EXECUTIVE SUMMARY

The majority of the City of Winnipeg Flood Pumping Stations were constructed in the 1950's and the City is now faced with managing the maintenance and rehabilitation/renewal of an aging Flood Pumping Station infrastructure. In July 2004, KGS Group was retained to conduct a condition assessment, prepare cost estimates and priorities for recommended Flood Pumping Station upgrades.

This condition assessment follows previous assessments by KGS Group of the Flood Pumping Station reliability (Flood Control Adequacy Review Study, September 2003) and a cursory assessment of the Flood Protection Upgrade requirements following the 1997 Flood (Memo – City of Winnipeg Flood Pump Station, Upgrade Requirements, Capital Cost Estimates, 2004).

The scope of services is based on the Water and Waste Departments RFP, dated March 18, 2004 and consists of the following:

- Condition assessment of 29 City of Winnipeg Flood Pumping Stations as described in Section 12.0 of The Flood Control Adequacy Review Study dated September 2003.
- Recommend upgrade measures resulting from the condition assessment.
- Prioritize the upgrade measures.
- Develop budget estimate for the recommended upgrade measures.

The following Flood Pumping Stations were assessed:

1. Ash, FPS
2. Assiniboine, FPS
3. Aubrey, FPS
4. Baltimore, FPS
5. Bannatyne, FPS
6. Clifton, FPS
7. Cockburn, FPS
8. Colony, FPS
9. Cornish, FPS
10. Despins, FPS
11. Dumoulin, FPS
12. Galt, FPS
13. Hart, FPS
14. Hawthorne, FPS
15. Jefferson, FPS
16. Jessie, FPS
17. Larchdale, SPS / FPS *
18. La Verendrye, FPS
19. Linden, FPS
20. Mager, FPS
21. Marion, FPS
22. Mayfair, FPS
23. Metcalfe, FPS
24. Mission, FPS
25. Munroe, Temporary FPS *
26. Newton, FPS
27. Polson, FPS
28. Roland, FPS
29. Selkirk, FPS
30. St. John's, FPS
31. Syndicate, FPS
32. Ravelston, LDFPS (Transcona "Deep Pond") *

Note: * - Station was removed from scope of work (not a typical flood pumping station)

The condition assessment of the station buildings and their sites was based primarily on a walk through and close up visual examination of each station. In a small number of stations where a more detailed examination was warranted, investigative openings were created in walls, ceilings or any other assemblies that were suspected of concealing some potentially significant but

hidden information, deterioration or condition. These openings were typically made in a location that would not jeopardize the function of the station, usually through sheathing or paneling that could be replaced or patched relatively easily after the investigation.

The mechanical component condition assessment was evaluated based on field observations and Flood Pumping Station (FPS) data acquired through the following sources:

1. Site inspection of all FPS in August/September 2004.
2. Vibration testing performed on 17 out of 28 FPS in fall 2004 – spring 2005.
3. Ultrasonic testing of flood pump piping on Dumoulin, Jessie, Linden and Newton FPS in January 2005.
4. Discussion with City of Winnipeg Water & Waste Dept. personnel.
5. Review of archival Water & Waste Department engineering drawings.

Once all of the mechanical information was compiled, qualitative observations were reviewed and several components were assigned a relative rating. Use of rating scales allowed consistency to be established across the various FPS condition assessments.

The geotechnical portion of the assessment was based on an overview evaluation of the potential for riverbank instability, which could impact the reliability of the flood pumping stations. Existing riverbank stability and erosion conditions at each site were reviewed based on a visual site inspection, review of stereo aerial photography, review of existing geotechnical reports, and our previous geotechnical engineering experience.

Each site was assessed against a number of factors which impact bank stability including:

1. Location of station relative to river meander pattern (inside bend, outside bend, straight section)
2. History of bank stability
3. Erosion conditions
4. Existing bank works (riprap erosion protection, shear keys, toe berