 (Major Repairs) Rating 4 (Risk of Critical Failure)	3	0.6	NOTES & COMMENTS: No known issues			
		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)	4	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)	1	0.3					
Force Main Under a River Crossing: <i>Issues for Discussion:</i>		Rating 1 (No) Rating 3 (Yes - location of pipe not an issue) Rating 5 (Yes - location of pipe is an issue)	1	0.5					
PHOTOGRAPHS									

Appendix G – Design Standards and 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 watertight, 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