UTILITIES KINGSTON

CITY OF KINGSTON WATER MASTER PLAN

CONDITION ASSESSMENT REPORT - WATER

JANUARY, 2017

WSP

CITY OF KINGSTON WATER MASTER PLAN

CONDITION ASSESSMENT REPORT - WATER

Utilities Kingston

Final Report

Project nº : 151-02944-00
Date : January, 2017

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1	**SEPTEMBER 2015**	Draft Version
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SIGNATURES

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1 INTRODUCTION

1.1 MASTER PLAN

The City of Kingston retained WSP to undertake a Water Master Plan. The purpose of the Master Plan project is to establish servicing strategies for water infrastructure for the core urban areas and surrounding communities in the City for the next 20 years, per the City's Official Plan.

A key component of the Master Plan is to incorporate the City's Official Plan, as well as the Utilities Kingston Vision, Values and Mission statement into long-term infrastructure planning.

An integral part of Water master plan was to conduct a condition assessment to give an overview of the state of all Utility Kingston owned and run facilities. This report will outline the process undertaken and then present the results of the Condition Assessment for the Wastewater System.

1.2 SYSTEM OVERVIEW

The City of Kingston water distribution system comprises an area of approximately 8258 ha. It is split between three (3) regions:

1. Kingston West (3953 ha, 44,400 POP)
2. Kingston Central (2919 ha, 54,600 POP)
3. Kingston East (1386 ha, 10,200 POP)

Kingston West is separated from Kingston Central by the Little Cataraqui River Creek, while Kingston Central is separated by Kingston East by the Great Cataraqui River. Water is supplied to the Point Pleasant WTP from Lake Ontario and pumped to service Kingston West. Water is supplied to the King Street WTP and pumped to service Kingston Central and to the James Street Booster Station which services Kingston East. Figure 1-1 is a map displaying the main components of the 2015 City of Kingston Water Distribution System while Figure 1-2 is a hydraulic schematic of the distribution system.

The City of Kingston water distribution system has 6 different pressure zones. Kingston West encompasses pressure zones 1A and 2. Kingston Central encompasses Zone 1B and Kingston East encompasses Zones 3A, 3B and 3C. Figure 1-3 is a map that outlines the above.

KINGSTON WEST

KINGSTON CENTRAL

KINGSTON EAST

CREEKFORD RD WT

O'CONNOR DR RES AND BS

O'CONNOR RD WT

OLD COLONY RD BS

COLLINS BAY RD BS

SYDENHAM RD BS

PROGRESS AVE RES AND BS

POINT PLEASANT WTP

CANA WTP

INNOVATION DR WT

GORE RD WT

SOMME AVE - DND WT

FOREST DR STANDPIPE

THIRD AVE RES AND BS

TOWER ST WT

JAMES ST BS

KING ST WTP

CATARAQUI RIVER

CATARAQUI BAY

LAKE ONTARIO

WSP

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Legend

- WTP — WATER TREATMENT PLANT
- BS — WATER BOOSTER STATION
- BS — WATER BOOSTER STATION (NOT ACTIVE)
- WATER RESERVOIR
- WATER TOWER
- WATER TOWER (NOT ACTIVE)
- WATER PIPE
- WATERBODY

Data Source: Ontario Base Mapping, Minisitry of Natural Resources, August 2013. Water and Waste Water Systems, Utilities Kingston, April 2015, City of Kingston.

Scale:
0 350 700 1,400 Meters
1:55,000

N W E S

Project:
Water and Wastewater Master Plan Updates

City of Kingston, Ontario

Title:
WATER DISTRIBUTION SYSTEM OVERVIEW MAP

Project No.:	Date:		
151-02944-00	DECEMBER 2016		
Drawn By: CM	Checked By: MF	Code: CA	Figure No.: 1-1

File Location:M:\2015\151-02944-00 UK Water and Wastewater Masterplan\3.0 Technical\3.7 Reports\3.7.2_Condition Assessment\6 Maps\151-02944-00_CA_Fig1-1_WFacilities - Whole.mxd

KINGSTON WEST

KINGSTON CENTRAL

KINGSTON EAST

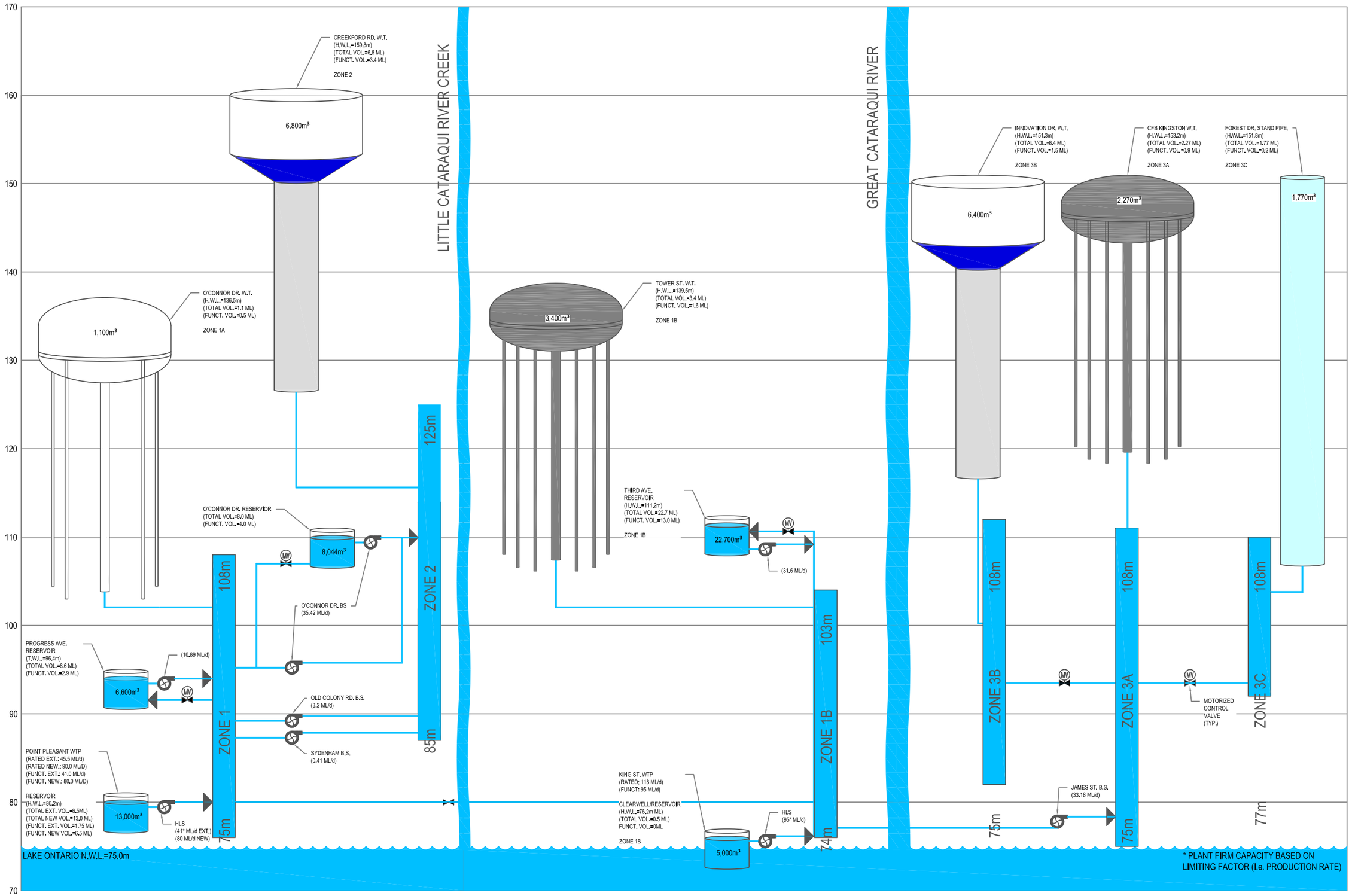
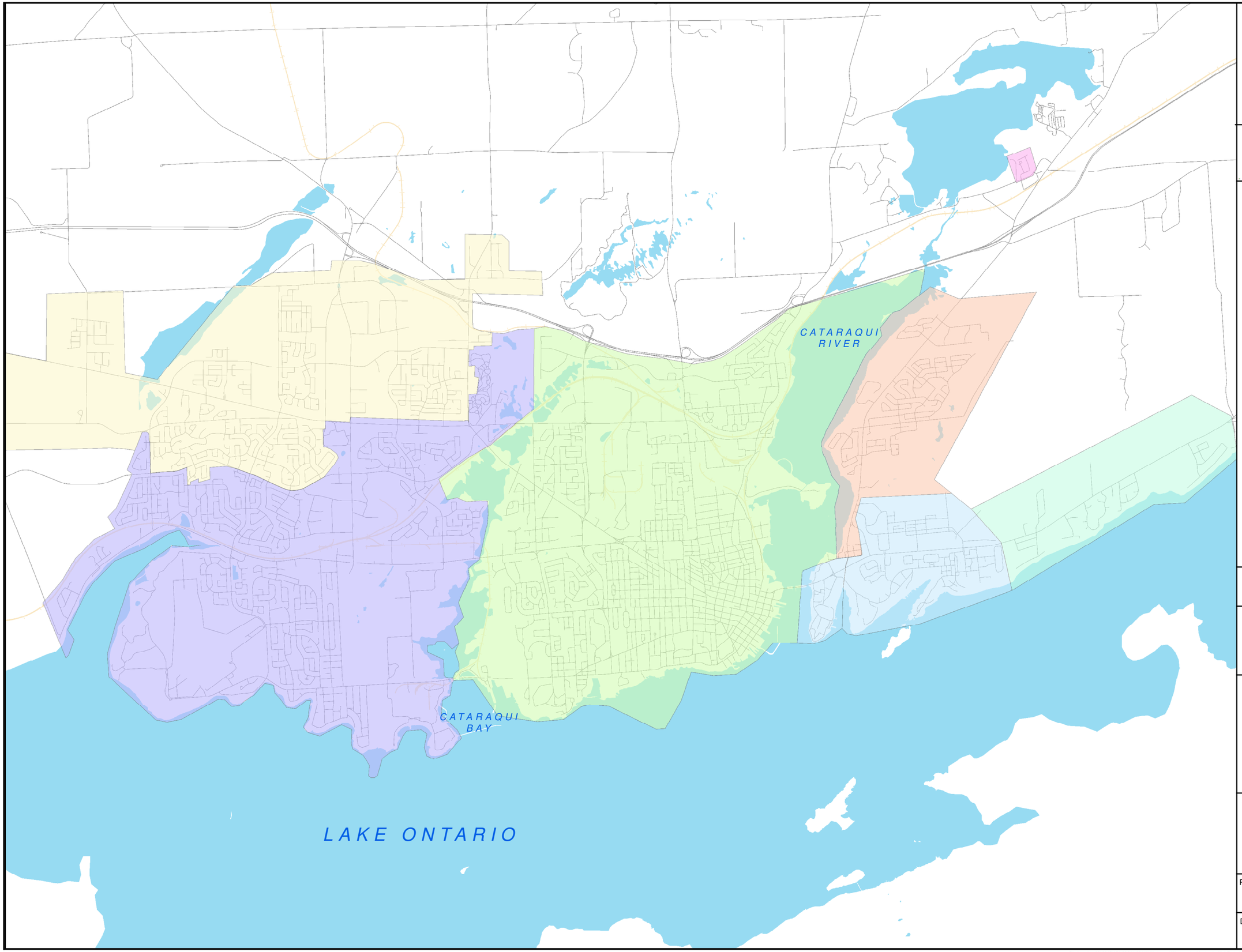


Figure 1-2 Water Distribution Schematic



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Legend

WATER ZONE

- 1A
- 1B
- 2
- 3A
- 3B
- 3C
- CANA

Data Source: Ontario Base Mapping, Minisitry of Natural Resources, August 2013. Water and Waste Water Systems, Utilties Kingston, April 2015, City of Kingston.

Scale:
0 350700 1,400 Meters
1:58,000

N
W E
S

Project:

Water and Wastewater Master Plan Updates

City of Kingston, Ontario

Title:

WATER DISTRIBUTION SYSTEM OVERVIEW MAP

Project No.:		Date:	
151-02944-00		DECEMBER 2016	
Drawn By:	Checked By:	Code:	Figure No.:
CM	MF	CA	1-3

File Location:M:\2015\151-02944-00 UK Water and Wastewater Masterplan\3.0 Technical\3.7 Reports\3.7.2_Condition Assessment\6 Maps\151-02944-00_CA_Fig1-3_Water_Zone.mxd

1.3 OBJECTIVE

The objective of the Condition Assessment was to gain an understanding of what facilities form part of the City's Water system and evaluate each facility's importance to the system; the condition of the facility and the establishment of a reliability rating for each facility.

The rating of each facility provides an important understanding of the condition and criticality of the different facilities and determines repair, rehabilitation and replacement needs of the facilities to develop a proper strategy for the phasing of expenditures. An understanding of the risk of failure to facility operation will enable prioritization and mitigation actions and optimize capital allocation based on this risk. This aspect will be integrated into the master planning process to ensure that condition and critically are an aspect of the capital improvement plan.

2 SCOPE OF WORK

The scope of work for this report was to assess the condition of all Water facilities owned by UK (Figure 1-2 and Figure 1-3) comprising of:

1. Three Water Treatment Plants (WTP):
   - Point Pleasant WTP (Kingston West)
   - King Street WTP (Kingston Central)
   - Cana WTP (Cana Subdivision)
2. Four Booster Stations (BS):
   - Collins Bay Road BS (Kingston West)
   - Sydenham Road BS (Kingston West)
   - Old Colony Road BS (Kingston West)
   - James Street BS (Kingston East)
3. Three combined reservoir/booster stations (Res/BS):
   - Progress Avenue Res/BS (Kingston West)
   - O'Connor Drive Res/BS (Kingston West)
   - Third Avenue Res/BS (Kingston Central)
4. Four Elevated Storage Tanks (ESTs):
   - O'Connor EST (Kingston West)
   - Creekford EST (Kingston West)
   - Tower Street EST (Kingston Central)
   - Innovation Drive EST (Kingston East)
5. One Standpipe:
   - Forrest Drive Standpipe (Kingston East)

2.1 WATER TREATMENT PLANTS (WTP)

Although the intention was to assess all WTPs, during the period of review there were upgrades being conducted so assessment was limited to the following:

POINT PLEASANT WTP

Due to current upgrades (full plant replacement) the facility was not reviewed but an explanation of the upgrade and rating was established, taking these upgrades into account.

KING STREET WTP

A review of the whole plant was conducted.

CANA WTP

A review of the whole plant was conducted.

2.2 BOOSTER STATIONS AND RESERVOIRS

The Condition Assessments were compromised of a review of background information which familiarised the Condition Assessment team with the water system and its facilities, and also allowed the gathering of information to complete a Hydraulic Summary Sheet (Section 3) for each facility.

Following the review of background information, a high-level visual field inspection was conducted by a multi-discipline WSP team in conjunction with UK operators. Each facility was split up and assessed under the following asset categories:

- Civil/Site Conditions
- Structural
- Process Piping and Equipment
- Instrumentation
- Process and Building Electrical
- Building Mechanical

During the Condition Assessment of the water booster stations and reservoirs, a functionality test was also conducted (see Section 3).

A visit was made to the Collins Bay Road BS but the station is no longer in operation, therefore it was not fully assessed.

2.3 ELEVATED STORAGE TANKS AND STANDPIPES

Elevated storage tanks and standpipes were assessed visually from ground level and condition was recorded during the Condition Assessment (Appendix B), but results were not included in the Risk Assessment Sheet. Instead, the results will be summarized in the same format as the WTPs. See section 7.4 for results.

3 HYDRAULIC SUMMARY AND PERFOMANCE CHECK SHEETS

3.1 HYDRAULIC SUMMARY SHEET

Utilities Kingston provided the majority of as-built drawings and SCADA data for the booster stations and reservoirs. This information was used to generate a Hydraulic Summary for each facility. This Hydraulic Summary compiles all of the relevant information from an operational standpoint and is a resource that will be used to ensure accuracy in the Wastewater Model that is being developed for the Master Plan.

Although this sheet was primarily completed from as-built drawings, all data was checked or completed during field work if feasible. Figure 3-1 shows a completed Hydraulic Summary Sheet for Old Colony Road BS and Section 7.3 contains the completed Hydraulic Summary Sheets.

3.2 PUMP PERFORMANCE CHECK SHEET (APPENDIX A)

During Field Assessments, pump performance checks were carried out at the facilities with pumps (BSs and Res/BSs). The data collected during these performance tests will allow a more accurate Water Model to be produced in the Water Modelling Section of the Master Plan.

Figure 3-2 shows a completed Performance Check Sheet for Old Colony Road BS and Appendix A contains the completed Performance Check Sheets.

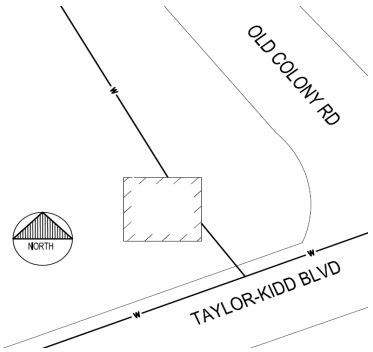
Figure 3-1 Completed Hydraulic Summary Sheet: Old Colony Road BS

Pump Station Facility Summary

Facility Name:	Old Colony Road BS		**Notes:**
Facility Address:	Crnr Old Colony Rd & Taylor-Kidd Blvd		
Community/Service Area:	Point Pleasant WTP		
Coordinates (Lat./Long.):	374688.647E, 4900806N		
Reference Drawing(s): Include Revision(s) & Date(s)	17016-S1, May 2000		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	5.50	0.20
Main Pipeline Length & Dia.:	**m**	N/A	0.40
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	N/A
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	Yes	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	Yes	

Photo: Exterior

Plan View:

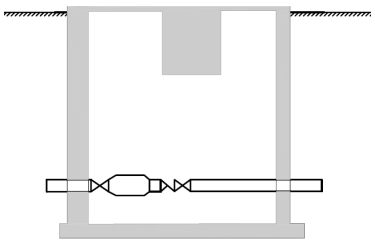


Storage Well & Pump Suction Details			
Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	17016-S1	
Base Elevation & Level:	**m**		0.00
Low Alarm Elevation:	**m**	N/A	N/A
Minimum Elevation:	**m**		
Initial/Normal Elev. & Level:	**m**	N/A	N/A
Maximum Elevation:	**n/a**		
High Alarm Elevation:	**m**	N/A	N/A
Ground Elevation:	**m**		
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Rectangular	
Average Cross-Section Area:	**sq.m**	7.43	
Length & Width (or Diam.):	**m**	3.05	2.44

Notes:
Assumed pipe details from field survey

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Old Colony Road BS	**Notes:**
Facility Address:	Crnr Old Colony Rd & Taylor-Kidd	
Community/Service Area:	Point Pleasant WTP	
Coordinates (Lat./Long.):	374688.647E, 4900806N	
Reference Drawing(s): Include Revision(s) & Date(s)	17016-S1, May 2000	
Page No.	Page 2 of 2	

Pump Details

Number of Pumps		2		**Notes:**		
SCADA Flow?		No				
SCADA Level?		Yes				
Pump Type		**Lead**	**Lag 1**			
Make:		Aurora				
Model ID or Rating:		410-HSC-1800				
Impeller ID or Size:						
Variable-Speed?:		N/A				
Year Installed		2000				
Pump Curve ID in Model:		Exponential 3-Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**	N/A				
Shutoff Head	**m**	27.40	27.40			
Design Head	**m**	21.60	21.60			
Design Flow	**L/s**	52.00	82.00			
High Head	**m**	9.10	9.10			
High Flow	**L/s**	151.00	151.00			
Pump (Impeller) Elevation:	**m**	N/A	N/A			

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (2000):	**m**	4.24	0.20		1/1/1/1	LAT, MF, GV, CV
Discharge Line (2000):	**m**	1.46	0.20		1	GV
Pump Station (2000):	**m**	N/A	N/A	N/A	N/A	N/A
Yard Piping (2000):	**m**	3.09	0.20		1	GV
Main Pipeline (2000):	**m**	N/A	0.40			
Exit Elevation:	**m**	88.07				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

Notes:
Only 1 Pump can run at a time. Pump 1 motor screen not working.

Figure 3-2 Completed Performance Check Sheet: Old Colony Road BS

DATE - 3rd June 2015

Old Colony Road Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1		72	101.4							Pressure Units =Kpa Flow Units = Time measured (nearest 5 min) =10:00
2										Time measured (nearest 5 min) =
3				72	102.3					Time measured (nearest 5 min) =10:25
4										Time measured (nearest 5 min) =
5										Time measured (nearest 5 min) =
Notes: Both pumps were boosting pressure not flow. Could not run two pumps at the same time										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere.

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything.

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible.

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

4 FIELD ASSESSMENT

4.1 BOOSTER SATATIONS, RESERVOIRS, ELEVATED TOWERS AND STANDPIPES (APPENDIX B)

Each facility underwent a high-level Field Assessment which encompassed a site visit by a multidiscipline WSP team. All the findings are recorded on the Field Assessment Sheet and can be found in Table 4-1 as well as Appendix B.

Each facility was split into the following Asset Categories for all major components of the asset being assessed:

- Civil/Site Conditions
- Structural
- Process piping and Equipment
- Instrumentation
- Process and Building Electrical
- Building Mechanical

The Field Assessment was conducted as a high-level visual inspection of these components, and any observations made during station operation (by UK operators) and any input provided by UK staff was recorded.

Each major component was scored on its Risk Level, Effective Life and Condition Rating; see an excerpt of a field assessment sheet in Table 4-1 below.

This scoring was recorded on the Field Assessment Sheet and formed part of the Risk Assessment calculation to give each facility its Reliability Rating (see Section 5 for the method and Section 6/Appendix D for the results).

Table 4-1 Excerpt from Field Assessment Sheet: Old Colony Road BS - Process Mechanical

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02 **Project No: 151-02944-00**

Inspection Site:	Old Colony Road PS	**Inspection By:**	RW +JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life Remaining	Cond. Rating (1-5)
Process Pumps	Pumps visibly in good condition – no issues during Pressure test	2		20	2
Main Process Piping	Some rust present	2		15	2
Pipe Supports	No supports visible – Not applicable				
Main Process Valves – Manual On/Off	Good condition	2		20	2
Main Process Valves - Actuated	Not applicable				
Main Process Valves - Check	Good condition	2		20	2

4.1.1 COMPONENT RISK LEVEL

The likelihood of asset failure was determined by the WSP engineer, taking into account any comments made by UK staff and the overall condition of the component. The Risk Level is scored between 1 (Unlikely) and 5 (Very likely).

4.1.2 MAINTENANCE PROGRAM

This column is to show which components are deemed by UK to be part of a maintenance program. Any item part of the maintenance program was scored accordingly, taking this work into account.

4.1.3 EFFECTIVE LIFE REMAINING

The effective life (in years) is the life remaining of the component as deemed by the WSP engineer taking into account any comments made by UK staff and the overall condition of the component.

4.1.4 CONDITION RATING

The condition rating of the component as deemed by the WSP engineer taking into account any comments made by UK staff. The Condition Rating will be scored between 1 (Excellent) and 5 (Poor).

The Asset Category Risk Level, Effective Life remaining and Condition Rating of each component asset will be used to calculate the Overall Asset Rating as described in Sections 4.1.5 - 4.1.7.

Table 4-2 Asset Total - Overall Score of Each Asset

PROCESS MECHANICAL	
Overall Risk Level	3.2
Overall Effective Life Remaining	9.8
Overall Condition Rating	3.0

4.1.5 OVERALL RISK LEVEL

The average of the Risk Level for each asset is recorded in the Risk Assessment Sheet (Appendix D and Section 4) where it is used to calculate the Asset Risk Factor (Table 4-2).

4.1.6 OVERALL EFFECTIVE LIFE REMAINING

The Average Effective Life (in years) remaining of each asset is recorded in the Risk Assessment Sheet where it is used to calculate the Asset Risk Factor (Table 4-2).

4.1.7 OVERALL CONDITION RATING

The Average Condition Rating of each asset category is recorded in the Risk Assessment Sheet where it is used in calculating the Total Condition of the facility (Table 4-2).

4.1 WATER TREATMENT PLANTS (APPENDIX C)

The format for the Water Treatment Plant Field Assessment Sheet was different to that of the other facilities, with the treatment plants being split by process (Table 4-3). Each process was reviewed by a multidiscipline team to give an overall condition assessment of each process with this being recorded on the Field Assessment Sheet. (Appendix C).

Table 4-3 Excerpt from Field Assessment Sheet - Cana WTP

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02 **Project No: 151-02944-00**

Inspection Site:	Cana WTP	**Inspection By:**	BP + RW + JS +MV
Inspection Location:	Cana Boulevard	**Date:**	16th June 2015

System	Condition Assessment
Well and Well Pump	Not reviewed – Operator reported no issues
Flow Meter	Insulation around the outlet and bypass removed (Should be replaced), repair must have been required or damage caused to insulation in the past. Appears new bypass valve fitted.
Chlorination	Good condition – Operator reported no issues
Static Mixer	Good condition – Operator reported no issues

5 RELIABILITY RATING

The rating will provide an important understanding of the condition and criticality of the different facilities and determine repair, rehabilitation and replacement needs of the facilities to develop a proper strategy for the phasing of expenditures.

An understanding of the risk of failure to facility operation will enable prioritization and mitigation actions and optimize capital allocation based on this risk.

A formula based approach, using background information and data gathered during field work, was used to calculate the Reliability Rating for each facility:

Reliability Rating = Total Facility Risk (A) x Total Equipment Risk (B) x Total Condition Rating (C)

5.1 RISK ASSESSMENT SHEET (APPENDIX D)

The Risk Assessment tabulates the facility information and the findings from the Field Assessment. This table was used to calculate each facility's: Facility Risk, Equipment Risk, Condition Rating and ultimately the Reliability Rating. The Risk Assessment Sheet can be found in Appendix D.

5.2 FACILITY RISK (A)

The Facility Risk involved a review of each facility's information including the type of customer the facility services, the quantity of customers, and the outcome, if any, a failure could cause to customers health and safety and to the environment of the surrounding area.

The evaluation was split into the four categories and was scored as follows (Sections 0 - 5.2.4). The findings were used to calculate the Facility Risk and recorded in the Risk Assessment Sheet (Appendix D).

Table 5-1 below shows the Facility Risk section of the Risk Assessment Sheet.

Table 5-1 Facility Risk Section of the Risk Assessment Sheet

Facility Information				Facility Risk								
Current Name	**Year of Installation/upgrade**	**As Builts available**	**Pump Info Available**	**Customer type**	**Score (0.25)**	**No. of Customers**	**Score (0.25)**	**Risk to the Public**	**Score (0.4)**	**Environmental Impact**	**Score (0.1)**	**Total Facility Risk - A**
Collins Bay Road BS	1987	Yes	Yes	Residential	1	<100	2	Moderate	3	Remote	2	**2.2**
James St BS	1991	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Old Colony Rd BS	2000	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Purdys BS (Sydenham Rd)	1996	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
O'Connor Drive Res/BS	2009	No	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Progress Avenue Res/BS		Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Third Avenue Res/BS	1964	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Creekford Rd EST	2004	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Innovation Drive EST	2012	Yes	No	Mixed Use	4	Up to 10,000	4	Moderate	3	Remote	2	**3.4**
O'Connor Drive EST	1962	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Tower Street EST	1968	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Forest Drive Standpipe	1981	Yes	No	Residential	1	Up to 1,000	3	Moderate	3	Remote	2	**2.4**

5.2.1 CUSTOMER TYPE

The customer type serviced by the facility was determined, with the following scoring and weighting:

Table 5-2 Customer Type Scoring

CUSTOMER TYPE	SCORE
Residential	1
Commercial	2
Industrial	3
Mixed Use	4
High Risk	5

Weighting = 0.25

The designation “high risk” customers will be used to describe facilities that service:

- Military bases
- Hospitals
- Residential Institutions - nursing homes, old age homes, etc.
- Large water users

5.2.2 NUMBER OF CUSTOMERS

The number of customers affected by any disruption was determined, with the following scoring and weighting:

Table 5-3 Customer Number Scoring

CUSTOMER NUMBER	SCORE
N/A	0
<100	1
Up to 1,000	3
Up to 10,000	4
> 10,000	5

Weighting = 0.25

5.2.3 RISK TO PUBLIC

The risk to public health, property and safety by any failure was established, with the following scoring and weighting in Table 5-4:

Table 5-4 Risk to the Public Scoring

RISK TO THE PUBLIC	SCORE
Nil	0
Remote	1
Moderate	3
Extreme	5

Weighting = 0.4

5.2.4 ENVIRONMENTAL IMPACT

The environmental impact of failure was determined, with the following scoring and weighting:

Table 5-5 Environmental Impact Scoring

ENVIRONMENTAL IMPACT	SCORE
Nil	0
Remote	2
Moderate	3
Extreme	4
High Risk	5

Weighting = 0.1

5.2.5 CALCULATING TOTAL FACILITY RISK (A)

Using the weighted score of the four factors described above, the Facility Risk Factor was calculated with the following calculation:

Facility Risk (A) = Customer Type + No. of Customers. + Risk to Public + Environmental Impact

This gave a Total Facility Risk of between 0.25 and 5.

5.3 EQUIPMENT RISK (B)

The Equipment Risk is the risk of failure of the equipment at each facility, taking in to account the Criticality, the Probability of Failure, the Overall Risk, and the Effective Life Remaining of each asset, as recorded during Field Assessments (Section 4).

The findings were used to calculate the Equipment Risk and recorded in the Risk Assessment Sheet (Appendix D). Table 5-6 below shows an excerpt of the Equipment Risk section of the Risk Assessment Sheet. See section 6.2 for the entire Equipment Risk section.

Table 5-6 Excerpt of the Equipment Risk Section of the Risk Assessment Sheet

Facility Information	Equipment Risk												
	Process Mechanical (Pumps, Piping, Valves, etc.)						Instrumentation and Controls/SCADA (Gauges, Flow meters, etc.)						
Current Name	Criticality	Probability	Overall Risk (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment)		Process Mech. Risk Factor - B3 (0.2)	Criticality	Probability	Overall Risk (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment)		Instrumentation Risk Factor - B4 (0.15)	Total Equipment Risk - B
				Years	Score					Years	Score		
James St BS	4	2	2.1	16-20	2	**2.5**	4	2	1.3	11-15	3	**2.6**	**2.4**
Old Colony Rd BS	4	2	1.8	16-20	2	**2.5**	4	2	1.0	20+	1	**2.0**	**2.2**
Purdys BS (Sydenham Rd)	4	2	1.8	11-15	3	**2.7**	4	2	1.3	11-15	3	**2.6**	**2.4**
O'Connor Drive Res/BS	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	**1.8**
Progress Avenue Res/BS	4	3	1.9	16-20	2	**2.7**	4	3	1.3	11-15	3	**2.8**	**2.7**
Third Avenue Res/BS	4	3	2.1	11-15	3	**3.0**	4	3	1.0	16-20	2	**2.5**	**3.0**
Creekford Rd EST	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	**1.8**
Innovation Drive EST	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	**1.8**
O'Connor Drive EST	3	3	1.8	16-20	2	**2.5**	3	3	1	16-20	2	**2.3**	**2.4**
Tower Street EST	3	3	2.8	5-10	4	**3.2**	3	3	1.2	11-15	3	**2.6**	**2.7**
Forest Drive Standpipe	2	3	1.2	16-20	2	**2.1**	2	3	1	11-15	3	**2.3**	**2.2**

5.3.1 CRITICALITY

Criticality is the consequence of failure and was deemed by the WSP engineer taking into account the criticality of the asset. Criticality was scored between 1 (Minor) and 5 (Critical).

5.3.2 PROBABILITY

The probability (likelihood) of failure and was deemed by the WSP engineer taking into account the asset being assessed and was be scored between 1 (Unlikely) and 5 (Very likely).

5.3.3 OVERALL RISK FOR EACH ASSET

The overall risk for each asset was established during the Field Assessment with a score between 1 (Unlikely) and 5 (Very likely).

5.3.4 EFFECTIVE LIFE REMAINING

The effective life remaining was established during the Field Assessment and scored using the following ranges as shown in Table 5-7:

Table 5-7 Effective Life Remaining Scoring

EFFECTIVE LIFE REMAINING (YEARS)	SCORE
20+	1
15-20	2
10-15	3
5-10	4
1-5	5

5.3.5 CALCULATING ASSET RISK FACTOR (B1–B7)

The criticality, probability, overall risk and effective life were all given a weighting of 0.25 and once this weighting was applied the formula used to calculate Asset Risk Factor (B):

B1, B2, B3, etc. = Criticality + Probability + Overall Risk + Effective Life Remaining

This gave an Asset Risk Factor of between 1 and 5.

5.3.6 CALCULATING TOTAL EQUIPMENT RISK

To calculate the Total Equipment Risk the importance of each asset to the daily operation of the facility was taken into account. Therefore the following weighting was used:

Table 5-8 Asset Weighting

ASSET	WEIGHTING
B1 - Civil/Site	0.1
B2 - Structural	0.2
B3 - Process Mechanical	0.2
B4 - Instrumentation	0.15
B5 - Process Electrical	0.15
B6 - Building Mechanical	0.1
B7 - Building Electrical	0.1

Once the weighting was applied, the Total Equipment Risk was calculated by adding the score obtained for each asset:

Total Equipment Risk (B) = B1 + B2 + B3 + B4 + B5 + B6 + B7

5.4 CONDITION RATING (C)

The Condition Rating was established and recorded for each asset during the Field Assessments. These findings were used to calculate the Total Condition Rating and recorded in the Risk Assessment Sheet (Appendix D). Table 5-9 below shows the Condition Rating section of the Risk Assessment Sheet.

Table 5-9 Excerpt of Condition Rating Section of the Risk Assessment Sheet

Facility Information	Condition Rating (From Field Assessment)							
Current Name	Civil/Structural - C1 (0.1)	Structural - C2 (0.2)	Process Mechanical - C3 (0.2)	Instrumentation/SCADA - C4 (0.15)	Process Electrical - C5 (0.15)	Building Mechanical - C6 (0.1)	Building Electrical - C7 (0.1)	Total Condition Rating - C
James St BS	1.0	1.1	2.5	1.3	1.6	2.8	1.0	**1.7**
Old Colony Rd BS	2.0	1.0	1.8	1.8	1.0	2.0	1.0	**1.4**
Purdys BS (Sydenham Rd)	2.0	2.0	2.3	1.3	1.0	2.0	1.0	**1.7**
O'Connor Drive Res/BS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Progress Avenue Res/BS	1.0	1.3	2.0	1.3	1.2	2.0	1.3	**1.5**
Third Avenue Res/BS	1.0	2.1	2.7	1.0	3.2	2.4	2.0	**2.3**
Creekford Rd EST	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Innovation Drive EST	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
O'Connor Drive EST	1.0	1.9	2.0	1.0	1.0	1.0	1.0	**1.5**
Tower Street EST	2.3	2.4	3.6	1.2	1.0	2.0	1.0	**2.1**
Forest Drive Standpipe	1.5	1.6	1.3	1.0	1.0	1.0	1.0	**1.3**

5.4.1 CALCULATING TOTAL CONDITION RATING

Once the Condition Rating results were entered into the Risk Assessment sheet the following weighting were used as shown in Table 5-10:

Table 5-10 Asset Weighting

ASSET	WEIGHTING
C1 - Civil/Site	0.1
C2 - Structural	0.2
C3 - Process Mechanical	0.2
C4 - Instrumentation	0.15
C5 - Process Electrical	0.15
C6 - Building Mechanical	0.1
C7 - Building Electrical	0.1

Once the weighting was applied, the Total Condition Rating was calculated by adding the score of all assets together:

Total Condition Rating (C) = C1 + C2 + C3 + C4 + C5 + C6 + C7

5.5 OVERALL RATING

Once all data was recorded in the Risk Assessment sheet, the Reliability Rating was calculated for all facilities. The Reliability Rating allows all facilities to be compared with the Overall Rating (A, B, C, D, E) established. Table 5-11 below outlines the Overall Rating used to determine the timeframe for any recommended intervention.

Table 5-11 Comparison of Overall Rating and Reliability Rating

OVERALL RATING	RELIABILITY RATING	DESCRIPTION
A	0 - 5	No action required.
B	6 – 10	Minor repairs may be required to non-critical components. Review required, but no work required immediately.
C	11 – 40	Certain assets/equipment may need replacing in the future. Review and plan maintenance.
D	41 – 99	Certain assets/equipment may need replacing in the immediate future and review is required to outline maintenance.
E	100 – 125	Immediate action required to prevent failure and minimise impact to customers.

6 RESULTS

This section gives a breakdown of each segment of the Risk Assessment Sheet (Appendix D) of each booster station, reservoir, elevated storage and standpipe.

6.1 FACILITY RISK

Table 6-1 below shows the importance of each facility to the Water Distribution System. The values seen for these facilities are high, based on the criticality of the water system to a large diverse population. This, coupled with the moderate risk to the public if a failure occurs, ensures a high facility risk.

Facility Information				Facility Risk								
Current Name	Year of Installation/upgrade	As Builts avaialble	Pump Info Available	Customer type	Score (0.25)	No. of Customers	Score (0.25)	Risk to the Public	Score (0.4)	Environmental Impact	Score (0.1)	**Total Facility Risk - A**
Collins Bay Road BS	1987	Yes	Yes	Residential	1	<100	2	Moderate	3	Remote	2	**2.2**
James St BS	1991	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Old Colony Rd BS	2000	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Purdys BS (Sydenham Rd)	1996	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
O'Connor Drive Res/BS	2009	No	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Progress Avenue Res/BS		Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Third Avenue Res/BS	1964	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Creekford Rd EST	2004	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Innovation Drive EST	2012	Yes	No	Mixed Use	4	Up to 10,000	4	Moderate	3	Remote	2	**3.4**
O'Connor Drive EST	1962	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Tower Street EST	1968	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Forest Drive Standpipe	1981	Yes	No	Residential	1	Up to 1,000	3	Moderate	3	Remote	2	**2.4**

Table 6-1 Risk Assessment Sheet - Facility Risk

6.2 EQUIPMENT RISK

Table 6-2 below shows how the equipment risk was established and provides a breakdown of which assets impact the total equipment risk. From the table it can be seen that in the majority of cases the Total Equipment Risk is low, therefore the equipment in the facilities are in a good state of repair.

The best scores were for O'Connor Drive Res/BS, Creekford Road EST and Innovation Drive EST. This is expected, as they are some of the water distribution system's new facilities, with the oldest (Creekford Road EST) being just over ten years old.

Progress Avenue Res/BS, Third Avenue Res/BS and Tower Street EST stand out as the worst offenders, with scores between 2.7 and 3.0, due to high scoring across the board. This would imply that these facilities will require an upgrade in the coming years.

City of Kingston - Water and Wastewater Master Plan

Table 6-2 Risk Assessment Sheet - Equipment Risk

Project No: UK-15-02

Project No: 151-02944-00

Facility Information				Equipment Risk																																										
				Civil/Site Conditions (Access Roads, Drains, Fencing, etc.)						Structural (Well, Foundations, walls, etc.)						Process Mechanical (Pumps, Piping, Valves, etc.)						Instrumentation and Controls/SCADA (Gauges, Flow meters, etc.)						Process Electrical (Main Breaker , Transformer, etc.)						Building Mechanical (HVAC, Heaters, Thermostats, etc.)						Building Electrical (Interior/Exterior Lighting)						
							Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)						Effective Life Remaining (Years) (From Field Assessment)			
Current Name	Year of Installation/upgrade	As Builts avaialble	Pump Info Available	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Civil Risk Factor - B1 (0.1)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Structural Risk Factor - B2 (0.2)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Process Mech. Risk Factor - B3 (0.2)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Instrumentation Risk Factor - B4 (0.15)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Process Electrical Risk Factor - B5 (0.15)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Building Mech. Risk Factor - B6 (0.1)**	Criticality	Probability	Overall Risk (From Field Assessment)	Years	Score	**Building Electrical Risk Factor - B7 (0.1)**	**Total Equipment Risk - B**
Collins Bay Road BS	1987	Yes	Yes	**PS currently not in use - See comments under section 7.3.1 of Condition Assessment Report**																																										
James St BS	1991	Yes	Yes	4	2	1.0	20+	1	**2.0**	4	2	1.1	16-20	2	**2.3**	4	2	2.1	16-20	2	**2.5**	4	2	1.3	11-15	3	**2.6**	4	2	1.4	16-20	2	**2.4**	4	2	2.3	11-15	3	**2.8**	4	2	1.0	11-15	3	**2.5**	**2.4**
Old Colony Rd BS	2000	Yes	Yes	4	2	1.0	20+	1	**2.0**	4	2	1.0	20+	1	**2.0**	4	2	1.8	16-20	2	**2.5**	4	2	1.0	20+	1	**2.0**	4	2	1.0	16-20	2	**2.3**	4	2	2.0	11-15	3	**2.8**	4	2	1.0	20+	1	**2.0**	**2.2**
Purdys BS (Sydenham Rd)	1996	Yes	Yes	4	2	1.0	20+	1	**2.0**	4	2	2.0	20+	1	**2.3**	4	2	1.8	11-15	3	**2.7**	4	2	1.3	11-15	3	**2.6**	4	2	1.0	16-20	2	**2.3**	4	2	2.0	11-15	3	**2.8**	4	2	1.0	20+	1	**2.0**	**2.4**
O'Connor Drive Res/BS	2009	No	Yes	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	16-20	2	**2.0**	**1.8**
Progress Avenue Res/BS		Yes	Yes	4	3	1.0	11-15	3	**2.8**	4	3	1.3	20+	1	**2.3**	4	3	1.9	16-20	2	**2.7**	4	3	1.3	11-15	3	**2.8**	4	3	1.3	16-20	2	**2.6**	4	3	2.0	16-20	2	**2.8**	4	3	1.3	11-15	3	**2.8**	**2.7**
Third Avenue Res/BS	1964	Yes	Yes	4	3	1.0	16-20	2	**2.5**	4	3	1.7	11-15	3	**2.9**	4	3	2.1	11-15	3	**3.0**	4	3	1.0	16-20	2	**2.5**	4	3	2.7	5-10	4	**3.4**	4	3	2.2	11-15	3	**3.1**	4	3	2.0	5-10	4	**3.3**	**3.0**
Creekford Rd EST	2004	Yes	No	3	2	1.0	20+	1	**1.8**	3	2	1.0	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	11-15	3	**2.3**	3	2	1	16-20	2	**2.0**	**1.8**
Innovation Drive EST	2012	Yes	No	3	2	1.0	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	**1.8**
O'Connor Drive EST	1962	Yes	No	3	3	1.0	11-15	3	**2.5**	3	3	1.9	16-20	2	**2.5**	3	3	1.8	16-20	2	**2.5**	3	3	1	16-20	2	**2.3**	3	3	1	20+	1	**2.0**	3	3	1	5-10	4	**2.8**	3	3	1	16-20	2	**2.3**	**2.4**
Tower Street EST	1968	Yes	No	3	3	1.7	16-20	2	**2.4**	3	3	1.7	11-15	3	**2.7**	3	3	2.8	5-10	4	**3.2**	3	3	1.2	11-15	3	**2.6**	3	3	1	16-20	2	**2.3**	3	3	2	5-10	4	**3.0**	3	3	1	16-20	2	**2.3**	**2.7**
Forest Drive Standpipe	1981	Yes	No	2	3	1.0	11-15	3	**2.3**	2	3	1.6	11-15	3	**2.4**	2	3	1.2	16-20	2	**2.1**	2	3	1	11-15	3	**2.3**	2	3	1	16-20	2	**2.0**	2	3	2	11-15	3	**2.5**	2	3	1	11-15	3	**2.3**	**2.2**

6.3 CONDITION RATING

The low scoring in this section shows that the facilities are generally in a good condition. The scores are generally below 2, with most facilities scoring well across the board.

The four facilities that standout as the worst offenders, with scores of approximately 2, are James Street BS, Purdy's Court BS, Third Avenue Res/BS and Tower Street EST. These facilities tend to score poorly due to process mechanical, structural, or process electrical issues. Additionally, the age of the facility as a whole is a contributing factor.

Facility Information		Condition Rating (From Field Assessment)							
Current Name	Old Name	Civil/Structural - **C1** (0.1)	Structural - **C2** (0.2)	Process Mechanical - **C3** (0.2)	Instrumentation/SCADA - **C4** (0.15)	Process Electrical - **C5** (0.15)	Building Mechanical - **C6** (0.1)	Building Electrical - **C7** (0.1)	**Total Condition Rating - C**
Collins Bay Road BS	Collins Bay BS	PS currently not in use - See comments under section 7.3.1 of Condition Assessment Report							
James St BS	James St BS	1.0	1.1	2.5	1.3	1.6	2.8	1.0	**1.7**
Old Colony Rd BS	Old Colony Rd BS	2.0	1.0	1.8	1.8	1.0	2.0	1.0	**1.4**
Purdys BS (Sydenham Rd)	Sydenham Rd BS (Purdy's Court)	2.0	2.0	2.3	1.3	1.0	2.0	1.0	**1.7**
O'Connor Drive Res/BS	Gardiners Rd BS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Progress Avenue Res/BS	Progress Avenue Res	1.0	1.3	2.0	1.3	1.2	2.0	1.3	**1.5**
Third Avenue Res/BS	Third Avenue Res	1.0	2.1	2.7	1.0	3.2	2.4	2.0	**2.3**
Creekford Rd EST	Creekford Rd Tower	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
Innovation Drive EST		1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**
O'Connor Drive EST	O'Connor Drive Tower	1.0	1.9	2.0	1.0	1.0	1.0	1.0	**1.5**
Tower Street EST	Tower Street Tower	2.3	2.4	3.6	1.2	1.0	2.0	1.0	**2.1**
Forest Drive Standpipe	Milton Tower	1.5	1.6	1.3	1.0	1.0	1.0	1.0	**1.3**

Table 6-3 Risk Assessment Sheet - Condition Assessment

6.4 OVERALL RATING

6.4.1 RELIABILITY RATING AND OVERALL RATING

The Reliability Rating was calculated for all facilities and the results are shown below (Table 6-4). As previously described in Section 5.5, the Overall Rating correlates with the following description:

- Overall Rating of A - No action required.
- Overall Rating of B - Minor repairs may be required to non-critical components. Review required, but no work required immediately.
- Overall Rating of C - Certain assets/equipment may need replacing in the future. Review and plan maintenance.

An asset summary follows to explain what maintenance upgrades are required over the next 25 years to maintain or exceed the current levels.

Pumping Station Name	Total Facility Risk - A	Total Equipment Risk - B	Total Condition Rating - C	Reliability Rating = A x B x C	Overall Rating
Innovation Drive EST	3.4	1.8	1.0	6.0	**B**
O'Connor Drive Res/BS	3.7	1.8	1.0	6.5	**B**
Forest Drive Standpipe	2.4	2.2	1.3	6.7	**B**
Creekford Rd EST	3.8	1.8	1.0	6.8	**B**
Progress Avenue Res/BS	2.9	2.7	1.5	11.3	**C**
Old Colony Rd BS	3.7	2.2	1.4	11.4	**C**
Purdys BS (Sydenham Rd)	2.9	2.4	1.7	11.9	**C**
O'Connor Drive EST	3.8	2.4	1.5	13.1	**C**
James St BS	3.7	2.4	1.7	14.7	**C**
Third Avenue Res/BS	2.9	3.0	2.3	19.4	**C**
Tower Street EST	3.8	2.7	2.1	21.4	**C**
Collins Bay Road BS	2.2	PS currently not in use - See comments under section 7.3.1 of Condition Assessment Report			

Table 6-4 Risk Assessment Sheet - Reliability Rating and Overall Rating

6.4.2 VISUAL REPRESENTATION WITH OVERALL RATING IN SEQUENCE

Table 6-5 below provides a visual representation of how the Total Condition Rating, Total Facility and Equipment Risk influence the Overall rating and shows where the capital budget should be prioritised to improve the system as a whole.

Table 6-5 Total Facility Risk, Total Equipment Risk, Total Condition Rating and Overall Rating

Pumping Station Name	Total Facility Risk - A	Total Equipment Risk - B	Total Condition Rating - C	Overall Rating
Innovation Drive EST	3.4	1.8	1.0	**B**
O'Connor Drive Res/BS	3.7	1.8	1.0	**B**
Forest Drive Standpipe	2.4	2.2	1.3	**B**
Creekford Rd EST	3.8	1.8	1.0	**B**
Progress Avenue Res/BS	2.9	2.7	1.5	**C**
Old Colony Rd BS	3.7	2.2	1.4	**C**
Purdys BS (Sydenham Rd)	2.9	2.4	1.7	**C**
O'Connor Drive EST	3.8	2.4	1.5	**C**
James St BS	3.7	2.4	1.7	**C**
Third Avenue Res/BS	2.9	3.0	2.3	**C**
Tower Street EST	3.8	2.7	2.1	**C**
Collins Bay Road BS	2.2	PS currently not in use - See comments under section 7.3.1 of Condition Assessment Report		

Legend

Total Facility Risk	1.0 - 2.0	2.1 - 3.5	3.6 - 5.0
Total Equipment Risk	1.0 - 2.0	2.1 - 3.5	3.6 - 5.0
Total Condition Rating	1.0 - 2.0	2.1 - 3.5	3.6 - 5.0
Overall Rating	A	B /C	D

7 ASSET SUMMARY

7.1 GENERAL

The water distribution facilities as a whole are in a good condition due to operators' and maintenance crews' effort to maintain the facilities that make up the Water System. This section of the report will focus on general issues that if corrected would either help the operators and maintenance staff to complete their jobs in a safer or easier manor. This section with also address general issues that affect more than a handful of the water distribution facilities. A detailed breakdown of each asset follows in Section 7.2, 7.3 and 7.4.

7.1.1 SAFETY GRATING

Safety grating would be a valuable addition to booster station hatches and any other access point where fall prevention would improve safety at the facility. During times when hatches are opened for inspection, these safety gratings will provide an extra preventative measure to avert staff or members of the public from falling through access ways. Refer to Figure 7-1 below.

Figure 7-1 Palace Road PS – Safety Grate (Photograph)

7.1.2 VALVE MAINTENANCE

In most cases, valves do not appear to be maintained until there is a repair required. Turning the valves on, on a regular basis, to keep the valve in a good state of repair will allow operators to control these valves without difficulty. Refer to Figure 7-2 below.

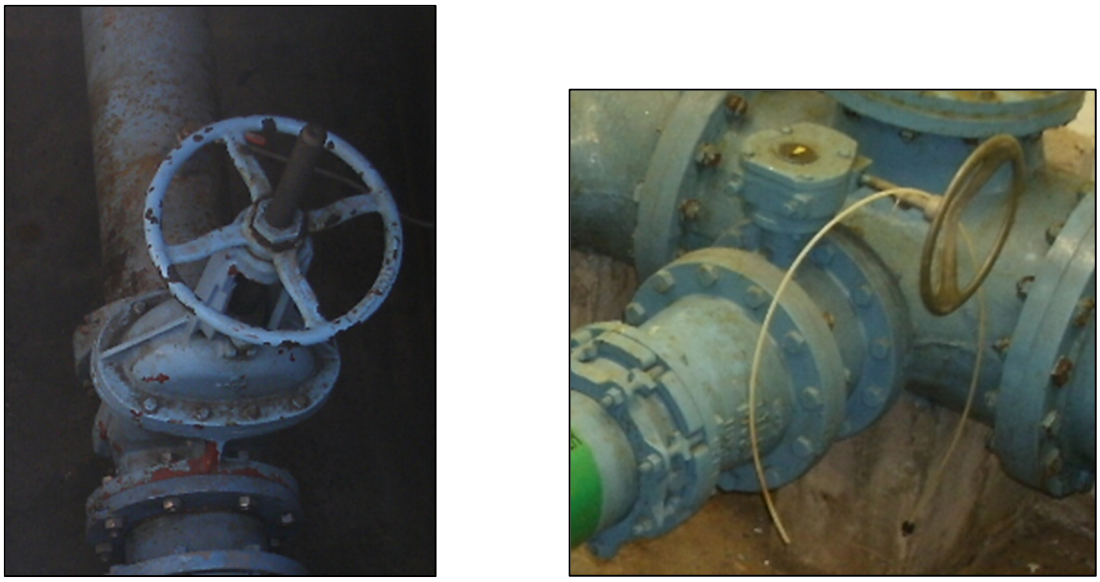


Figure 7-2 Isolation Valves (Two Photographs)

7.1.3 NETWORK PANEL

The network panel is an integral part of the water distribution system. All network panels appear identical in all locations, which leads to the assumption that the panels were all replaced/upgraded around the same time. Due to advances in technology and the need to keep data available at all times, it is assumed that the system will need to be upgraded in the next 10-15 years, with a total cost of approximately $2,000 per pumping station. This is a total of approximately $24,000.

7.1.4 SCADA

SCADA data is an integral part of water distribution systems and during the Condition Assessment it was noted that the system works well as a whole. This was also confirmed by operators. One assessment made and validated by the operator is that there are different SCADA systems for various segments of the system. This means that at King Street, there were various PC's – one for each segment of SCADA. Integration of the SCADA system to one dedicated system would reduce the need for multiple PC's and the difficulty of maintaining different systems.

7.1.5 ROOFS

Although the type of roof varies between locations (flat/pitched) they appear, from visual inspection, to be relatively new in most cases. WSP's opinion is that all roofs will need replacing within a 10-25 year period and a review of the roofs should be completed separately to outline which roofs should be replaced and at what time. This review will allow UK to prioritise work, efficiently budget, and obtain manageable fees from contractors by combining the work into a bigger contract, then proceeding to upgrade the roof of each facility as required. Figure 7-3 below shows and example of a City of Kingston water res/BS roof.

Figure 7-3 Third Avenue Res/BS roof (Photograph)

7.1.6 RESERVOIRS, ELEVATED STORAGE AND STANDPIPES

The tanks, standpipes and reservoirs were not inspected internally during the course of this Condition Assessment. Operators confirmed that the linings are replaced at the required intervals.

7.1.7 SECURITY

Although the majority of facilities have safety measures such as fencing, locked hatches/panels and secure buildings, concern was raised by operations which suggested that security should be improved for the safety of operators and the public. It is suggested that the security of the facilities is reviewed to determine if further improvements to the general safety of the operators and public can be made.

7.2 WATER TREATMENT PLANTS (WTP)

The following section will summarize the findings of our Field Assessment. Refer to Appendix C for the full report.

7.2.1 POINT PLEASANT WTP

Due to current upgrades (full plant replacement), the facility was not reviewed but an explanation of the upgrade and rating was established, taking these upgrades into account.

7.2.2 KING STREET WTP

A review of the whole plant was conducted. Generally the plant as a whole was found to be in good condition, with the age of the facility being the major contributing factor to the need for upgrades. This being said, the plant is well looked after by operations and maintenance staff.

There are areas of the plant that require some attention over the coming years. Table 7-1 is a breakdown of the issues that should be investigated in the coming years, with an advised timeline of when the upgrade or review of the area should be completed. The table also includes the criticality of these items in order to maintain or improve the current condition of the plant going forward.

The Criticality is scored accordingly - 1 (Non-Critical) to 5 (Critical).

Cost is scored accordingly - 1 (Inexpensive) to 5 (Very Expensive).

Table 7-1 King Street WTP Summary with Suggested Upgrades

SYSTEM	ISSUE	UPGRADE/REVIEW REQUIRED	TIMELINE (YEARS)	CRITICALITY (1-5)	COST
Filtering	Building structure in decay – concrete ceiling supports crumbling.	Further investigation required. Repair/rebuild.	10-15	4	4
Filtering	PLC older model – replacement parts hard to source	Replace PLC	1-5	4	2
Chemical Injection	Polymer injection requires manual operation and can be time consuming and messy	Review process	1-5	1	1
Water Reservoirs	Reservoirs are not fenced – should be secured against vandalism and sabotage (Operator Comment)	Review Security (See General comments, Section 7.1.7)	1-5	3	1
High Lift Pumps	Pump 5 (Diesel Pump) – currently not working due to either SCADA issue or an issue with the check valve on pump outlet.	Review required	1-5	2	1
High Lift Pumps	Below ground diesel tank	Consider replacing with above ground diesel tank	5-10	2	2
High Lift Pumps	Pump outlet piping and header – evidence of leaking	Replace gaskets	1-5	4	2
Other Chemical Systems	Hypochlorite tank may need replacing in the next 5 years	Replace	1-5	3	2
Sludge Tanks	Baffles are starting to decay	Review and replace	5-10	4	3
PLC Control Panels	Extremely aged electronics	Replace	1-5	4	4

Table 7-2 below contains the total estimated upgrade/repair costs for each five year period, for the upgrades described in Table 7-1 for King Street WTP.

Table 7-2 King Street WTP Estimated Cost of Repairs/Upgrades in the Next 20 years

REPAIR / UPGRADE AND COST							
0-5 YEARS		5-10 YEARS		10-15 YEARS		15-20 YEARS	
Upgrade 1	$175 K	Upgrade 2	$50 K	Upgrade 3	$30 K		

Note: Where investigation or review is suggested, cost has been estimated for the review/investigation only and does not include any work that may result from that investigation.

7.2.3 CANA WTP

Cana WTP services a small population north of Highway 401 and was constructed in 2008. A review of the whole plant was conducted and it was found to be in good condition with no issues reported by the operation and maintenance team.

Minor issues were observed by the Condition Assessment team. See Table 7-3 for a breakdown of issues that should be investigated over the coming years, with an advised timeline of when the upgrade or review of the area should be completed. The table also includes the criticality of these items in order to maintain or improve the current condition of the plant going forward.

The Criticality is scored accordingly - 1 (Non-Critical) to 5 (Critical).

Table 7-3 Cana WTP Summary with Suggested Upgrades

SYSTEM	ISSUE	UPGRADE/REVIEW REQUIRED	TIMELINE (YEARS)	CRITICALITY (1-5)	COST
Flow Meter	Insulation removed around outlet and bypass. Appears new by-pass valve was fitted	Replace Insulation to ensure longevity of pipework.	1-5	3	1
Filters	Evidence of leak and repair. Insulation removed on inlet and by-pass.	Replace Insulation to ensure longevity of pipework.	1-5	3	1

Table 7-4 below contains the total estimated upgrade/repair costs for each five year period from the upgrades described above in Table 7-3 for Cana WTP.

REPAIR / UPGRADE AND COST							
0-5 YEARS		5-10 YEARS		10-15 YEARS		15-20 YEARS	
Upgrade 1	$10 K						

Table 7-4 Cana WTP Estimated Cost of Repairs/Upgrades in the Next 20 Years

7.3.1 Collins Bay Road BS

Reliability Rating	0.0	Overall Rating	0		
Total Facility Risk	2.2 /5	Total Equipment Risk	0.0 /5	Condition rating	0.0 /5

Condition Assessment:

This facility is currently not required to be used as the water system no longer requires boosting at this point.

If this BS was reinstated on a permenant basis it would require a overhaul of pumps and valves within the next 5 - 10 years. If this upgrade was to occur it would be suggested that electrical and instrumentation were also reviewed at that point.

Priority Work:

Work required 5-25 Years:

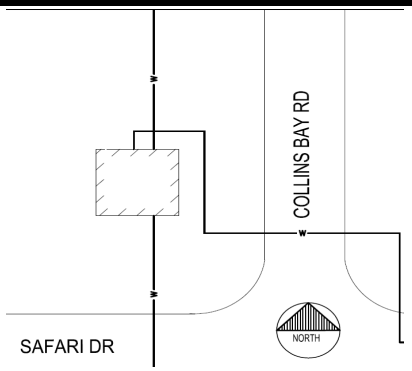
Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	

Pump Station Facility Summary

Facility Name:	Collins Bay Road BS			**Notes:**
Facility Address:	Crnr Collins Bay Rd and Safari Drive			
Community/Service Area:	Point Pleasant WTP			
Coordinates (Lat./Long.):	371886.704E, 4901410.417N			
Reference Drawing(s): Include Revision(s) & Date(s)	Site Plan, 1987			
Page No.	Page 1 of 2			
Inflow and Outflow Types	**Units**	**Length**	**Diameter**	
Inflow Pipe Length & Dia.:	**m**	N/A	0.20	
Main Pipeline Length & Dia.:	**m**	N/A	0.30	
Main Discharge Location.	**n/a**	Watermain		
Overflow Pipe Length & D.:	**m**	N/A	N/A	
Overflow Discharge Loc.:	**n/a**	N/A		
Backup Power?:	**n/a**	Yes		
Site Fencing?:	**n/a**	No		
CofA/ECA?:	**n/a**	N/A		

Photo: Exterior

Plan View:

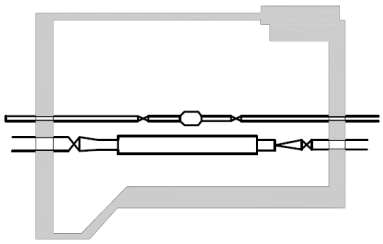


Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**	**Notes:**
Reference Drawing Number:	**n/a**	Site Plan, Drawing 1, 1987		
Base Elevation & Level:	**m**	88.29	**0.00**	
Low Alarm Elevation:	**m**	N/A	N/A	
Minimum Elevation:	**m**			
Initial/Normal Elev. & Level:	**m**	N/A	N/A	
Maximum Elevation:	**n/a**			
High Alarm Elevation:	**m**	N/A	N/A	
Ground Elevation:	**m**	90.98	2.69	
Physical Data:	**Units**			
Section (circular, oval, etc…)	**n/a**	Rectangular		
Average Cross-Section Area:	**sq.m**	10.41		
Length & Width (or Diam.):	**m**	4.27	2.44	

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Collins Bay Road BS			**Notes:**		
Facility Address:	Crnr Collins Bay Rd and Safari					
Community/Service Area:	Point Pleasant WTP					
Coordinates (Lat./Long.):	371886.704E, 4901410.417N					
Reference Drawing(s): Include Revision(s) & Date(s)	Site Plan, 1987					
Page No.	Page 2 of 2					
Pump Details						
Number of Pumps	2			**Notes:**		
SCADA Flow?	No					
SCADA Level?	No					
Pump Type		**Lead**	**Lag 1**			
Make:		Pleuger				
Model ID or Rating:		QN82 2 M6 53				
Impeller ID or Size:		N/A				
Variable-Speed?:		N/A	N/A			
Year Installed		1987	1987			
Pump Curve ID in Model:		Expoenential 3-Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**	26.00	27.00			
Shutoff Head	**m**	35.10	35.10			
Design Head	**m**	26.80	26.80			
Design Flow	**L/s**	50.00	50.00			
High Head	**m**	10.70	10.70			
High Flow	**L/s**	82.00	82.00			

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (1987):	**m**	N/A	0.2/0.15	DI	1/1/1	E, BFV, CV
Discharge Line (1987):	**m**	N/A	0.15/0.2	DI	1/1	E, BFV
Pump Station (1987):	**m**	N/A	N/A	N/A	N/A	N/A
Yard Piping (1987):	**m**	N/A	0.20	DI	1	Valve
Main Pipeline (1987):	**m**	N/A	0.30	DI	N/A	N/A
Exit Elevation:	**m**	88.29				

Legend:

C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

Notes:

Pumps havent been turned on in over two years.. No longer in active use.

7.3.2 James St BS

Reliability Rating	14.7	Overall Rating		C	
Total Facility Risk	3.7 /5	Total Equipment Risk	2.4 /5	Condition rating	1.7 /5

Condition Assessment:

Civil / Site: **Asphalt driveway and concrete paths - Good Condition**

Structural: **Some evidence of water damage to dry well walls on exterior walls. Access ways and Ladders in good condition.**

Proc. Mech.: **Signs of Corrosion on Piping and valves. Pumps are aging. Standing water on floor for visible leaks from Pump casing seals and auxilary pipework.**

Instrument: **Generally in good condition. SCADA panel needs to be upgraded in the near future.**

Proc. Elec.: **Generally in good condition. Aging Back-up Generator. Generator controller beyond design life.**

Build. Mech.: **Generally in good condition, but aging.**

Build. Elec.: **Good Condition**

Priority Work:

- Replace SCADA panel and Generator Controller ($ 60,000)

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
Upgrade 1	**$ 250,000**	**Upgrade 2**	**$ 450,000**			**Upgrade 3**	**$ 80,000**

Upgrade 1:

1) Upgrade – Replace Auxilary Pipework and generator. Have pumps serviced and reviewed to establish effective life expectancy.
2) Consider upgrade 2 during this work. (See upgrade 2 Price)

Upgrade 2:

1) Replace Pumps, Process piping, Instrumentation and building mechanical.
2) Consider upgrade 3 during this work. (See upgrade 3 price)

Upgrade 3:

1) Replace Pump Control Panel
2) Roof Replacement

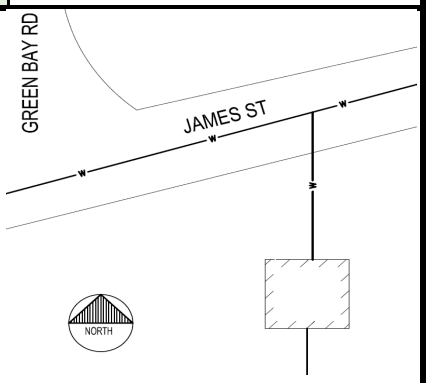
Pump Station Facility Summary

Facility Name:	James Street BS		
Facility Address:	228 James Street		
Community/Service Area:	King St. WTP		
Coordinates (Lat./Long.):	383031.964E, 4899253.53N		
Reference Drawing(s): Include Revision(s) & Date(s)	11803-01, S1 & S2, July 1991		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.30
Main Pipeline Length & Dia.:	**m**	N/A	0.40
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	N/A
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	Yes	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	Yes	

Notes:

Photo: Exterior

Plan View:



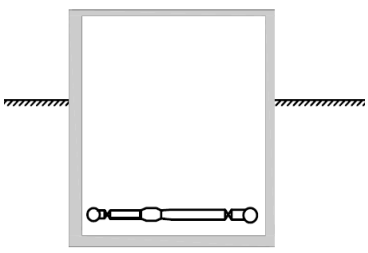
Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	L-K74-9304(1)-901	
Base Elevation & Level:	**m**	74.93	**0.00**
Low Alarm Elevation:	**m**	N/A	N/A
Minimum Elevation:	**m**		
Initial/Normal Elev. & Level:	**m**	N/A	N/A
Maximum Elevation:	**n/a**		
High Alarm Elevation:	**m**	N/A	N/A
Ground Elevation:	**m**		
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	N/A	
Average Cross-Section Area:	**sq.m**	N/A	
Length & Width (or Diam.):	**m**	N/A	N/A

Notes:

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	James Street BS			**Notes:**		
Facility Address:	228 James Street					
Community/Service Area:	King St. WTP					
Coordinates (Lat./Long.):	383031.964E, 4899253.53N					
Reference Drawing(s): Include Revision(s) & Date(s)	11803-01, S1 & S2, July 1991					
Page No.	Page 2 of 2					
Pump Details						
Number of Pumps	3			**Notes:**		
SCADA Flow?	Yes					
SCADA Level?	Yes					
Pump Type		**Lead**	**Lag 1**	**Lag 2**		
Make:		Aurora				
Model ID or Rating:		Z24992				
Impeller ID or Size:		N/A				
Variable-Speed?:		N/A	N/A	N/A		
Year Installed		1991.00				
Pump Curve ID in Model:		2PC-117385A - Multiple Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**	**Lag 2**		
Tested Flow (e.g.: Drawdown):	**L/s**	184.00	185.00	N/A		
Shutoff Head	**m**	N/A	N/A	N/A		
Design Head	**m**	N/A	N/A	N/A		
Design Flow	**L/s**	N/A	N/A	N/A		
High Head	**m**	N/A	N/A	N/A		
High Flow	**L/s**	N/A	N/A	N/A		
Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (1991):	**m**	2.53	0.25/0.2032	DI	1//1	BFV, CV, E
Discharge Line (1991):	**m**	1.21	0.1524/0.254	DI	1/1/1	BFV/E/CV
Pump Station (1991):	**m**	4.32	0.40	DI		
Yard Piping (1991):	**m**	8.40	0.40	Di		
Main Pipeline (1991):	**m**	N/A	0.40	N/A		
Exit Elevation:	**m**	79.37				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion BVF = Butterfly Valve

Notes:

7.3.3 Old Colony Rd BS

Reliability Rating	11.4	Overall Rating		C	
Total Facility Risk	3.7 /5	Total Equipment Risk	2.2 /5	Condition rating	1.4 /5

Condition Assessment:

Civil / Site: **Roadside parking**

Structural: **Good Condition**

Proc. Mech.: **Good Condition**

Instrument: **Pump #1 Motor screen not displaying, Pump #2 Inlet Pressure Screen not displaying. Otherwise in good condition.**

Proc. Elec.: **Good Condition. No Back-up power**

Build. Mech.: **Venting and heaters not visible in well, no issue reported by operator, assumed in good condition.**

Build. Elec.: **Good Condition**

Other: **BS only used for peak flow**

Priority Work:

Repair/Replace - Inlet pressure screen for Pump #2 and Motor Speed screen for Pump #1. ($ 5,000)

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
				Upgrade 1	**$ 25,000**	**Upgrade 2**	**$ 300,000**

Upgrade 1:

1) Review and replace building mechanical. Review Condition of Pumps.

Upgrade 2:

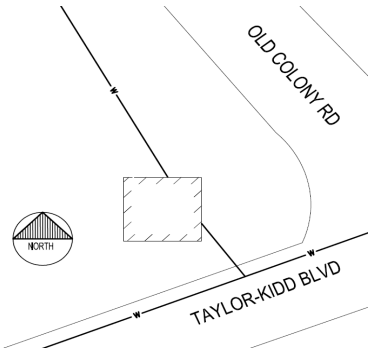
1) Replace Piping & Valves; Instrumentation; Process Mechanical; Process Electrical.

Pump Station Facility Summary

Facility Name:	Old Colony Road BS		**Notes:**
Facility Address:	Crnr Old Colony Rd & Taylor-Kidd Blvd		
Community/Service Area:	Point Pleasant WTP		
Coordinates (Lat./Long.):	374688.647E, 4900806N		
Reference Drawing(s): Include Revision(s) & Date(s)	17016-S1, May 2000		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	5.50	0.20
Main Pipeline Length & Dia.:	**m**	N/A	0.40
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	N/A
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	Yes	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	Yes	

Photo: Exterior

Plan View:



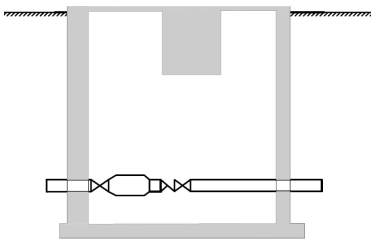
Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	17016-S1	
Base Elevation & Level:	**m**		0.00
Low Alarm Elevation:	**m**	N/A	N/A
Minimum Elevation:	**m**		
Initial/Normal Elev. & Level:	**m**	N/A	N/A
Maximum Elevation:	**n/a**		
High Alarm Elevation:	**m**	N/A	N/A
Ground Elevation:	**m**		
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Rectangular	
Average Cross-Section Area:	**sq.m**	7.43	
Length & Width (or Diam.):	**m**	3.05	2.44

Notes:
Assumed pipe details from field survey

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Old Colony Road BS	**Notes:**
Facility Address:	Crnr Old Colony Rd & Taylor-Kidd	
Community/Service Area:	Point Pleasant WTP	
Coordinates (Lat./Long.):	374688.647E, 4900806N	
Reference Drawing(s): Include Revision(s) & Date(s)	17016-S1, May 2000	
Page No.	Page 2 of 2	

Pump Details

Number of Pumps		2		**Notes:**		
SCADA Flow?		No				
SCADA Level?		Yes				
Pump Type		**Lead**	**Lag 1**			
Make:		Aurora				
Model ID or Rating:		410-HSC-1800				
Impeller ID or Size:						
Variable-Speed?:		N/A				
Year Installed		2000				
Pump Curve ID in Model:		Exponential 3-Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**	N/A				
Shutoff Head	**m**	27.40	27.40			
Design Head	**m**	21.60	21.60			
Design Flow	**L/s**	52.00	82.00			
High Head	**m**	9.10	9.10			
High Flow	**L/s**	151.00	151.00			
Pump (Impeller) Elevation:	**m**	N/A	N/A			

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (2000):	**m**	4.24	0.20		1/1/1/1	LAT, MF, GV, CV
Discharge Line (2000):	**m**	1.46	0.20		1	GV
Pump Station (2000):	**m**	N/A	N/A	N/A	N/A	N/A
Yard Piping (2000):	**m**	3.09	0.20		1	GV
Main Pipeline (2000):	**m**	N/A	0.40			
Exit Elevation:	**m**	88.07				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

Notes:
Only 1 Pump can run at a time. Pump 1 motor screen not working.

7.3.4 Purdys BS (Sydenham Rd)

Reliability Rating	11.9	Overall Rating	C

Total Facility Risk	2.9 /5	Total Equipment Risk	2.4 /5	Condition rating	1.7 /5

Condition Assessment:

Civil / Site: **Parking at adjacent parking lot.**

Structural: **Evidence of water in well, most likely condensation.**

Proc. Mech.: **Corrosion present on pump body, piping and valves.**

Instrument: **Pump Control lights not working. Instrumentation aging.**

Proc. Elec.: **Good Condition**

Build. Mech.: **Venting and heaters not visible in well, no issue reported by operator, assumed in good condition.**

Build. Elec.: **Good Condition**

Priority Work:

Repair lights on Pump Control Panel ($ 200)

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
Upgrade 1	**$ 60,000**			**Upgrade 2**	**$ 450,000**		

Upgrade 1:

1) Replace Pump Control Panel

Upgrade 2:

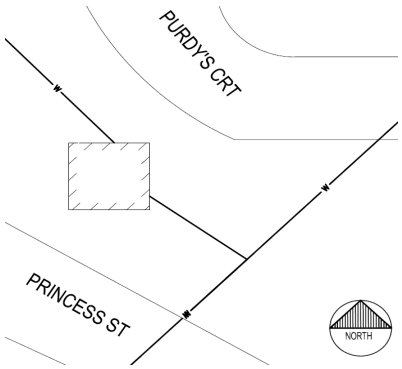
1) Replace Process Mechanical; Instrumentation (excluding Pump Control Panel); Process Electrical; Building Mechanical and Building Electrical.

Pump Station Facility Summary

Facility Name:	Sydenham Road BS			**Notes:**
Facility Address:	Crn Sydenham Rd & Princess St			
Community/Service Area:	Point Pleasant			
Coordinates (Lat./Long.):	376793.406E, 4901511.964N			
Reference Drawing(s): Include Revision(s) & Date(s)	A1-96154-G1 & A1-96154-L1 , May 1996			
Page No.	Page 1 of 2			
Inflow and Outflow Types	**Units**	**Length**	**Diameter**	
Inflow Pipe Length & Dia.:	**m**	2.50	0.30	
Main Pipeline Length & Dia.:	**m**	N/A	0.30	
Main Discharge Location.	**n/a**	Watermain		
Overflow Pipe Length & D.:	**m**	N/A	N/A	
Overflow Discharge Loc.:	**n/a**	0.3m Bypass		
Backup Power?:	**n/a**	Yes		
Site Fencing?:	**n/a**	No		
CofA/ECA?:	**n/a**	N/A		

Photo: Exterior

Plan View:

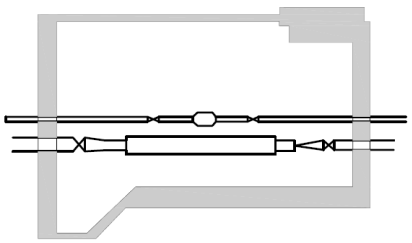


Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**	**Notes:**
Reference Drawing Number:	**n/a**	A1-96154-L1		
Base Elevation & Level:	**m**	85.15	**0.00**	
Low Alarm Elevation:	**m**	N/A	N/A	
Minimum Elevation:	**m**	85.75	0.60	
Initial/Normal Elev. & Level:	**m**	N/A	N/A	
Maximum Elevation:	**n/a**	85.75	0.60	
High Alarm Elevation:	**m**	N/A	N/A	
Ground Elevation:	**m**	88.35	3.20	
Physical Data:	**Units**			
Section (circular, oval, etc…)	**n/a**	Rectangular		
Average Cross-Section Area:	**sq.m**	14.04		
Length & Width (or Diam.):	**m**	5.40	2.60	

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Sydenham Road BS	**Notes:**
Facility Address:	Crn Sydenham Rd & Princess St	
Community/Service Area:	Point Pleasant	
Coordinates (Lat./Long.):	376793.406E, 4901511.964N	
Reference Drawing(s): Include Revision(s) & Date(s)	A1-96154-G1 & A1-96154-L1 , May 1996	
Page No.	Page 2 of 2	

Pump Details						
Number of Pumps		2		**Notes:**		
SCADA Flow?		No Data				
SCADA Level?		No Data				
Pump Type		**Lead**	**Lag 1**	**Lag 2**		
Make:		Jacuzzi SanHandler 7				
Model ID or Rating:		7.5hp				
Impeller ID or Size:		N/A				
Variable-Speed?:		N/A				
Year Installed		2003				
Pump Curve ID in Model:		Exponential 3-Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**	**Lag 2**		
Tested Flow (e.g.: Drawdown):	**L/s**	N/A	N/A	N/A		
Shutoff Head	**m**	49.00	49.00	45.727.4		
Design Head	**m**	36.00	36.00	27.40		
Design Flow	**L/s**	6.60	6.60	88.00		
High Head	**m**	20.00	20.00	16.80		
High Flow	**L/s**	7.60	7.60	113.00		
Pump (Impeller) Elevation:	**m**	N/A	N/A	N/A		

Piping Details					**Minor Losses**	
Description(Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (Duty) (1996):	**m**	4.10	0.3/0.2	DI/SS	2/1/1/1/1/1	TEE, BFV, E, 90EL, TEE,
Suction Line (Fire) (1996):	**m**	1.75	0.3/0.2	DI/SS	2/1	TEE, BFV
Discharge Line (Duty) (1996):	**m**	0.50	0.10	DI/SS	1	BFV
Discharge Line (Fire) (1996):	**m**	0.50	0.20	DI/SS	1	BFV
Pump Station (1996):	**m**	5.45	0.2/0.25/0.3	DI/SS	2/1/1/1	TEE, E, TEE, BFV, R.TEE
Yard Piping (1996):	**m**	2.28	0.30	DICML	2	45EL
Main Pipeline (N/A):	**m**	48.75	0.30	DICML	1	BFV
Exit Elevation:	**m**	85.75				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion, BF=Butterfly Valve

Notes:

7.3.5 O'Connor Drive Res/BS

Reliability Rating	6.5	Overall Rating	B

Total Facility Risk	3.7 /5	Total Equipment Risk	1.8 /5	Condition rating	1.0 /5

Condition Assessment:

Civil / Site: **Good Condition.**

Structural: **Good Condition**

Proc. Mech.: **Good Condition**

Instrument: **Good Condition**

Proc. Elec.: **Good Condition**

Build. Mech.: **Good Condition**

Build. Elec.: **Good Condition**

Priority Work:

None

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
		Review 1	**$ 5,000**				

Review 1:

1) Condition assessment required to establish upgrade requirements.

Other Comments:

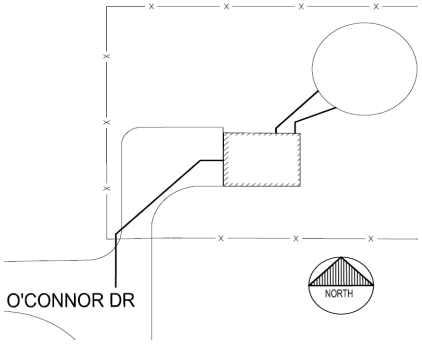
Overall rating 'B' is due to a high Total Facility Risk and its criticality to the system and not its condition.

Pump Station Facility Summary

Facility Name:	O'Connor Drive BS			**Notes:**
Facility Address:	570 O'Connor Drive			
Community/Service Area:	Point Pleasant WTP			
Coordinates (Lat./Long.):	375060.744E, 4901926.122 N			
Reference Drawing(s): Include Revision(s) & Date(s)	C101, P100, P201 & I102, June 2009			
Page No.	Page 1 of 2			
Inflow and Outflow Types	**Units**	**Length**	**Diameter**	
Inflow Pipe Length & Dia.:	**m**	N/A	0.75	
Main Pipeline Length & Dia.:	**m**	N/A	0.60	
Main Discharge Location.	**n/a**	Watermain		
Overflow Pipe Length & D.:	**m**	N/A	N/A	
Overflow Discharge Loc.:	**n/a**	N/A		
Backup Power?:	**n/a**	Yes		
Site Fencing?:	**n/a**	Yes		
CofA/ECA?:	**n/a**	Yes		

Photo: Exterior

Plan View:

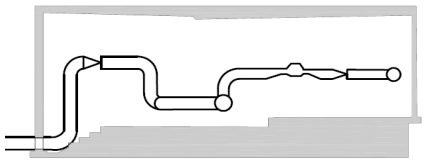


Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**	**Notes:**
Reference Drawing Number:	**n/a**	P201		
Base Elevation & Level:	**m**	106.50	**0.00**	
Low Alarm Elevation:	**m**	N/A	N/A	
Minimum Elevation:	**m**	104.10		
Initial/Normal Elev. & Level:	**m**	N/A	N/A	
Maximum Elevation:	**n/a**	107.37		
High Alarm Elevation:	**m**	N/A	N/A	
Ground Elevation:	**m**	106.50		
Physical Data:	**Units**			
Section (circular, oval, etc…)	**n/a**	N/A		
Average Cross-Section Area:	**sq.m**	N/A		
Length & Width (or Diam.):	**m**	N/A	N/A	

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	O'Connor Drive BS	**Notes:**
Facility Address:	570 O'Connor Drive	
Community/Service Area:	Point Pleasant WTP	
Coordinates (Lat./Long.):	375060.744E, 4901926.122 N	
Reference Drawing(s): Include Revision(s) & Date(s)	C101, P100, P201 & I102, June 2009	
Page No.	Page 2 of 2	

Pump Details

Number of Pumps		3			**Notes:**	
SCADA Flow?		Yes				
SCADA Level?		Yes				
Pump Type		**Lead**	**Lag 1**	**Lag 2**		
Make:		Aurora				
Model ID or Rating:		10-1943235				
Impeller ID or Size:		384mm				
Variable-Speed?:		N/A				
Year Installed		2009.00				
Pump Curve ID in Model:		2PC-1200356CHH, Multiple Point Curve				
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**	**Lag 2**		
Tested Flow (e.g.: Drawdown):	**L/s**	N/A	N/A	N/A		
Shutoff Head	**m**	N/A	N/A	N/A		
Design Head	**m**	60.00	60.00	60.00		
Design Flow	**L/s**	205.00	205.00	205.00		
High Head	**m**	N/A	N/A	N/A		
High Flow	**L/s**	N/A	N/A	N/A		
Pump (Impeller) Elevation:	**m**	107.70	107.70	107.70		

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (2009):	**m**	2.91	0.5/0.25	STEEL	1/1/1	90EL, BFV, E
Discharge Line (2009):	**m**	3.85	0.2/0.4	STEEL	1/1/1	E, CV, BFV
Pump Station (2009):	**m**	27.00	0.6/0.45	STEEL	3/2/1/2	90EL, E, FE, 45EL
Yard Piping (2009):	**m**	33.33	0.60	STEEL	2/1	45EL, BFV
Main Pipeline (2009):	**m**	N/A	0.60	N/A		
Exit Elevation:	**m**	107.44				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

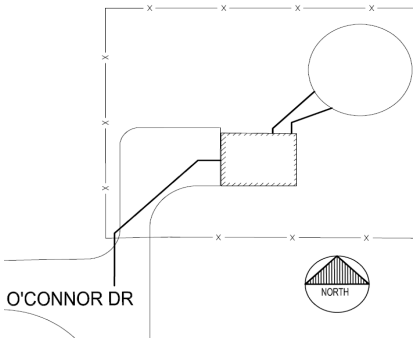
Notes:
'Inlet valve to reservoir was sticking - actuator not matching the set point

Pump Station Facility Summary

Facility Name:	O'Connor Resevoir		**Notes:**
Facility Address:	O'Connor dr.		
Community/Service Area:	Point Pleasant		
Coordinates (Lat./Long.):	375062.893E, 4901927.371N		
Reference Drawing(s): Include Revision(s) & Date(s)	C101, 2011		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.60
Main Pipeline Length & Dia.:	**m**	N/A	6.00
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	N/A
Overflow Discharge Loc.:	**n/a**		
Backup Power?:	**n/a**	Yes	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	N/A	

Photo: Exterior

Plan View:



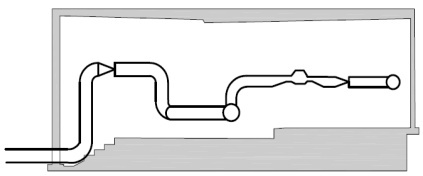
Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	P100	
Base Elevation & Level:	**m**	103.70	**0.00**
Low Alarm Elevation:	**m**	N/A	N/A
Minimum Elevation:	**m**	104.00	0.30
Initial/Normal Elev. & Level:	**m**	N/A	N/A
Maximum Elevation:	**n/a**	N/A	N/A
High Alarm Elevation:	**m**	N/A	N/A
Sensor Elevation	**m**	N/A	N/A
Ground Elevation:	**m**	106.50	2.80
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	N/A	
Average Cross-Section Area:	**sq.m**	28.14	
Length & Width (or Diam.):	**m**	N/A	N/A

Notes:

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	O'Connor Resevoir	**Notes:**
Facility Address:	O'Connor dr.	
Community/Service Area:	Point Pleasant	
Coordinates (Lat./Long.):	375062.893E, 4901927.371N	
Reference Drawing(s): Include Revision(s) & Date(s)	C101, 2011	
Page No.	Page 2 of 2	

Pump Details						
Number of Pumps	0			**Notes:**		
SCADA Flow?	Yes					
SCADA Level?	Yes					
Pump Type		**Lead**	**Lag 1**			
Make:						
Model ID or Rating:						
Impeller ID or Size:						
Variable-Speed?:						
Year Installed						
Pump Curve ID in Model:						
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**					
Shutoff Head	**m**					
Design Head	**m**					
Design Flow	**L/s**					
High Head	**m**					
High Flow	**L/s**					
Pump (Impeller) Elevation:	**m**					

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (N/A):	**m**	N/A	0.60	N/A	2'/2/4	45EL/BF/TE E
Discharge Line (N/A):	**m**	N/A	0.60	N/A	1/'2	C/45EL
Pump Station (N/A):	**m**	N/A	0.20	N/A	1.00	45EL
Yard Piping (N/A):	**m**	N/A	0.60	N/A	2.00	45EL
Main Pipeline (N/A):	**m**	N/A	0.20	N/A		
Exit Elevation:	**m**	105.85				

Legend:
Comments: C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion, BF=Butterfly Valve

Notes:
'Inlet valve to reservoir was sticking - actuator not matching the set point

7.3.6 Progress Avenue Res/BS

Reliability Rating	11.3	Overall Rating	C

Total Facility Risk	2.9 /5	Total Equipment Risk	2.7 /5	Condition rating	1.5 /5

Condition Assessment:

Civil / Site: **Gravel driveway and paths - Good Condition**

Structural: **Generally in good condition. Freshly painted (winter 2014/15). Some water damage evident on floor around inlet piping.**

Proc. Mech.: **Generally in good condition. Aging Pumps.**

Instrument: **Generally in good condition. Aging Pumps Control Panel.**

Proc. Elec.: **Generally in good condition .**

Build. Mech.: **Generally in good condition . Diesel tank not bunded.**

Build. Elec.: **Generally in good condition.**

Priority Work:

None

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
Upgrade 1	**$ 40,000**			**Upgrade 2**	**$ 280,000**	**Upgrade 3**	**$ 6,000**

Upgrade 1:

1) Replace Pump Control Panel

Upgrade 2:

1) Replace Process Mechanical; Instrumentation (excluding Pump Control Panel); Process Electrical; Building Mechanical and Building Electrical.

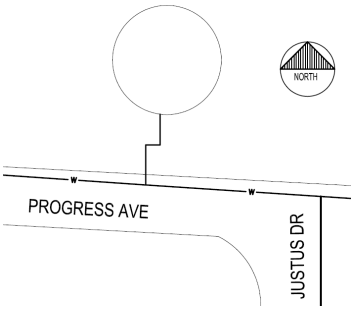
Upgrade 3: Roof Replacement

Pump Station Facility Summary

Facility Name:	Progress Avenue BS			**Notes:**
Facility Address:	725 Progress Avenue			
Community/Service Area:	O'Connor Tower			
Coordinates (Lat./Long.):	374445.991E, 4900324.967N			
Reference Drawing(s): Include Revision(s) & Date(s)	Profiles exterior lines, Site Plan			
Page No.	Page 1 of 2			
Inflow and Outflow Types	**Units**	**Length**	**Diameter**	
Inflow Pipe Length & Dia.:	**m**	N/A	0.25	
Main Pipeline Length & Dia.:	**m**	N/A	0.25	
Main Discharge Location.	**n/a**	Watermain		
Overflow Pipe Length & D.:	**m**	N/A	0.25	
Overflow Discharge Loc.:	**n/a**	N/A	N/A	
Backup Power?:	**n/a**	Yes		
Site Fencing?:	**n/a**	No		
CofA/ECA?:	**n/a**	N/A		

Photo: Exterior

Plan View:

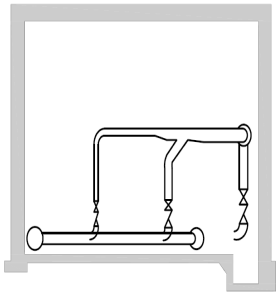


Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**	**Notes:**
Reference Drawing Number:	**n/a**	Piping Section A-A		
Base Elevation & Level:	**m**	91.90	**0.00**	
Low Alarm Elevation:	**m**	N/A	N/A	
Minimum Elevation:	**m**	92.04	0.14	
Initial/Normal Elev. & Level:	**m**	N/A	N/A	
Maximum Elevation:	**n/a**	94.49	2.59	
High Alarm Elevation:	**m**	N/A	N/A	
Ground Elevation:	**m**	N/A	N/A	
Physical Data:	**Units**			
Section (circular, oval, etc…)	**n/a**	N/A		
Average Cross-Section Area:	**sq.m**	N/A		
Length & Width (or Diam.):	**m**	N/A	N/A	

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Progress Avenue BS			**Notes:**		
Facility Address:	725 Progress Avenue					
Community/Service Area:	O'Connor Tower					
Coordinates (Lat./Long.):	374445.991E, 4900324.967N					
Reference Drawing(s): Include Revision(s) & Date(s)	Profiles exterior lines, Site Plan					
Page No.	Page 2 of 2					
Pump Details						
Number of Pumps	3			**Notes:**		
SCADA Flow?	Yes					
SCADA Level?	Yes					
Pump Type		**Lead**	**Lag 1**	**Lag 2**		
Make:		Aurora Pump				
Model ID or Rating:		5x6x17Type OJ				
Impeller ID or Size:		330mm				
Variable-Speed?:		N/A				
Year Installed		N/A				
Pump Curve ID in Model:		Exponential 3-Point Curve		Constant Power Input		
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**	**Lag 2**		
Tested Flow (e.g.: Drawdown):	**L/s**	N/A	N/A	N/A		
Shutoff Head	**m**	67.10	67.10	N/A		
Design Head	**m**	61.00	61.00	73.15		
Design Flow	**L/s**	63.00	63.00	66.24		
High Head	**m**	39.00	39.60	N/A		
High Flow	**L/s**	120.00	120.00	N/A		
Pump (Impeller) Elevation:	**m**	92.35	92.35	92.35		

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Discharge Line (2009):	**m**	3.65	0.25	DI	1/1/2/3/1	CV/45EL/90 EL/GV/E
Pump Station (2009):	**m**	10.97	0.25	DI	3/1/1/1	90El/LAT/CV /GV
Yard Piping (2009):	**m**	N/A	N/A	N/A	N/A	N/A
Main Pipeline (N/A):	**m**		0.25	N/A	N/A	N/A
Exit Elevation:	**m**	92.86				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

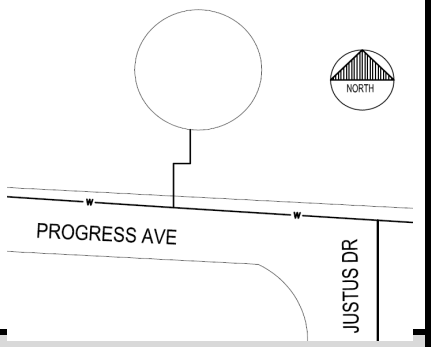
Notes:
'Inlet valve to reservoir was sticking - actuator not matching the set point

Pump Station Facility Summary

Facility Name:	Progress Avenue Resevoir		**Notes:**
Facility Address:	725 Progress Avenue		
Community/Service Area:	O'Connor Tower		
Coordinates (Lat./Long.):	374445.991E, 4900324.967N		
Reference Drawing(s): Include Revision(s) & Date(s)	Profiles exterior lines, Site Plan		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.25
Main Pipeline Length & Dia.:	**m**	N/A	0.25
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.25
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	Yes	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	N/A	

Photo: Exterior

Plan View:



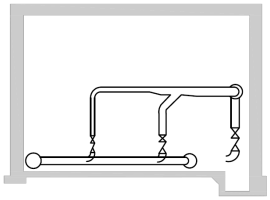
Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	Piping Section A-A	
Base Elevation & Level:	**m**	91.90	**0.00**
Low Alarm Elevation:	**m**	N/A	N/A
Minimum Elevation:	**m**	92.04	0.14
Initial/Normal Elev. & Level:	**m**	N/A	N/A
Maximum Elevation:	**n/a**	94.49	2.59
High Alarm Elevation:	**m**	N/A	N/A
Sensor Elevation	**m**	N/A	N/A
Ground Elevation:	**m**	N/A	N/A
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	N/A	
Average Cross-Section Area:	**sq.m**	42.00	
Length & Width (or Diam.):	**m**	N/A	N/A

Notes:

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Progress Avenue Resevoir	**Notes:**
Facility Address:	725 Progress Avenue	
Community/Service Area:	O'Connor Tower	
Coordinates (Lat./Long.):	374445.991E, 4900324.967N	
Reference Drawing(s): Include Revision(s) & Date(s)	Profiles exterior lines, Site Plan	
Page No.	Page 2 of 2	

Pump Details						
Number of Pumps	0			**Notes:**		
SCADA Flow?	Yes					
SCADA Level?	Yes					
Pump Type		**Lead**	**Lag 1**			
Make:						
Model ID or Rating:						
Impeller ID or Size:						
Variable-Speed?:						
Year Installed						
Pump Curve ID in Model:						
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**					
Shutoff Head	**m**					
Design Head	**m**					
Design Flow	**L/s**					
High Head	**m**					
High Flow	**L/s**					
Pump (Impeller) Elevation:	**m**					

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (N/A):	**m**	5.41	0.25	N/A	3'/2/3	90EL/GV/TEE
Discharge Line (N/A):	**m**	3.65	0.25	N/A	1/'1/2/3/1	CV/45EL/90EL/GV/E
Pump Station (N/A):	**m**	10.97	0.25	N/A	3/1/1/1	90El/LAT/CV/GV
Yard Piping (N/A):	**m**	N/A	N/A	N/A	N/A	N/A
Main Pipeline (N/A):	**m**	N/A	N/A	N/A	N/A	N/A
Exit Elevation:	**m**	N/A				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion, BF=Butterfly Valve

Notes:
Usually run manually.. Pump used to turn over resvoir to tower

7.3.7 Third Avenue Res/BS

Reliability Rating	19.4	Overall Rating	C		
Total Facility Risk	2.9 /5	Total Equipment Risk	3.0 /5	Condition rating	2.3 /5

Condition Assessment:

Civil / Site: **Asphalt Driveway, Concrete paths and chain link fence in good condition.**

Structural: **Evidence of leak from roof; water damage to floor and walls around piping.**

Proc. Mech.: **Leaking pump bodies; some bolting on the pump casing loose; corrosion present on pump pedestal; standing water on floors; piping show signs of corrosion.**

Instrument: **Good Condition**

Proc. Elec.: **All components aged beyond design life. Diesel motor runs emergency pump - aging.**

Build. Mech.: **Generally in good condition. Diesel Tank shows evidence of leakage from filler pipe.**

Build. Elec.: **Aging, but generally in good condition.**

Priority Work:

1) Total Process Electrical upgrade. (45000)
2) Diesel Tank to be reviewed and replaced if required or add new gas generator (Cost Not Included)
3) Review to assess the water loss and moisture build up present. (3000)
4) Review/Replace roof of BS. (15000)

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
Upgrade 1	**$ 550,000**			**Upgrade 2**	**$ 400,000**	**Upgrade 3**	**$ 6,000**

Upgrade 1:
1) Replace Pumps; Diesel Motor for emergency Pump and Building Electrical.
2) Consider upgrade 2 during this work. (See upgrade 2 Price)

Upgrade 2:
1) Replace Process Mechanical (excluding Pumps); Instrumentation; Building Mechanical and Building Electrical.

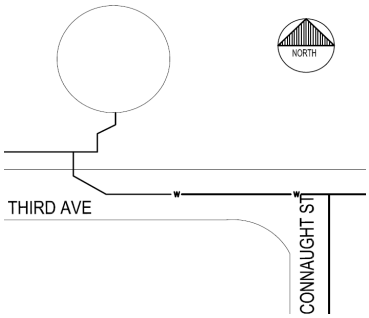
Upgrade 3: Roof Replacement

Pump Station Facility Summary

Facility Name:	Third Ave BS			**Notes:**
Facility Address:	Third ave and victoria			
Community/Service Area:	King			
Coordinates (Lat./Long.):	379779.747E, 4899934.947N			
Reference Drawing(s): Include Revision(s) & Date(s)	DWG No. 9 - June 1964			
Page No.	Page 1 of 2			
Inflow and Outflow Types	**Units**	**Length**	**Diameter**	
Inflow Pipe Length & Dia.:	**m**	N/A	0.46	
Main Pipeline Length & Dia.:	**m**	N/A	0.61	
Main Discharge Location.	**n/a**	Watermain		
Overflow Pipe Length & D.:	**m**	N/A	N/A	
Overflow Discharge Loc.:	**n/a**	N/A		
Backup Power?:	**n/a**	Yes		
Site Fencing?:	**n/a**	No		
CofA/ECA?:	**n/a**	N/A		

Photo: Exterior

Plan View:

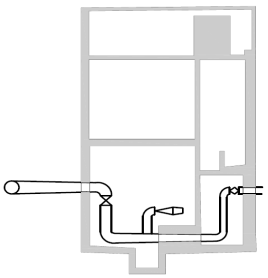


Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**	**Notes:**
Reference Drawing Number:	**n/a**	DWG No. 9 - June 1964		
Base Elevation & Level:	**m**	102.03	**0.00**	
Low Alarm Elevation:	**m**			
Minimum Elevation:	**m**	103.10	1.07	
Initial/Normal Elev. & Level:	**m**			
Maximum Elevation:	**n/a**	107.59	5.56	
High Alarm Elevation:	**m**			
Ground Elevation:	**m**	108.05	6.02	
Physical Data:	**Units**			
Section (circular, oval, etc…)	**n/a**	N/A		
Average Cross-Section Area:	**sq.m**	N/A		
Length & Width (or Diam.):	**m**	N/A	N/A	

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Third Ave BS			**Notes:**		
Facility Address:	Third ave and victoria					
Community/Service Area:	King					
Coordinates (Lat./Long.):	379779.747E, 4899934.947N					
Reference Drawing(s): Include Revision(s) & Date(s)	DWG No. 9 - June 1964					
Page No.	Page 2 of 2					
Pump Details						
Number of Pumps	3			**Notes:**		
SCADA Flow?	No					
SCADA Level?	Yes					
Pump Type		**Lead**	**Lag 1**	**Lag 2**		
Make:		Sandham Eng.				
Model ID or Rating:		ITTAC8x8SF-V				
Impeller ID or Size:		287mm				
Variable-Speed?:		No				
Year Installed		1964.00				
Pump Curve ID in Model:		TAR1+2, Multiple Point		Constant Power Input		
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**	**Lag 2**		
Tested Flow (e.g.: Drawdown):	**L/s**	N/A	N/A	N/A		
Shutoff Head	**m**	N/A	N/A	N/A		
Design Head	**m**	41.12	41.12	N/A		
Design Flow	**L/s**	141.95	141.95	N/A		
High Head	**m**	110.65	110.65	110.53		
High Flow	**L/s**	N/A	N/A	N/A		
Pump (Impeller) Elevation:	**m**	103.48	103.48	103.48		

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (1964):	**m**	1.70	0.3048/0.2032	DI	1	GV/E
Discharge Line (1964):	**m**	3.40	0.2032/0.254	DI	1/5/1/1	E/90EL/CV/GV
Pump Station (1964):	**m**	3.40	0.46	DI	N/A	N/A
Yard Piping (1964):	**m**	N/A	N/A	N/A	N/A	N/A
Main Pipeline (N/A):	**m**	N/A	0.60	N/A	N/A	N/A
Exit Elevation:	**m**	107.91				

Legend:

C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion

Notes:

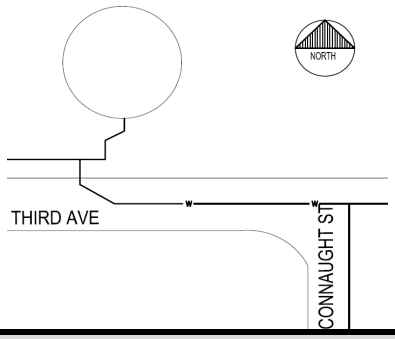
'Inlet valve to reservoir was sticking - actuator not matching the set point

Pump Station Facility Summary

Facility Name:	Third Ave Resevoir		**Notes:**
Facility Address:	Third ave and victoria		
Community/Service Area:	King		
Coordinates (Lat./Long.):	379779.747E, 4899934.947N		
Reference Drawing(s): Include Revision(s) & Date(s)	DWG No. 9 - June 1964		
Page No.	Page 1 of 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.46
Main Pipeline Length & Dia.:	**m**	N/A	0.61
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	N/A
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	N/A	
Site Fencing?:	**n/a**	No	
CofA/ECA?:	**n/a**	N/A	

Photo: Exterior

Plan View:



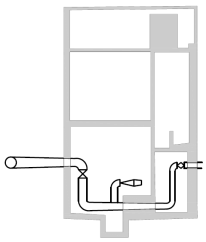
Storage Well & Pump Suction Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	Plans and sections -	
Base Elevation & Level:	**m**	102.03	**0.00**
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**	103.10	1.07
Initial/Normal Elev. & Level:	**m**		
Maximum Elevation:	**n/a**	107.59	5.56
High Alarm Elevation:	**m**		
Sensor Elevation	**m**		
Ground Elevation:	**m**	108.05	6.02
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	N/A	
Average Cross-Section Area:	**sq.m**	71.80	
Length & Width (or Diam.):	**m**	N/A	N/A

Notes:

Photo: Interior

Profile View:



Pump Station Facility Summary

Facility Name:	Third Ave Resevoir	**Notes:**
Facility Address:	Third ave and victoria	
Community/Service Area:	King	
Coordinates (Lat./Long.):	379779.747E, 4899934.947N	
Reference Drawing(s): Include Revision(s) & Date(s)	DWG No. 9 - June 1964	
Page No.	Page 2 of 2	

Pump Details

Number of Pumps		0		**Notes:**		
SCADA Flow?		No				
SCADA Level?		Yes				
Pump Type		**Lead**	**Lag 1**			
Make:						
Model ID or Rating:						
Impeller ID or Size:						
Variable-Speed?:						
Year Installed						
Pump Curve ID in Model:						
Flow and Level Set Points	**Units**	**Lead**	**Lag 1**			
Tested Flow (e.g.: Drawdown):	**L/s**					
Shutoff Head	**m**					
Design Head	**m**					
Design Flow	**L/s**					
High Head	**m**					
High Flow	**L/s**					
Pump (Impeller) Elevation:	**m**					

Piping Details					**Minor Losses**	
Description (Year Installed)	**Units**	**Length**	**Diameter**	**Mat.**	**Qty.**	**Type**
Suction Line (N/A):	**m**	1.70	0.3048/0.2032	N/A	1/'1	GV/E
Discharge Line (N/A):	**m**	3.40	0.2032/0.254	N/A	1'/5/1/1	E/90EL/CV/GV
Pump Station (N/A):	**m**	3.40	0.46	N/A	N/A	N/A
Yard Piping (N/A):	**m**	N/A	N/A	N/A	N/A	N/A
Main Pipeline (N/A):	**m**	N/A	N/A	N/A	N/A	N/A
Exit Elevation:	**m**	N/A				

Legend:
C = Contraction/Reducer , 90EL = 90 DEG Elbow, CV = Check Valve, MF = Magnetic Flow Meter, GV = Gate Valve, 45EL = 45 Deg Elbow, E = Expansion, BF=Butterfly Valve

Notes:

7.4.1 Creekford Rd EST

Reliability Rating	6.8	Overall Rating	B		
Total Facility Risk	3.8 /5	Total Equipment Risk	1.8 /5	Condition rating	1.0 /5

Condition Assessment:

Civil / Site:	**Good Condition**
Structural:	**Good Condition**
Proc. Mech.:	**Good Condition**
Instrument:	**Good Condition**
Proc. Elec.:	**Good Condition**
Build. Mech.:	**Good Condition**
Build. Elec.:	**Good Condition**

Priority Work:

None

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
		Review 1	**$ 5,000**				

Review 1:

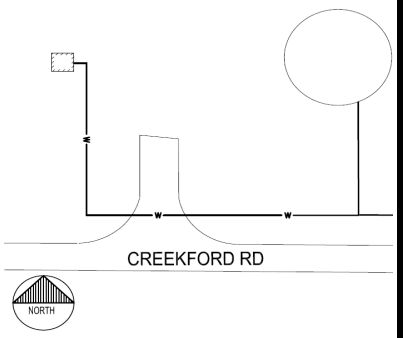
1) Condition assessment required to establish upgrade requirements.

Other Comments:

Overall rating 'B' is due to a high Total Facility Risk and its criticality to the system and not its condition.

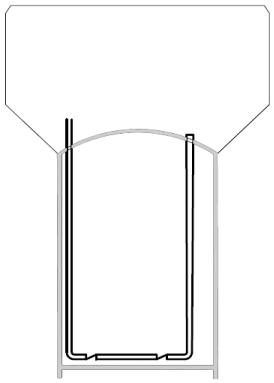
Storage Facility Summary

Facility Name:	Creekford Water Tower		
Facility Address:	2574 Creekford rd		
Community/Service Area:	Point Pleasant		
Coordinates (Lat./Long.):	374105.992E, 4903943.275N		
Reference Drawing(s): Include Revision(s) & Date(s)	G3, 2004		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.3 / 0.45
Main Pipeline Length & Dia.:	**m**	N/A	0.3 / 0.45
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.30
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	N/A	
Site Fencing?:	**n/a**	Yes	
CofA/ECA?:	**n/a**	N/A	



Storage Well Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	M2	
Base Elevation & Level:	**m**	122.05	**0.00**
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**	145.98	23.93
Initial/Normal Elev. & Level:	**m**		
Maximum Elevation:	**n/a**		
High Alarm Elevation:	**m**	160.70	38.65
Sensor Elevation	**m**		
Ground Elevation:	**m**	121.90	-0.15
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Circular	
Average Cross-Section Area:	**sq.m**	TCCREEKFORD, Model Curve	
Length & Width (or Diam.):	**m**		



7.4.2 Innovation Drive EST

Reliability Rating	6.0	Overall Rating	B

Total Facility Risk	3.4 /5	Total Equipment Risk	1.8 /5	Condition rating	1.0 /5

Condition Assessment:

Civil / Site: **Good Condition**

Structural: **Good Condition**

Proc. Mech.: **Good Condition**

Instrument: **Good Condition**

Proc. Elec.: **Good Condition**

Build. Mech.: **Good Condition**

Build. Elec.: **Good Condition**

Priority Work:

None

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
		Review 1	**$ 5,000**				

Review 1:

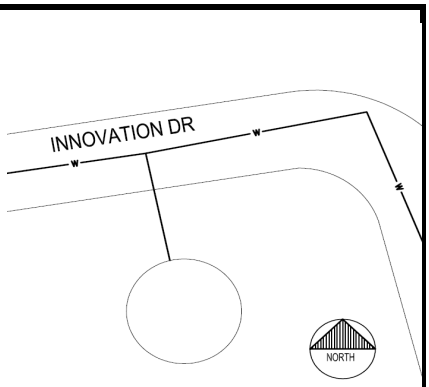
1) Condition assessment required to establish upgrade requirements.

Other Comments:

Overall rating 'B' is due to a high Total Facility Risk and its criticality to the system and not its condition.

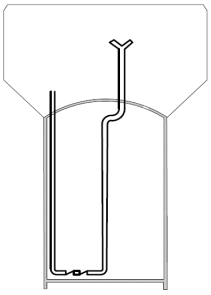
Storage Facility Summary

Facility Name:	Innovation Dr. Water Tower		
Facility Address:	Innovation Dr.		
Community/Service Area:	King st.		
Coordinates (Lat./Long.):	385346.061E, 4903162.048N		
Reference Drawing(s): Include Revision(s) & Date(s)	_20120112_0001		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.30
Main Pipeline Length & Dia.:	**m**	N/A	0.30
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.30
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	N/A	
Site Fencing?:	**n/a**	Yes	
CofA/ECA?:	**n/a**	N/A	



Storage Well Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	_20120112_0001	
Base Elevation & Level:	**m**	346.75	0.00
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**	456.77	110.02
Initial/Normal Elev. & Level:	**m**		
Maximum Elevation:	**n/a**		
High Alarm Elevation:	**m**	497.06	150.31
Sensor Elevation	**m**		
Ground Elevation:	**m**	357.02	10.27
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Circular	
Average Cross-Section Area:	**sq.m**	286.30	
Length & Width (or Diam.):	**m**	13.56	



7.4.3 O'Connor Drive EST

Reliability Rating	13.1	Overall Rating	C

Total Facility Risk	3.8 /5	Total Equipment Risk	2.4 /5	Condition rating	1.5 /5

Condition Assessment:

Civil / Site: **Chain Link Fence and gate; Parking at Fire station. No Paths. Good Condition**

Structural: **Tower, accessways & Ladders/Stairs - good condition.**
Control Room - Good Condition but aging

Proc. Mech.: **Observed piping in good condition, no valves assessed.**

Instrument: **Good Condition**

Proc. Elec.: **Good Condition**

Build. Mech.: **Good Condition**

Build. Elec.: **Good Condition**

Priority Work:

Sump Pump in valve pit to be replaced. **(2000)**

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
		Upgrade 1	**$ 50,000**	**Upgrade 2**	**$ 150,000**	**Upgrade 3**	**$ 4,000**

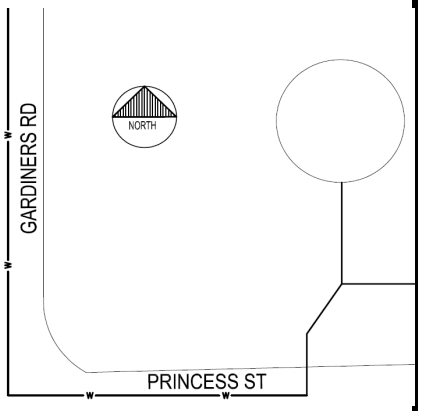
Upgrade 1:
1) Replace - Building Mechanical
2) Consider upgrade 2 during this work. (See upgrade 2 Price)

Upgrade 2:
1) Replace - Instrumentation, Process Electrical and Building Electrical.
2) Consider upgrading control room structurally and Process Mechanical (Price not Included)

Upgrade 3: Roof Replacement

Storage Facility Summary

Facility Name:	O'Connor Dr. Water Tower		
Facility Address:	O'Connor dr and Gardiners rd.		
Community/Service Area:	Point Pleasant		
Coordinates (Lat./Long.):	374938.664E, 4901593.807N		
Reference Drawing(s): Include Revision(s) & Date(s)	1962 General Plan		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.30
Main Pipeline Length & Dia.:	**m**	N/A	0.30
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.20
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	N/A	
Site Fencing?:	**n/a**	Yes	
CofA/ECA?:	**n/a**	N/A	



Storage Well Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	1962 General Plan	
Base Elevation & Level:	**m**	0.00	**0.00**
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**	25.53	25.53
Initial/Normal Elev. & Level:	**m**		
Maximum Elevation:	**n/a**	32.00	32.00
High Alarm Elevation:	**m**		
Sensor Elevation	**m**		
Ground Elevation:	**m**		
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Circular	
Average Cross-Section Area:	**sq.m**	67.40	
Length & Width (or Diam.):	**m**	13.11	

7.4.4 Tower Street EST

Reliability Rating	21.4	Overall Rating	C

Total Facility Risk	3.8 /5	Total Equipment Risk	2.7 /5	Condition rating	2.1 /5

Condition Assessment:

Civil / Site: **Chain Link Fence and gate - Good Condition**
Gravel Driveway has potholes from recent construction.

Structural: **Tower, accessways & Ladders/Stairs - good condition.**
Control Room - Good Condition but aging. Accessway to valve pit - difficult to gain entry.

Proc. Mech.: **Actuated Valve - corrosion present on valve body and actuator aged betond design life.**
Piping in good condition

Instrument: **Good Condition**

Proc. Elec.: **Good Condition**

Build. Mech.: **Good Condition, but aging.**

Build. Elec.: **Good Condition**

Priority Work:

1) Repair Potholes in driveway ($ 2,000)

2) Replace Sump pump in valve pit ($ 2,000)

3)

Work required 5-25 Years:

Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
Upgrade 1	**$ 250,000**			**Upgrade 2**	**$ 150,000**		

Upgrade 1:

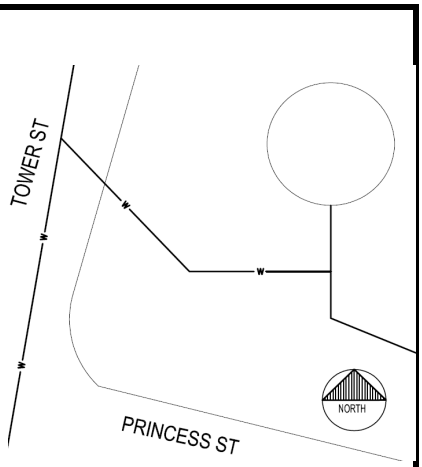
1) Replace Building Mechanical, Actuated Valve and manual valves.

Upgrade 2:

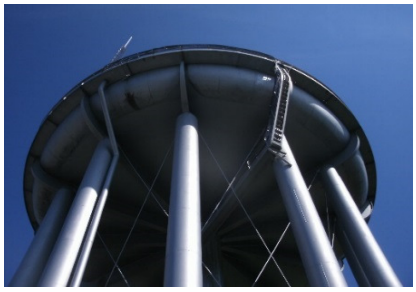
1) Replace - Instrumentation, Process Electrical and Building Electrical.
2) Consider upgrading control room structurally (Price not Included)

Storage Facility Summary

Facility Name:	Tower St. Water Tower		
Facility Address:	Tower st. and Princess St.		
Community/Service Area:	Ravensview		
Coordinates (Lat./Long.):	374938.664E, 4901593.807N		
Reference Drawing(s): Include Revision(s) & Date(s)	Tower Drain 1956		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.41
Main Pipeline Length & Dia.:	**m**	N/A	0.41
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.30
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	No	
Site Fencing?:	**n/a**	Yes	
CofA/ECA?:	**n/a**	N/A	



Storage Well Details			
Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	1954 General Plan	
Base Elevation & Level:	**m**	0.00	**0.00**
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**	24.40	24.40
Initial/Normal Elev. & Level:	**m**		
Maximum Elevation:	**n/a**	32.00	32.00
High Alarm Elevation:	**m**		
Sensor Elevation	**m**		
Ground Elevation:	**m**		
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Circular	
Average Cross-Section Area:	**sq.m**	433.70	
Length & Width (or Diam.):	**m**	23.5	



7.4.5 Forest Drive Standpipe

Reliability Rating	6.7	Overall Rating	B

Total Facility Risk	2.4 /5	Total Equipment Risk	2.2 /5	Condition rating	1.3 /5

Condition Assessment:

Civil / Site: **Gravel drive and Chain link fence - good condition.**

Structural: **Tower, accessways & Ladders/Stairs - good condition.**
Control Room - Good Condition but aging.

Proc. Mech.: **Piping assessed in good condition.**
Valves not assessed

Instrument: **Good Condition**

Proc. Elec.: **Good Condition**

Build. Mech.: **Good Condition**

Build. Elec.: **Good Condition**

Priority Work:

None

Work required 5-25 Years:

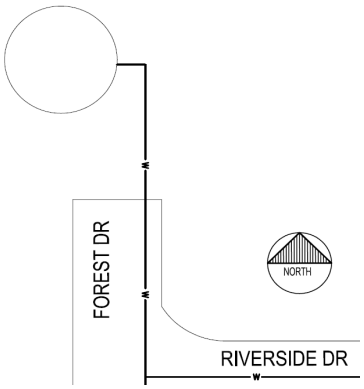
Repair/Upgrade & Cost							
5-10 Years		10-15 Years		15-20 Years		20-25 Years	
				Upgrade 1	**$ 250,000**		

Upgrade 1:

1) Replace - Auxilary Piping, Instrumentation, Process Electrical, Building Mechanical and Building Electrical.
2) Consider upgrading control room structurally (Price not Included)

Storage Facility Summary

Facility Name:	Forest Dr. Water Tower		
Facility Address:	Forest Dr.		
Community/Service Area:	King st		
Coordinates (Lat./Long.):	389510.491E, 4901336.659N		
Reference Drawing(s): Include Revision(s) & Date(s)	1981, 2		
Inflow and Outflow Types	**Units**	**Length**	**Diameter**
Inflow Pipe Length & Dia.:	**m**	N/A	0.3 / 0.45
Main Pipeline Length & Dia.:	**m**	N/A	0.3 / 0.45
Main Discharge Location.	**n/a**	Watermain	
Overflow Pipe Length & D.:	**m**	N/A	0.30
Overflow Discharge Loc.:	**n/a**	N/A	
Backup Power?:	**n/a**	N/A	
Site Fencing?:	**n/a**	Yes	
CofA/ECA?:	**n/a**	N/A	



Storage Well Details

Operational Data	**Units**	**HGL**	**Level**
Reference Drawing Number:	**n/a**	389510.491E, 4901336.659N	
Base Elevation & Level:	**m**		0.00
Low Alarm Elevation:	**m**		
Minimum Elevation:	**m**		
Initial/Normal Elev. & Level:	**m**		14.00
Maximum Elevation:	**n/a**		47.50
High Alarm Elevation:	**m**		
Sensor Elevation	**m**		
Ground Elevation:	**m**	104.24	
Physical Data:	**Units**		
Section (circular, oval, etc…)	**n/a**	Circular	
Average Cross-Section Area:	**sq.m**	38.48	
Length & Width (or Diam.):	**m**	7	

8 CAPITAL IMPROVEMANT PLAN AND ASSET VALUATION SUMMARY

8.1 CAPITAL IMPROVEMENT

Table 8-1 below shows the estimated cost of capital improvement over a 25 year period. The cost for each five year period is calculated using the estimated cost of repairs as detailed on the Asset Summary Sheets (Section 7). The cost of improvement in the near future (0-5 years) does not include any current improvements underway or already committed.

Table 8-1 Estimated Cost of Capital Improvement for a 25 Year Period

	0-5 YEARS	5-10 YEARS	10-15 YEARS	15-20 YEARS	20-25 YEARS
Collins Bay Road BS					
James St BS	$60,000	$250,000	$450,000		$80,000
Old Colony Rd BS	$5,000			$25,000	$300,000
Purdys BS (Sydenham Rd)	$200	$60,000		$450,000	
O'Connor Drive Res/BS			$5,000		
Progress Avenue Res/BS		$40,000		$280,000	$6,000
Third Avenue Res/BS	$63,000	$550,000		$400,000	$6,000
Creekford Rd EST			$5,000		
Innovation Drive EST			$5,000		
O'Connor Drive EST	$2,000		$50,000	$150,000	$4,000
Tower Street EST	$4,000	$250,000		$150,000	
Forest Drive Standpipe				$250,000	
Cana WTP	$10,000				
King St WTP	$175,000	$50,000	$30,000		
Point Pleasant WTP					
TOTAL	**$ 319,200**	**$ 1,200,000**	**$ 545,000**	**$ 1,705,000**	**$ 396,000**

As can be seen from the graph in Figure 8-1 below, the cost of capital improvements is spread across all five year periods from 0 to 25 years. This is due to an array of years of construction or last upgrade of the facilities and the life-time of the components, with the concentration of expenditure falling in years 15-20.

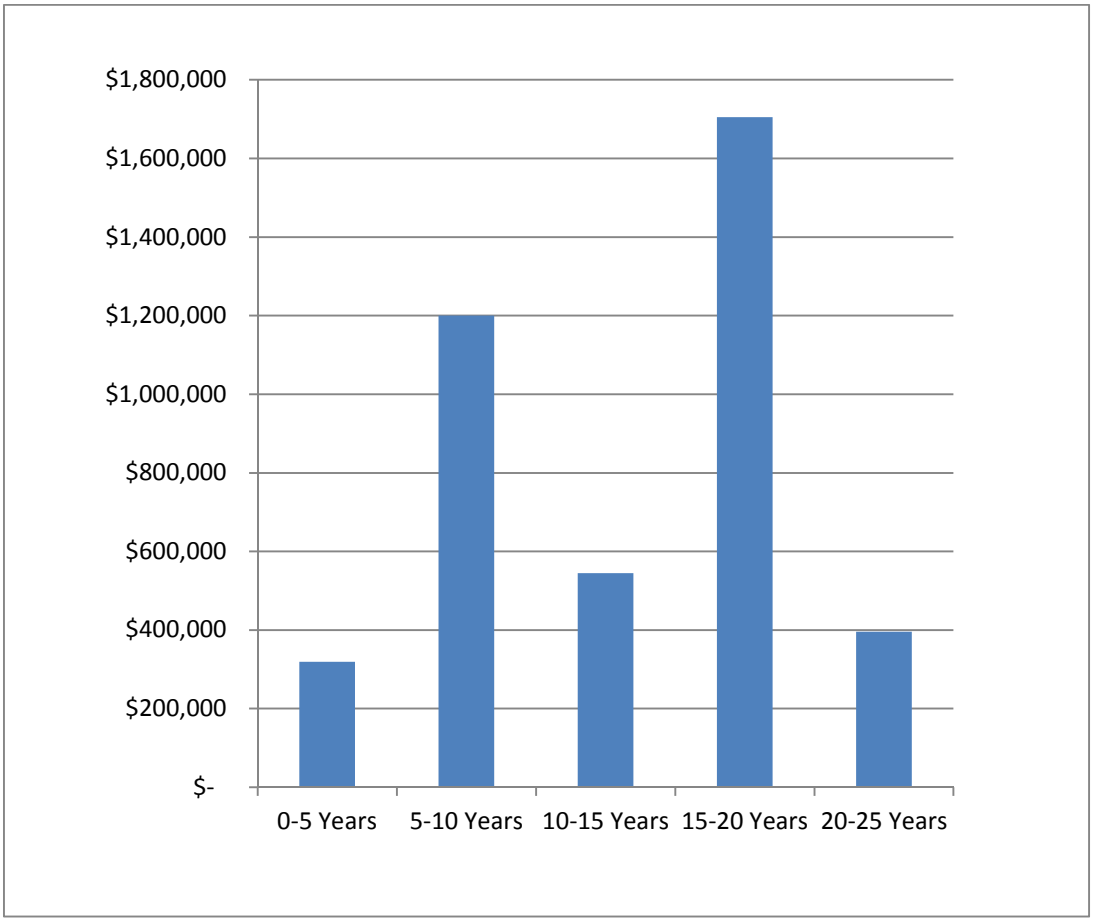


Figure 8-1 Estimated Cost of Capital Improvements (0-25 Years)

Figure 8-2 below shows a the combination of similar upgrades as indicated in the Condition Assessment Sheets (i.e. consider upgrade 2 during upgrade 1 due to similar type of work). This approach provides a better value by combining upgrades, and reduces the general requirements that are typically carried in most contracts. This reallocation includes completing all three upgrades at the James Street Booster Station and both suggested upgrades at Third Avenue Booster Station in the 5-10 year time step and completing upgrades 1 and 2 at the O'Connor Drive EST in the 10-15 year time step. While this does not provide a more balanced expenditure, it does provide better value for Utilities Kingston.

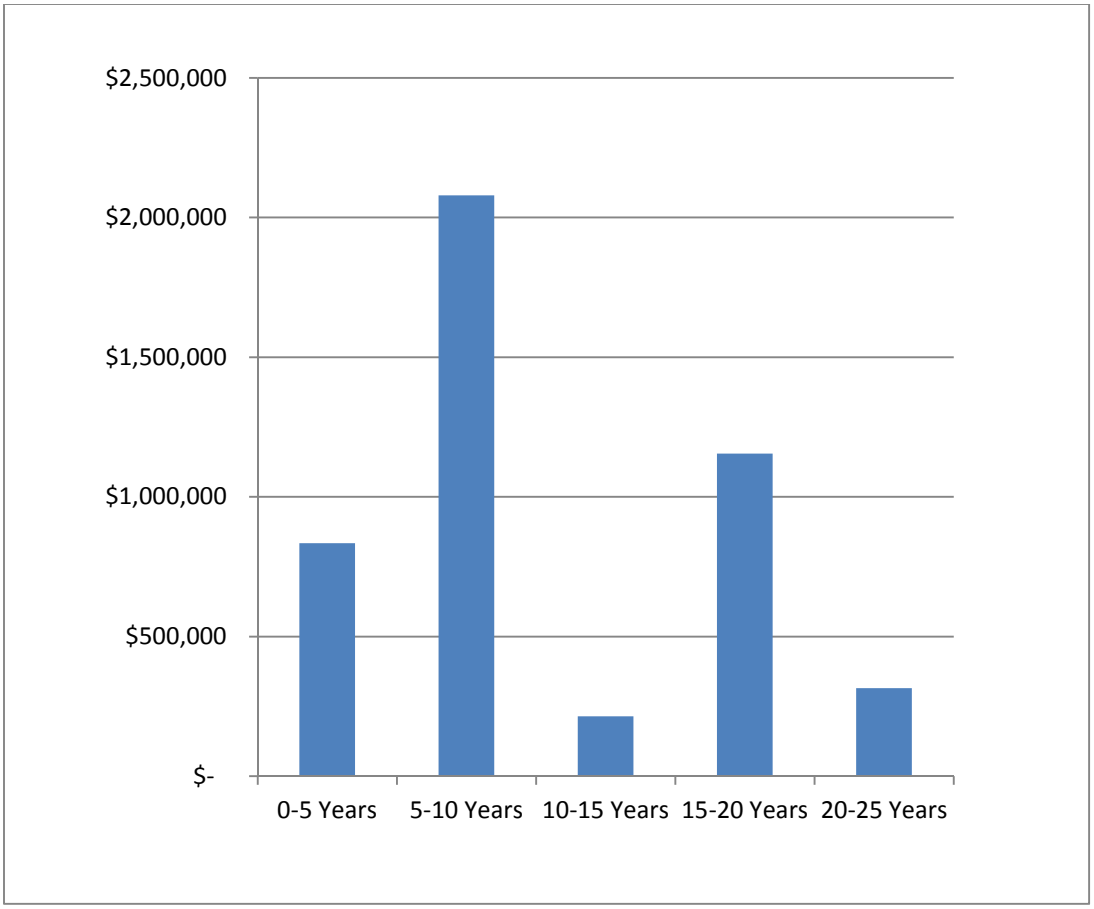


Figure 8-2 Estimated Cost of Capital Improvements for PS (0-25 Years) - Rebalance of Expenditure

8.2 ASSET REPLACEMENT VALUE SUMMARY

The following table provides a summary of the estimated replacement value associated with each pumping station. Estimates were based on WSP's knowledge of pumping station cost, using recently tendered quotes within eastern Ontario as a bench mark.

Replacement value included a complete rebuild of the facility, with replacement of all equipment ("Like" for "Like").

Table 8-2 Estimated Replacement Value for Water Facilities

FACILITY NAME	STANTEC (2008 STUDY)	WSP (2015 STUDY)	% OF TOTAL VALUE
Collins Bay Road BS	$ 239,259	$ 386,000	1.3%
James St BS	$ 1,477,269	$ 3,167,000	10.7%
Old Colony Rd BS	$ 310,657	$ 561,000	1.9%
Purdys BS (Sydenham Rd)	$ 305,773	$ 773,000	2.6%

O'Connor Drive Res/BS	N/A	$ 3,878,000	13.1%
Progress Avenue Res/BS	N/A	$ 3,837,000	13.0%
Third Avenue Res/BS	N/A	$ 4,012,000	13.5%
Creekford Rd EST	N/A	$ 3,574,000	12.1%
Innovation Drive EST	N/A	$ 3,399,000	11.5%
O'Connor Drive EST	N/A	$ 1,792,000	6.1%
Tower Street EST	N/A	$ 2,029,000	6.9%
Forest Drive Standpipe	N/A	$ 2,204,000	7.4%
Total	**$ 2,332,958**	**$ 29,612,000**	**100.0%**

Table 8-3 Estimated Replacement Value for Water Treatment Facilities

FACILITY NAME	STANTEC (2008 STUDY)	WSP (2015 STUDY)	% OF TOTAL VALUE
Cana WTP		$ 800,000	0.5%
King St WTP		$ 60,000,000	36.2%
Point Pleasant WTP		$ 105,000,000	63.3%
Total		$ 165,800,000	100.0%

**Stantec's cost estimate includes – Construction Cost; General Overhead and Profit; Bond and Insurance; and a 15% Contingency. For ease of comparison WSP have retained this approach.*
**WSP suggest that a 15% Engineering fee be added to the costs above to get a total estimated cost of replacement.*
**The Point Pleasant WTP replacement cost are based on the existing WTP and do not account for the current upgrades.*

Appendix A

PUMP PERFORMANCE CHECK SHEETS

DATE - 3rd June 2015

Collins Bay Road Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1		68.5	104.5							Pressure Units =Kpa Flow Units = Time measured (nearest 5 min) =1:35
2										Time measured (nearest 5 min) =
3				68.5	103					Time measured (nearest 5 min) =1:40
4										Time measured (nearest 5 min) =
5										Time measured (nearest 5 min) =
Notes: Pumps 1 and 2 could not run at the same time.										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

DATE - 3rd June 2015

James Street Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1	520							760		Pressure Units = Flow Units = Time measured (nearest 5 min) =10:20
2	520							760		Time measured (nearest 5 min) =10:35
3	520							760		Time measured (nearest 5 min) =10:50
4										Time measured (nearest 5 min) =
5										Time measured (nearest 5 min) =
Note: Only one pump able to run at a time.										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

DATE - 3rd June 2015

Old Colony Road Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1		72	101.4							Pressure Units =Kpa Flow Units = Time measured (nearest 5 min) =10:00
2										Time measured (nearest 5 min) =
3				72	102.3					Time measured (nearest 5 min) =10:25
4										Time measured (nearest 5 min) =
5										Time measured (nearest 5 min) =
Notes: Both pumps were boosting pressure not flow. Could not run two pumps at the same time										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere.

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything.

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible.

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

DATE - 3rd June 2015

Sydenham Road Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1		68.5	104.5							Pressure Units =Kpa Flow Units = Time measured (nearest 5 min) =1:35
2										Time measured (nearest 5 min) =
3				68.5	103					Time measured (nearest 5 min) =1.40
4										Time measured (nearest 5 min) =
5										Time measured (nearest 5 min) =
Note: Pumps 1 and 2 cant run at the same time.										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

DATE - 3rd June 2015

O'Connor Drive Booster Station: Performance Check

Run	Suction Header	Pump 1		Pump 2		Pump 3		Discharge Header		Comments
	Pressure	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pump Suction	Pump Discharge	Pressure	Flow	
1	240	110	530					530	11.1	Pressure Units =Kpa Flow Units =m^3/min Time measured (nearest 5 min) =11:05
2	240	110	530	70	550			550	12.4	Time measured (nearest 5 min) =11:10
3	240			70	525					Time measured (nearest 5 min) =11:20
4	240			70	525	70	525			Time measured (nearest 5 min) =11:30
5	240					75	530			Time measured (nearest 5 min) =11:35
6										

Notes:

1 Notify central control room prior to beginning operations. No other changes should occur in the system, e.g.: pump starts/stops or hydrant tests elsewhere.

2 Only normal pump starts and stops are required, activated remotely (auto) or locally by an experienced Operator if he/she agrees it is safe. WSP does not operate anything.

3 Write-down any excessive noise, vibration or other notable fact or anecdote contributed by Operators. Photo/video of each pump running if possible.

4 Once tests are done, call the central operations centre to let them know WSP is leaving the facility.

Appendix B

FIELD ASSESSMENT SHEETS – BOOSTER STATIONS, RESERVOIRS, ELEVATED STORAGE AND STANDPIPES

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	Booster station no longer in use				
Paths					
Gates/Fences					
Drainage					
Over flow Chanels					

Civil/Site	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Well					
Roof					
Walls - Exterior					
Walls - Interior					
Foundations					
Access Ways					
Ladders					

Structural	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Process Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Process Pumps					
Main Process Piping					
Pipe Supports					
Main Process Valves - Manual On/Off					
Main Process Valves - Actuated					
Main Process Valves - Check					
Filters/Strainers					
Dosing System					
Sampling System					
Auxilary Pipe and Valves (Sampling/Dosing)					
Sample Pumps					
Insulation					
Sump Pump					

Process Mechanical	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel					
Instrument Panels					
Sensors and Transmitters					
Gauges					
Flowmeters					
Auxilary Instrumentation (Sampling/Dosing)					
Flood Alarm					

Instrumentation	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed					
Utility Metering Panel					
Main Breaker					
Distribution Panel					
Transformer					
Back up power source					

Process Electrical	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Building Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Tanks					
HVAC					
Davits					
Fire extinguisher					
Eye wash station					
Heaters					
Thermostats					

Building Mechanical	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Collins Bay Road BS	**Inspection By:**	RW + JS
Inspection Location:	865 Collins Bay Road	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Network Access panel					
Interior Lighting					
Exterior Lighting					
Emergency lighting					
Smoke alarms					

Building Electrical	
Overall Risk Level	
Overall Effective Life Remaining	
Overall Condition rating	

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- Booster station no longer in use

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	Asphalt driveway - good condition	1	N	25	1
Paths	Concrete paths - good condition	1	N	25	1
Gates/Fences	Not Applicable				
Drainage	Not Applicable				
Over flow Chanels	Not Applicable				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	25.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	Dry well - some evidence of water damage on floor and walls - good condition	2	N	20	2
Roof	Visibly in Good Condition	1	N	10	1
Walls - Exterior	Good condition	1	N	22	1
Walls - Interior	Good condition	1	N	22	1
Foundations	Good Condition	1	N	22	1
Access Ways	All doors and access ways - Good Condition	1	N	22	1
Ladders	Ladder - Good Condition	1	N	22	1

Structural	
Overall Risk Level	1.1
Overall Effective Life Remaining	20.0
Overall Condition rating	1.1

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	Aging - leaking pump bodies. Lots of standing water on floor and in pipe trenches.	3	Y	12	3
Main Process Piping	Aging - Rust present, condensation. Newer by-pass piping	2	N	15	3
Pipe Supports	Concrete and metalic supports in good condition.	2	N	15	2
Main Process Valves - Manual On/Off	Good Condition	2	N	20	2
Main Process Valves - Actuated	Good Condition	1	N	20	1
Main Process Valves - Check	Showing signs of corrosion	2	N	15	3
Filters/Strainers	Not Applicable				
Dosing System	Not Applicable				
Sampling System	Good condition	1	N	15	1
Auxilary Pipe and Valves (Sampling/Dosing)	Auxilary piping leaking	2	N	10	3
Sample Pumps	Not Applicable				
Insulation	Not Applicable				
Sump Pump	Good condition	2		10	2

Process Mechanical	
Overall Risk Level	2.1
Overall Effective Life Remaining	16.5
Overall Condition rating	2.5

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Instrumentation and Controls/SCADA

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Pump Control Panel	Good condition	1		20	1
Instrument Panels	Needs to be upgraded	3		3	3
Sensors and Transmitters	Good Condition	1		15	1
Gauges	Good Condition	1		15	1
Flowmeters	Good Condition	1		15	1
Auxilary Instrumentation (Sampling/Dosing)	Good Condition	1		15	1

Instrumentation	
Overall Risk Level	1.3
Overall Effective Life Remaining	13.8
Overall Condition rating	1.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	**1**		**20**	**1**
Main Breaker	**Good condition**	**1**		**20**	**1**
Distribution Panel	**Good condition**	**1**		**20**	**1**
Transformer	**Good condition**	**1**		**20**	**1**
Back up power source	**Aging Back-up generator**	**2**		**10**	**3**
Network Access panel	**Good condition**	**1**		**15**	**1**
Generator Controller	**Beyond design life**	**3**		**5**	**3**

Process Electrical	
Overall Risk Level	**1.4**
Overall Effective Life Remaining	**15.7**
Overall Condition rating	**1.6**

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	Below ground Tank - not visible. Aging.	3		10	3
HVAC	Venting and Fan - Not visible from well accessway. No issues reported by operator. Assumed in good condition.	2		15	2
Davits	Not Appplicable				
Eye wash station	Not Appplicable				
Heaters	Good Condition - Aging	2		10	3
Thermostats	Good Condition - Aging	2		10	3

Building Mechanical	
Overall Risk Level	2.3
Overall Effective Life Remaining	11.3
Overall Condition rating	2.8

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	James Street BS	**Inspection By:**	RW + JS
Inspection Location:	James Street	**Date:**	4th June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good condition**	**1**		**15**	**1**
Exterior Lighting	**Good condition**	**1**		**20**	**1**
Emergency lighting	**Good condition**	**1**		**15**	**1**
Smoke alarms	**Good condition**	**1**		**5**	**1**

Building Electrical

Overall Risk Level	**1.0**
Overall Effective Life Remaining	**13.8**
Overall Condition rating	**1.0**

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- SCADA panel & generator controller need to be upgraded.	- Only 1 pump able to run at a time.

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Park on Roadside**	1		20	1
Paths	**Not Applicable**				
Gates/Fences	**Not Applicable**				
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**Good condition**	1		25	1
Roof	**Not Applicable**				
Walls - Exterior	**Not Applicable**				
Walls - Interior	**Not Applicable**				
Foundations	**Not Applicable**				
Access Ways	**Good Condition**	1		20	1
Ladders	**Good Condition**	1		20	1

Structural	
Overall Risk Level	1.0
Overall Effective Life Remaining	21.7
Overall Condition rating	1.0

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Process Pumps	**Pumps visibly in good condition - no issues during Pressure test**	2		20	2
Main Process Piping	**Some rust present.**	2		15	2
Pipe Supports	**No supports visible - Not applicable**				
Main Process Valves - Manual On/Off	**Good condition**	2		20	2
Main Process Valves - Actuated	**Not Applicable**				
Main Process Valves - Check	**Good condition**	2		20	2
Filters/Strainers	**Not Applicable**				
Dosing System	**Not Applicable**				
Sampling System	**Not Applicable**				
Auxilary Pipe and Valves (Sampling/Dosing)	**Not Applicable**				

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Sample Pumps	**Not Applicable**				
Insulation	**Not Applicable**				
Sump Pump	**Not assessed - assumed in good condition, as no comment from operator**	1		10	1

Process Mechanical	
Overall Risk Level	1.8
Overall Effective Life Remaining	17.0
Overall Condition rating	1.8

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Pump Control Panel	**Pump #1 - Motor speed screen not displaying, otherwise good condition.**	1		20	3
Instrument Panels	**Pump #2 - Inlet pressure screen not displaying, possible Sensor/Transmitter issue.**	1		20	1
Sensors and Transmitters	**Good condition**	1		20	1
Gauges	**Good condition**	1		20	3
Flowmeters	**Good condition**	1		20	1
Auxilary Instrumentation (Sampling/Dosing)	**Not Applicable**				
Flood Alarm	**Not Applicable**				

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.8

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**No Back-up power**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	19.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Applicable**				
HVAC	**Venting and Fan - Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2
Davits	**Not Applicable**				
Eye wash station	**Not Applicable**				
Heaters	**Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2
Thermostats	**Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	15.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Old Colony Road BS	**Inspection By:**	RW + JS
Inspection Location:	901 Old Colony Road	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		22	1
Exterior Lighting	**Not Applicable**				
Emergency lighting	**Not Applicable**				
Smoke alarms	**Not Applicable**				

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	22.0
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Repair/Replace - Inlet pressure screen not for Pump #2 - Repair/Replace - Motor speed screen for Pump #1	- BS only used for peak flow - No issues with booster station - good operation.

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Civil/Site Conditions					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Access Roads and Driveways	**Parking available on Parking lot**	1		20	2
Paths	**Not Applicable**				
Gates/Fences	**Not Applicable**				
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	15.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Well	**Well - Evidence of water - most likely condensation**	2		20	2
Roof	**Not Applicable**				
Walls - Exterior	**Not Applicable**				
Walls - Interior	**Not Applicable**				
Foundations	**Not Applicable**				
Access Ways	**Good Condition**	2		20	2
Ladders	**Good Condition**	2		20	2

Structural	
Overall Risk Level	2.0
Overall Effective Life Remaining	20.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	Corrosion visible on Pump body - no issues during Pressure test	2		15	3
Main Process Piping	Some rust present, but in relatively good condition	2		15	2
Pipe Supports	Concrete supports in good condition. Pipe shoes starting to show corrosion	2		15	2
Main Process Valves - Manual On/Off	Valve bodies showing some corrosion	2		15	3
Main Process Valves - Actuated	Not Applicable				
Main Process Valves - Check	Valve bodies showing some corrosion	2		15	3
Filters/Strainers	Not Applicable				
Dosing System	Not Applicable				
Sampling System	Not Applicable				
Auxilary Pipe and Valves (Sampling/Dosing)	Not Applicable				
Sample Pumps	Not Applicable				
Insulation	Not Applicable				
Sump Pump	Not assessed - assumed in good condition, as no comment from operator	1		10	1

Process Mechanical	
Overall Risk Level	1.8
Overall Effective Life Remaining	14.2
Overall Condition rating	2.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Pump Control Panel	**Pump running light - Not working. Aging Electrical equipment.**	2		8	2
Instrument Panels	**Good Condition**	1		15	1
Sensors and Transmitters	**Good Condition**	1		15	1
Gauges	**Good Condition**	1		15	1
Flowmeters	**Not Applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Not Applicable**				
Flood Alarm	**Not Applicable**				

Instrumentation	
Overall Risk Level	1.3
Overall Effective Life Remaining	13.3
Overall Condition rating	1.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Process Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**No Back-up power**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	19.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Appplicable**				
HVAC	**Venting and Fan - Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2
Davits	**Not Appplicable**				
Eye wash station	**Not Appplicable**				
Heaters	**Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2
Thermostats	**Not visible from well accessway. No issues reported by operator. Assumed in good condition.**	2		15	2

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	15.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Purdys BS (Sydenham Road)	**Inspection By:**	RW + JS
Inspection Location:	896 Purdys Court	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		22	1
Exterior Lighting	**Not Applicable**				
Emergency lighting	**Not Applicable**				
Smoke alarms	**Not Applicable**				

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	22.0
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Asphalt driveway - good condition**	1	N	25	1
Paths	**Asphalt and Concrete paths - good condition**	1	N	25	1
Gates/Fences	**Chain-link fence and gate - good condition**	1	N	20	1
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	23.3
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**Reservoir - New - Good Condition** **Dry well - Good Condition**	1	N	30	1
Roof	**Flat roof - Good Condition**	1	N	30	1
Walls - Exterior	**Good condition**	1	N	30	1
Walls - Interior	**Good condition**	1	N	30	1
Foundations	**Good Condition**	1	N	30	1
Access Ways	**All doors and access ways - Good Condition**	1	N	30	1
Ladders	**Reservoir Ladder - Good Condition**	1	N	30	1

Structural	
Overall Risk Level	1.0
Overall Effective Life Remaining	30.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	**Good condition**	1	Y	25	1
Main Process Piping	**All Stainless steel pipework - Good condition Evidence of Condensation - should cause no issues**	**1**	**N**	25	**1**
Pipe Supports	**Concrete shoes with tie downs - Good condition. Tie downs welded to pipe work.**	1	N	25	1
Main Process Valves - Manual On/Off	**Good condition**	1	N	25	1
Main Process Valves - Actuated	**Good condition**	1	N	25	1
Main Process Valves - Check	**Good condition**	1	**N**	25	**1**
Filters/Strainers	**Not Applicable**				
Dosing System	**Not Applicable**				
Sampling System	**Good condition**	1	**N**	25	**1**
Auxilary Pipe and Valves (Sampling/Dosing)	**Good condition**	1	**N**	25	**1**
Sample Pumps	**Not Applicable**				
Insulation	**Not Applicable**				
Sump Pump	**Not assessed - assumed in good condition, as no comment from operator**	1	N	10	1

Process Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	23.3
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Pump Control Panel	**Good condition**	1		30	1
Instrument Panels	**Good condition**	1		20	1
Sensors and Transmitters	**Good condition**	1		30	1
Gauges	**Good condition**	1		30	1
Flowmeters	**Good condition**	1		30	1
Auxilary Instrumentation (Sampling/Dosing)	**Good condition**	1		25	1
Flood Alarm	**Good condition**	1		30	1

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	27.9
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Process Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Utility Power Feed	**Good condition**	1		30	1
Main Breaker	**Good condition**	1		30	1
Distribution Panel	**Good condition**	1		30	1
Transformer	**Good condition**	1		30	1
Back up power source	**Two generators**	1		25	1
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	26.7
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Applicable**				
HVAC	**Good Condition**	1		20	1
Davits	**Monorail - Good Condition**	1		25	1
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	1		20	1
Thermostats	**Good Condition**	1		20	1

Building Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	21.3
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Reservoir and Booster Station	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		25	1
Exterior Lighting	**Good Condition**	1		25	1
Emergency lighting	**Good Condition**	1		15	1
Smoke alarms	**Good Condition**	1		10	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	18.8
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- New facility - Water from O'Connor Reservoir feeds Creekford Tank - Inlet valve to reservoir was sticking - actuator not matching the set point

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Gravel drive way - good condition**	1		15	1
Paths	**Gravel drive way**	1		15	1
Gates/Fences	**Not Applicable**				
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**Reservoir - Not assessed, but in good working order. Dry well - painted over the 2014/15 winter. Dehumidifier to reduce condensation. Some water damage on floor and around inlet piping**	2	N	20	2
Roof	**Flat roof - Gravel patchy**	2	N	10	2
Walls - Exterior	**Good condition**	1	N	22	1
Walls - Interior	**Good condition - freshly painted**	1	N	22	1
Foundations	**Good Condition**	1	N	22	1
Access Ways	**Good Condition**	1	N	22	1
Ladders	**Stairs in good condition**	1	N	22	1

Structural	
Overall Risk Level	1.3
Overall Effective Life Remaining	20.0
Overall Condition rating	1.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	**Aging - good condition**	2	Y	15	3
Main Process Piping	**Freshly painted - Good condition**	**2**	**N**	22	**2**
Pipe Supports	**Good condition**	2	N	22	2
Main Process Valves - Manual On/Off	**Freshly painted - Good condition**	**2**	**N**	22	**2**
Main Process Valves - Actuated	**Not Applicable**				
Main Process Valves - Check	**Freshly painted - Good condition**	**2**	**N**	22	**2**
Filters/Strainers	**Not Applicable**				
Dosing System	**Not Applicable**				
Sampling System	**Good condition**	**2**	**N**	**20**	**2**
Auxilary Pipe and Valves (Sampling/Dosing)	**Good condition**	**2**	**N**	**20**	**2**
Sample Pumps	**Not Applicable**				
Insulation	**Not Applicable**				
Sump Pump	**Not assessed - assumed in good condition, as no comment from operator**	1		10	1

Process Mechanical	
Overall Risk Level	1.9
Overall Effective Life Remaining	19.1
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Pump Control Panel	**Aging -good condition**	**2**		**8**	**2**
Instrument Panels	**Good condition**	**1**		**15**	**1**
Sensors and Transmitters	**Good condition**	**1**		**15**	**1**
Gauges	**Good condition**	**1**		**15**	**1**
Flowmeters	**Not Applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Not Applicable**				

Instrumentation	
Overall Risk Level	1.3
Overall Effective Life Remaining	13.3
Overall Condition rating	1.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Process Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**Diesel motor runs emergengy pump - aging**	3		10	2
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.3
Overall Effective Life Remaining	17.5
Overall Condition rating	1.2

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Building Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Tanks	**Tank in good condition - Not bunded**	2		20	2
HVAC	**Dehumidifier in good condition. Fan and Vent also in good condition**	2		15	2
Davits	**Hoist beam - Good condition**	2		15	2
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	2		15	2
Thermostats	**Good Condition**	2		15	2

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	16.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Progress Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	730 Progress Avenue	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good condition**	1		15	1
Exterior Lighting	**Good condition**	1		20	1
Emergency lighting	**Good condition**	1		15	1
Smoke alarms	**Good condition**	2		5	2

Building Electrical	
Overall Risk Level	1.3
Overall Effective Life Remaining	13.8
Overall Condition rating	1.3

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- Pumps move water from reservoir to O'Conner Tower - Automatic run for emergency - Valve was stuck open in June 2013 - Interior had a fresh coat of paint over winter of 2014-2015

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Asphalt driveway - good condition**	1	N	15	1
Paths	**Asphalt and Concrete paths - good condition**	1	N	20	1
Gates/Fences	**Chain-link fence and gate on for flat roof - good condition**	1	N	15	1
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	16.7
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**Reservoir - Not assessed, but in good working order. Dry well - damp floor from leaking pumps and condensation - could cause an issue at later date Dehumidifier to reduce condensation. Some water damage on floor and walls around piping**	2	N	15	3
Roof	**Flat roof - patches of moss and weeds . Evidence of leaking.**	3	N	7	4
Walls - Exterior	**Good condition**	1	N	20	2
Walls - Interior	**Aging, Good condition**	2	N	15	2
Foundations	**Good Condition**	2	N	15	2
Access Ways	**Good Condition**	1	N	15	1
Ladders	**Stairs in good condition**	1	N	15	1

Structural	
Overall Risk Level	1.7
Overall Effective Life Remaining	14.6
Overall Condition rating	2.1

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	**Aging - leaking pump bodies, evidence of corrosion on pedestle. Some bolting on casing loose. Lots of standing water on floor and in pipe trenches.**	3	Y	7	4
Main Process Piping	**Aging - Rust present, condensation.**	**2**	**N**	10	**3**
Pipe Supports	**Concrete supports in good condition.**	2	N	15	2
Main Process Valves - Manual On/Off	**Aging - valves starting to corrode**	**3**	**N**	15	**3**
Main Process Valves - Actuated	**Good Condition**	**1**	**N**	20	**1**
Main Process Valves - Check	**Good condition**	**2**	**N**	20	**2**
Filters/Strainers	**Not Applicable**				
Dosing System	**Not Applicable**				
Sampling System	**Water constantly running Good condition**	**2**	**N**	**15**	**3**
Auxilary Pipe and Valves (Sampling/Dosing)	**Water constantly running in to sump .**	**2**	**N**	**15**	**3**
Sample Pumps	**Not Applicable**				
Insulation	**Not Applicable**				
Sump Pump	**Constantly working**	2		6	3

Process Mechanical	
Overall Risk Level	2.1
Overall Effective Life Remaining	13.7
Overall Condition rating	2.7

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Good condition**	**1**		20	**1**
Instrument Panels	**Good condition**	**1**		20	**1**
Sensors and Transmitters	**Good condition**	**1**		20	**1**
Gauges	**Good condition**	**1**		20	**1**
Flowmeters	**Not Applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Good condition**	**1**		15	**1**

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	19.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Process Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Utility Power Feed	**Aged beyond design life - should be replaced**	**3**	**N**	5	**4**
Main Breaker	**Aged beyond design life - should be replaced**	**3**	**N**	5	**4**
Distribution Panel	**Aged beyond design life - should be replaced**	**3**	**N**	5	**4**
Transformer	**Aged beyond design life - should be replaced**	**3**	**N**	5	**4**
Back up power source	**Diesel motor runs emergengy pump - aging**	3		10	2
Network Access panel	**Good condition**	**1**		15	**1**

Process Electrical	
Overall Risk Level	2.7
Overall Effective Life Remaining	7.5
Overall Condition rating	3.2

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Old Diesel Tank - not bunded. Evidence of leakage from filler pipe**	3		4	4
HVAC	**Dehumidifier in good condition. Fan and Vent also in good condition**	2		15	2
Davits	**Hoist beam - Good condition**	2		15	2
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	2		15	2
Thermostats	**Good Condition**	2		15	2

Building Mechanical	
Overall Risk Level	2.2
Overall Effective Life Remaining	12.8
Overall Condition rating	2.4

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Third Avenue Reservoir	**Inspection By:**	RW + JS
Inspection Location:	132 Third Avenue	**Date:**	4th June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good condition - aging**	**2**		10	**2**
Exterior Lighting	**Good condition - aging**	**2**		10	**2**
Emergency lighting	**Good condition - aging**	**2**		10	**2**
Smoke alarms	**Good condition - aging**	**2**		5	**2**

Building Electrical	
Overall Risk Level	2.0
Overall Effective Life Remaining	8.8
Overall Condition rating	2.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Diesel tank replacement and total electrical upgrade	- No Comments

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Asphalt driveway - good condition**	1	N	25	1
Paths	**Asphalt and Concrete paths - good condition**	1	N	25	1
Gates/Fences	**Chain-link fence and gate - good condition**	1	N	20	1
Drainage	**Not Applicable**				
Over flow Chanels	**Good Condition**	1	N	25	1

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	23.8
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Well	**No evident rust on outer.**	1		22	1
Roof	**Good condition**	1		22	1
Walls - Exterior	**Good condition**	1		22	1
Walls - Interior	**Good condition**	1		22	1
Foundations	**Good condition**	1		22	1
Access Ways	**Door ways and hatches in good condition**	1		22	1
Ladders	**Ladder/Stair access to tank is in good condition. Safety barrier in good condition**	1		22	1

Structural	
Overall Risk Level	1.0
Overall Effective Life Remaining	22.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Process Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Process Pumps	**Not Apllicable**				
Main Process Piping	**Good Condition**	1		22	1
Pipe Supports	**Good Condition**	1		22	1
Main Process Valves - Manual On/Off	**Good Condition**	1		22	1
Main Process Valves - Actuated	**Good Condition**	1		22	1
Main Process Valves - Check	**Good Condition**	1		22	1
Filters/Strainers	**Not Apllicable**				
Dosing System	**Good Condition**	1		20	1
Sampling System	**Good Condition**	1		20	1
Auxilary Pipe and Valves (Sampling/Dosing)	**Good Condition**	1		20	1
Sample Pumps	**Not Apllicable**				
Insulation	**Not Apllicable**				
Sump Pump	**Not Apllicable**				

Process Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	21.3
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Not Apllicable**				
Instrument Panels	**Good condition**	1		20	1
Sensors and Transmitters	**Good condition**	1		30	1
Gauges	**Good condition**	1		30	1
Flowmeters	**Good Condition**	1		20	1
Auxilary Instrumentation (Sampling/Dosing)	**Good Condition**	1		15	1

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	23.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	1		30	1
Main Breaker	**Good condition**	1		30	1
Distribution Panel	**Good condition**	1		30	1
Transformer	**Good condition**	1		30	1
Back up power source	**No Back-up power source**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	27.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Applicable**				
HVAC	**Fan and air intakes - Good Condition**	2		15	1
Davits	**Not Applicable**				
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	2		15	1
Thermostats	**Good Condition**	2		15	1

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Creekford Road Tower	**Inspection By:**	RW + JS
Inspection Location:	2753 Creekford Road	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		25	1
Exterior Lighting	**Good Condition**	1		25	1
Emergency lighting	**Good Condition**	1		15	1
Smoke alarms	**Good Condition**	1		10	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	18.8
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- No comments

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Civil/Site Conditions					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Access Roads and Driveways	**Asphalt driveway - good condition**	1	N	25	1
Paths	**Asphalt and Concrete paths - good condition**	1	N	25	1
Gates/Fences	**Chain-link fence and gate - good condition**	1	N	20	1
Drainage	**Not Applicable**				
Over flow Chanels	**Good Condition**	1	N	25	1

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	23.8
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Structural - Building Envelope/Architectural					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Well	**No evident rust on outer.**	1		22	1
Roof	**Good condition**	1		22	1
Walls - Exterior	**Good condition**	1		22	1
Walls - Interior	**Good condition**	1		22	1
Foundations	**Good condition**	1		22	1
Access Ways	**Door ways and hatches in good condition**	1		22	1
Ladders	**Ladder/Stair access to tank is in good condition. Safety barrier in good condition**	1		22	1

Structural	
Overall Risk Level	1.0
Overall Effective Life Remaining	22.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Process Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Process Pumps	**Not Apllicable**				
Main Process Piping	**Good Condition**	1		22	1
Pipe Supports	**Good Condition**	1		22	1
Main Process Valves - Manual On/Off	**Good Condition**	1		22	1
Main Process Valves - Actuated	**Good Condition**	1		22	1
Main Process Valves - Check	**Good Condition**	1		22	1
Filters/Strainers	**Not Apllicable**				
Dosing System	**Good Condition**	1		20	1
Sampling System	**Good Condition**	1		20	1
Auxilary Pipe and Valves (Sampling/Dosing)	**Good Condition**	1		20	1
Sample Pumps	**Not Apllicable**				
Insulation	**Not Apllicable**				
Sump Pump	**Not Apllicable**				

Process Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	21.3
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Not Apllicable**				
Instrument Panels	**Good Condition**	1		20	1
Sensors and Transmitters	**Good Condition**	1		20	1
Gauges	**Good Condition**	1		20	1
Flowmeters	**Good Condition**	1		20	1
Auxilary Instrumentation (Sampling/Dosing)	**Good Condition**	1		20	1
Flood Alarm	**Not Apllicable**				

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	1		30	1
Main Breaker	**Good condition**	1		30	1
Distribution Panel	**Good condition**	1		30	1
Transformer	**Good condition**	1		30	1
Back up power source	**No Back-up power source**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	27.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Applicable**				
HVAC	**Exhaust Fan and Intake Louver in good condition**	1		20	1
Davits	**Not Applicable**				
Eye wash station	**Not currently installed**				
Heaters	**Good Condition**	1		20	1
Thermostats	**Good Condition**	1		20	1

Building Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Innovation Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Innovation Drive	**Date:**	4th June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		25	1
Exterior Lighting	**Good Condition**	1		25	1
Emergency lighting	**Good Condition**	1		20	1
Smoke alarms	**Good Condition**	1		10	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- No comments

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Parking in Fire station car park**	1		15	1
Paths	**Not Applicable**				
Gates/Fences	**Chain link fence and gate - Good Condition**	1		15	1
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**No evident rust on outer.**	2		20	2
Roof	**Control room roof - Aging, Good condition**	2		15	2
Walls - Exterior	**Control room walls - Aging, Good condition**	2		15	2
Walls - Interior	**Control room walls - Aging, Good condition**	2		15	2
Foundations	**Control room walls - Aging, Good condition**	2		15	2
Access Ways	**Access ways to valve pit and control room in good condition**	2		15	2
Ladders	**Ladder/Stair access to tank is in good condition. Safety barrier in good condition.**	1		15	1

Structural	
Overall Risk Level	1.9
Overall Effective Life Remaining	15.7
Overall Condition rating	1.9

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	Not applicable				
Main Process Piping	Piping viewed in good condition	1		20	1
Pipe Supports	Not applicable				
Main Process Valves - Manual On/Off	Valving not assessed - but assumed in good condition (no comment to the conjury from operator)	1		20	1
Main Process Valves - Actuated	Not applicable				
Main Process Valves - Check	Valving not assessed - but assumed in good condition (no comment to the conjury from operator)	1		20	1
Filters/Strainers	Not applicable				
Dosing System	Not applicable				
Sampling System	Not applicable				
Auxilary Pipe and Valves (Sampling/Dosing)	Not applicable				
Sample Pumps	Not applicable				
Insulation	Not applicable				
Sump Pump	Valve pit full of water - sump not working	4		5	5

Process Mechanical	
Overall Risk Level	1.8
Overall Effective Life Remaining	16.3
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Not applicable**				
Instrument Panels	**Good condition**	1		20	1
Sensors and Transmitters	**Good condition**	1		20	1
Gauges	**Not applicable**				
Flowmeters	**Not applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Not applicable**				

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Process Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**Portable back-up generator used**	1		30	1
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	20.8
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Building Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Tanks	**Not Applicable**				
HVAC	**Fan - Good Condition**	1		10	1
Davits	**Not Applicable**				
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	1		10	1
Thermostats	**Good Condition**	1		10	1

Building Mechanical	
Overall Risk Level	1.0
Overall Effective Life Remaining	10.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	O'Connor Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	570 O'Connor Drive	**Date:**	3rd June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good condition**	1		15	1
Exterior Lighting	**Good condition**	1		20	1
Emergency lighting	**Good condition**	1		15	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	16.7
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Sump pump in valve pit to be replaced	- No Comments

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Gravel driveway - holes left by recent work**	2	N	15	3
Paths	**Gravel driveway - holes left by recent work**	2	N	15	3
Gates/Fences	**Chain-link fence and gate - good condition**	1	N	20	1
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.7
Overall Effective Life Remaining	16.7
Overall Condition rating	2.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Structural - Building Envelope/Architectural

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Well	**No evident rust on outer. Structure in good condition**	1		15	1
Roof	**Control room roof - Aging**	2		15	3
Walls - Exterior	**Control room roof - Aging**	2		15	3
Walls - Interior	**Control room roof - Aging**	2		15	3
Foundations	**Control room roof - Aging**	2		15	3
Access Ways	**Access ways to valve pit difficult to gain access.**	2		10	3
Ladders	**Ladder/Stair access to tank is in good condition. Safety barrier in good condition**	1		15	1

Structural	
Overall Risk Level	1.7
Overall Effective Life Remaining	14.3
Overall Condition rating	2.4

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Process Mechanical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Process Pumps	Not applicable				
Main Process Piping	Piping viewed in good condition	1		20	1
Pipe Supports	Not applicable				
Main Process Valves - Manual On/Off	Valving not assessed - but assumed in same condition as actuated valve.	3		8	4
Main Process Valves - Actuated	Valving pit contains water - corrosion present on body, gland nut and gland flange. Aging Actuator	3		8	4
Main Process Valves - Check	Valving not assessed - but assumed in same condition as valves assessed (no comment to the contrary from operator)	3		8	4
Filters/Strainers	Not applicable				
Dosing System	Not applicable				
Sampling System	Not applicable				
Auxilary Pipe and Valves (Sampling/Dosing)	Not applicable				
Sample Pumps	Not applicable				
Insulation	Not applicable				
Sump Pump	Valve pit full of water - sump not working	4		5	5

Process Mechanical	
Overall Risk Level	2.8
Overall Effective Life Remaining	9.8
Overall Condition rating	3.6

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Not applicable**				
Instrument Panels	**Good Condition**	1		15	1
Sensors and Transmitters	**Good Condition**	1		15	1
Gauges	**Good Condition**	1		15	1
Flowmeters	**Not applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Good Condition**	1		15	1
Flood Alarm	**Not applicable**				

Instrumentation	
Overall Risk Level	0.8
Overall Effective Life Remaining	12
Overall Condition rating	0.8

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**No backup power**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	19.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Building Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Tanks	**Not Applicable**				
HVAC	**Venting - Good Condition, aging**	2		8	2
Davits	**Not Applicable**				
Eye wash station	**Not Applicable**				
Heaters	**Aging**	2		8	2
Thermostats	**Aging**	2		8	2

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	8.0
Overall Condition rating	2.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Tower Street Tower	**Inspection By:**	RW + JS
Inspection Location:	Tower Street	**Date:**	4th June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good condition**	1		15	1
Exterior Lighting	**Good condition**	1		20	1
Emergency lighting	**Good condition**	1		15	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	16.7
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Repair potholes in driveway caused by recent construction. - Sump pump in valve pit to be replaced	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Civil/Site Conditions

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Access Roads and Driveways	**Gravel track**	1		15	2
Paths	**Not Applicable**				
Gates/Fences	**Chain link fence and gate - Good Condition**	1		15	1
Drainage	**Not Applicable**				
Over flow Chanels	**Not Applicable**				

Civil/Site	
Overall Risk Level	1.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.5

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Structural - Building Envelope/Architectural					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Well	**No evident rust on outer.**	1		15	1
Roof	**Control room roof - Aging, Good condition**	2		10	2
Walls - Exterior	**Control room walls - Aging, Good condition**	2		10	2
Walls - Interior	**Control room walls - Aging, Good condition**	2		10	2
Foundations	**Good condition**	1		15	1
Access Ways	**Access ways to control room in good condition**	2		15	2
Ladders	**Ladder/Stair access to tank is in good condition. Safety barrier in good condition.**	1		15	1

Structural	
Overall Risk Level	1.6
Overall Effective Life Remaining	12.9
Overall Condition rating	1.6

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Process Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Process Pumps	**Not applicable**				
Main Process Piping	**Piping viewed in good condition**	**1**		**20**	**1**
Pipe Supports	**Not applicable**				
Main Process Valves - Manual On/Off	**Valving not assessed - but assumed in good condition (no comment to the contrary from operator)**	**1**		**20**	**1**
Main Process Valves - Actuated	**Not applicable**				
Main Process Valves - Check	**Valving not assessed - but assumed in good condition (no comment to the contrary from operator)**	**1**		**20**	**1**
Filters/Strainers	**Not applicable**				
Dosing System	**Good condition**	**1**		**15**	**1**
Sampling System	**Good condition**	**1**		**15**	**1**
Auxilary Pipe and Valves (Sampling/Dosing)	**Auxilary piping leaking**	**2**		**10**	**3**
Sample Pumps	**Not applicable**				
Insulation	**Not applicable**				
Sump Pump	**Not applicable**				

Process Mechanical	
Overall Risk Level	1.2
Overall Effective Life Remaining	16.7
Overall Condition rating	1.3

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Instrumentation and Controls/SCADA					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Pump Control Panel	**Not applicable**				
Instrument Panels	**Good Condition**	1		15	1
Sensors and Transmitters	**Good Condition**	1		15	1
Gauges	**Good Condition**	1		15	1
Flowmeters	**Not applicable**				
Auxilary Instrumentation (Sampling/Dosing)	**Good Condition**	1		15	1
Flood Alarm	**Not applicable**				

Instrumentation	
Overall Risk Level	1.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Process Electrical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Utility Power Feed	**Good condition**	1		20	1
Main Breaker	**Good condition**	1		20	1
Distribution Panel	**Good condition**	1		20	1
Transformer	**Good condition**	1		20	1
Back up power source	**Not Applicable**				
Network Access panel	**Good condition**	1		15	1

Process Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	19.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Building Mechanical					
	Condition Assessment	**Comp Risk Level (1-5)**	**Maint. Prog. (Y/N)**	**Effective Life remaining**	**Cond. Rating (1-5)**
Tanks	**Not Applicable**				
HVAC	**Not Applicable**				
Davits	**Not Applicable**				
Eye wash station	**Not Applicable**				
Heaters	**Good Condition**	2		15	1
Thermostats	**Good Condition**	2		15	1

Building Mechanical	
Overall Risk Level	2.0
Overall Effective Life Remaining	15.0
Overall Condition rating	1.0

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	Forest Drive Tower	**Inspection By:**	RW + JS
Inspection Location:	Forest Drive	**Date:**	4th June 2015

Building Electrical

	Condition Assessment	Comp Risk Level (1-5)	Maint. Prog. (Y/N)	Effective Life remaining	Cond. Rating (1-5)
Interior Lighting	**Good Condition**	1		15	1
Exterior Lighting	**Good Condition**	1		15	1
Emergency lighting	**Good Condition**	1		10	1
Smoke alarms	**Good Condition**	1		10	1

Building Electrical	
Overall Risk Level	1.0
Overall Effective Life Remaining	12.5
Overall Condition rating	1.0

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
	- No Comments

Appendix C

FIELD ASSESSMENT SHEETS – WATER TREATMENT PLANTS

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**Cana WTP**	**Inspection By:**	**BP + RW + JS + MV**
Inspection Location:	**Cana Boulavard**	**Date:**	**16th July 2015**

System	Condition Assessment
Well and Well Pump	Not reviewed - Operator reported no issues
Flow Meter	Insulation around the outlet and bypass removed (Should be replaced), repair must have been required or damaged caused to insulation in the past. Appears new bypass valve fitted.
Chloronation	Good condition - Operator reported no issue
Static Mixer	Good condition - Operator reported no issue
Chlorine contact Tank	Internals Not reviewed, Externally in good condition - Operator reported no issues
High Lift Pumps	Internals of Chlorine contact tank not reviewed - Operator reported no issues
Filters	Evidence of leak and repair. Insulation removed on Inlet and bypass. Insulation to be replaced.
Pressure Vessels	Good condition - Operator reported no issue

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**Cana WTP**	**Inspection By:**	**BP + RW + JS + MV**
Inspection Location:	**Cana Boulavard**	**Date:**	**16th July 2015**

System	Condition Assessment
Chloronation	Good condition - Operator reported no issue
Static Mixer	Good condition - Operator reported no issue
Power Supply	Good condition
Standby Power	Portable Generator - Good condition - Operator reported no issue

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Insulation around the flowmeter and filters to be replaced to ensure longevity of pipework and valves	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**King Street WTP**	**Inspection By:**	**RW + JS + MV**
Inspection Location:	**297 King Street**	**Date:**	**15th July 2015**

System	Condition Assessment
Intakes	- Not Visible (Approx 900m off shore and 16m below the surface) - Divers review the intake on a regular basis - Chlorine used to control Zebra Mussels
Low Lift Pumping station	- Screening before Low Lift Pumps - Good condition. - Low Lift Pumps have Diesel Back up motors available. - Diesel Tank in good condition (fenced). - Flat roof - not visible, but further investigation should be completed to ensure integrity .
Flocculation	Mud valves (drain) have been problematic requiring regular gasket changing when tank is cleaned out.
Settling Tanks	Each Tank is cleared out annually - good condition
Filtering	- Building structure in decay - concrete ceiling supports crumbling. - PLC are an older model - issues with replacing of parts. - Filter inlet pipework in good condition, but the area around has water on floor (leaks present)
Chemical Injection	Polymer injection system requires operator to re-fill barrell with hand pump - very messy operation
Water reservoirs	Water reservoir is not fenced. Security against vandalism and sabotage should be assessed in the plants Risk Assessment.
Chlorine contact Tank	Not visible - operator stated no issues

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**King Street WTP**	**Inspection By:**	**RW + JS + MV**
Inspection Location:	**297 King Street**	**Date:**	**15th July 2015**

System	Condition Assessment
High Lift Pumps	Pumps are aging, but in very good order. Pump 5 is a diesel pump - works well when used, currently not working properly due to either a SCADA issue or an issue with Check valve on pump outlet. Pump outlet piping and header has some leakage, gasket replacement needed. Below ground diesel tanks - presently in good condition, is this best practise? Seperate Above ground diesel tank - in good condition (fenced)
Other Chemical Systems	Changed over to a pack system - working well Hypochlorite tanks may need replacing in the next 5 years - to be reviewed
Standby Power	2 sources of electricity and diesel powered pumps.
Sludge Tanks	Baffles are starting to decay - need to be reviewed.
Power Supply	Good condition
Power Distribution Equipment	Good condition
Insrumentation	Good condition
PLC Control Panels	Extremely aged electronics - Should be replaced

General

Work to be conducted in the next 5 year	Comments from City of Kingston Personnel
- Low Lift Pump house roof to be appraised - SCADA PLC control panels to be replaced	- Control systems are outdated - making parts expensive and difficult to find, update required. - Drainage gets clogged regularly. - Security of the public and operators, no fencing or security system against public access to plant. - SCADA upgrade, so all facilities used the same system.

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**King Street WTP**	**Inspection By:**	**RW + JS + MV**
Inspection Location:	**297 King Street**	**Date:**	**15th July 2015**

System	**Condition Assessment**

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**Point Pleasant WTP**	**Inspection By:**	**RW + JS + MV**
Inspection Location:	**81 Sunny Acres Rd**	**Date:**	**N/A**

System	Condition Assessment
Intakes	Not reviewed - Refurbishment underway
Low Lift Pumping station	
Flocculation	
Settling Tanks	
Filtering	
Chemical Injection	
Water reservoirs	
Chlorine contract Tank	

City of Kingston - Water and Wastewater Master Plan

Field Assessment Sheet

Project No: UK-15-02

Project No: 151-02944-00

Inspection Site:	**Point Pleasant WTP**	**Inspection By:**	**RW + JS + MV**
Inspection Location:	**81 Sunny Acres Rd**	**Date:**	**N/A**

System	Condition Assessment
High Lift Pumps	
Other Chemical Systems	
Electrical Sub-station	
Standby Power	

General	
Work to be conducted in the next 5 year	**Comments from City of Kingston Personnel**

Appendix D

RISK ASSESSMENT SHEET

City of Kingston - Water and Wastewater Master Plan

Risk Assessment

Project No: UK-15-02

Project No: 151-02944-00

Facility Information / Facility Risk

Current Name	Year of Installation/upgrade	As Builts avaialble	Pump Info Available	Customer type	Score (0.25)	No. of Customers	Score (0.25)	Risk to the Public	Score (0.4)	Environmental Impact	Score (0.1)	**Total Facility Risk - A**
Collins Bay Road BS	1987	Yes	Yes	Residential	1	<100	2	Moderate	3	Remote	2	**2.2**
James St BS	1991	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Old Colony Rd BS	2000	Yes	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Purdys BS (Sydenham Rd)	1996	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
O'Connor Drive Res/BS	2009	No	Yes	Mixed Use	4	> 10,000	5	Moderate	3	Remote	2	**3.7**
Progress Avenue Res/BS		Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Third Avenue Res/BS	1964	Yes	Yes	Residential	1	> 10,000	5	Moderate	3	Remote	2	**2.9**
Creekford Rd EST	2004	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Innovation Drive EST	2012	Yes	No	Mixed Use	4	Up to 10,000	4	Moderate	3	Remote	2	**3.4**
O'Connor Drive EST	1962	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Tower Street EST	1968	Yes	No	Mixed Use	4	> 10,000	5	Moderate	3	Moderate	3	**3.8**
Forest Drive Standpipe	1981	Yes	No	Residential	1	Up to 1,000	3	Moderate	3	Remote	2	**2.4**

Equipment Risk (Collins Bay Road BS: **PS currently not in use - See comments under section 7.3.1 of Condition Assessment Report**)

Current Name	Civil/Site Conditions (Access Roads, Drains, Fencing, etc.)						Structural (Well, Foundations, walls, etc.)						Process Mechanical (Pumps, Piping, Valves, etc.)					
	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Civil Risk Factor - B1 (0.1)**	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Structural Risk Factor - B2 (0.2)**	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Process Mech. Risk Factor - B3 (0.2)**
James St BS	4	2	1.0	20+	1	**2.0**	4	2	1.1	16-20	2	**2.3**	4	2	2.1	16-20	2	**2.5**
Old Colony Rd BS	4	2	1.0	20+	1	**2.0**	4	2	1.0	20+	1	**2.0**	4	2	1.8	16-20	2	**2.5**
Purdys BS (Sydenham Rd)	4	2	1.0	20+	1	**2.0**	4	2	2.0	20+	1	**2.3**	4	2	1.8	11-15	3	**2.7**
O'Connor Drive Res/BS	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**
Progress Avenue Res/BS	4	3	1.0	11-15	3	**2.8**	4	3	1.3	20+	1	**2.3**	4	3	1.9	16-20	2	**2.7**
Third Avenue Res/BS	4	3	1.0	16-20	2	**2.5**	4	3	1.7	11-15	3	**2.9**	4	3	2.1	11-15	3	**3.0**
Creekford Rd EST	3	2	1.0	20+	1	**1.8**	3	2	1.0	20+	1	**1.8**	3	2	1	20+	1	**1.8**
Innovation Drive EST	3	2	1.0	20+	1	**1.8**	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**
O'Connor Drive EST	3	3	1.0	11-15	3	**2.5**	3	3	1.9	16-20	2	**2.5**	3	3	1.8	16-20	2	**2.5**
Tower Street EST	3	3	1.7	16-20	2	**2.4**	3	3	1.7	11-15	3	**2.7**	3	3	2.8	5-10	4	**3.2**
Forest Drive Standpipe	2	3	1.0	11-15	3	**2.3**	2	3	1.6	11-15	3	**2.4**	2	3	1.2	16-20	2	**2.1**

Current Name	Instrumentation and Controls/SCADA (Gauges, Flow meters, etc.)						Process Electrical (Main Breaker , Transformer, etc.)					
	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Instrumentation Risk Factor - B4 (0.15)**	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Process Electrical Risk Factor - B5 (0.15)**
James St BS	4	2	1.3	11-15	3	**2.6**	4	2	1.4	16-20	2	**2.4**
Old Colony Rd BS	4	2	1.0	20+	1	**2.0**	4	2	1.0	16-20	2	**2.3**
Purdys BS (Sydenham Rd)	4	2	1.3	11-15	3	**2.6**	4	2	1.0	16-20	2	**2.3**
O'Connor Drive Res/BS	4	1	1.0	20+	1	**1.8**	4	1	1.0	20+	1	**1.8**
Progress Avenue Res/BS	4	3	1.3	11-15	3	**2.8**	4	3	1.3	16-20	2	**2.6**
Third Avenue Res/BS	4	3	1.0	16-20	2	**2.5**	4	3	2.7	5-10	4	**3.4**
Creekford Rd EST	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**
Innovation Drive EST	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**
O'Connor Drive EST	3	3	1	16-20	2	**2.3**	3	3	1	20+	1	**2.0**
Tower Street EST	3	3	1.2	11-15	3	**2.6**	3	3	1	16-20	2	**2.3**
Forest Drive Standpipe	2	3	1	11-15	3	**2.3**	2	3	1	16-20	2	**2.0**

Current Name	Building Mechanical (HVAC, Heaters, Thermostats, etc.)						Building Electrical (Interior/Exterior Lighting)						
	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Building Mech. Risk Factor - B6 (0.1)**	Criticality	Probability	Overall Risk Level (From Field Assessment)	Effective Life Remaining (Years) (From Field Assessment) Years	Score	**Building Electrical Risk Factor - B7 (0.1)**	**Total Equipment Risk - B**
James St BS	4	2	2.3	11-15	3	**2.8**	4	2	1.0	11-15	3	**2.5**	**2.4**
Old Colony Rd BS	4	2	2.0	11-15	3	**2.8**	4	2	1.0	20+	1	**2.0**	**2.2**
Purdys BS (Sydenham Rd)	4	2	2.0	11-15	3	**2.8**	4	2	1.0	20+	1	**2.0**	**2.4**
O'Connor Drive Res/BS	4	1	1.0	20+	1	**1.8**	4	1	1.0	16-20	2	**2.0**	**1.8**
Progress Avenue Res/BS	4	3	2.0	16-20	2	**2.8**	4	3	1.3	11-15	3	**2.8**	**2.7**
Third Avenue Res/BS	4	3	2.2	11-15	3	**3.1**	4	3	2.0	5-10	4	**3.3**	**3.0**
Creekford Rd EST	3	2	1	11-15	3	**2.3**	3	2	1	16-20	2	**2.0**	**1.8**
Innovation Drive EST	3	2	1	20+	1	**1.8**	3	2	1	20+	1	**1.8**	**1.8**
O'Connor Drive EST	3	3	1	5-10	4	**2.8**	3	3	1	16-20	2	**2.3**	**2.4**
Tower Street EST	3	3	2	5-10	4	**3.0**	3	3	1	16-20	2	**2.3**	**2.7**
Forest Drive Standpipe	2	3	2	11-15	3	**2.5**	2	3	1	11-15	3	**2.3**	**2.2**

Condition Rating (From Field Assessment)

Current Name	Civil/Structural - **C1** (0.1)	Structural - **C2** (0.2)	Process Mechanical - **C3** (0.2)	Instrumentation/SCADA - **C4** (0.15)	Process Electrical - **C5** (0.15)	Building Mechanical - **C6** (0.1)	Building Electrical - **C7** (0.1)	**Total Condition Rating - C**	**Reliability Rating = A x B x C**	**Overall Rating**
Collins Bay Road BS										
James St BS	1.0	1.1	2.5	1.3	1.6	2.8	1.0	**1.7**	**14.7**	**C**
Old Colony Rd BS	2.0	1.0	1.8	1.8	1.0	2.0	1.0	**1.4**	**11.4**	**C**
Purdys BS (Sydenham Rd)	2.0	2.0	2.3	1.3	1.0	2.0	1.0	**1.7**	**11.9**	**C**
O'Connor Drive Res/BS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**	**6.5**	**B**
Progress Avenue Res/BS	1.0	1.3	2.0	1.3	1.2	2.0	1.3	**1.5**	**11.3**	**C**
Third Avenue Res/BS	1.0	2.1	2.7	1.0	3.2	2.4	2.0	**2.3**	**19.4**	**C**
Creekford Rd EST	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**	**6.8**	**B**
Innovation Drive EST	1.0	1.0	1.0	1.0	1.0	1.0	1.0	**1.0**	**6.0**	**B**
O'Connor Drive EST	1.0	1.9	2.0	1.0	1.0	1.0	1.0	**1.5**	**13.1**	**C**
Tower Street EST	2.3	2.4	3.6	1.2	1.0	2.0	1.0	**2.1**	**21.4**	**C**
Forest Drive Standpipe	1.5	1.6	1.3	1.0	1.0	1.0	1.0	**1.3**	**6.7**	**B**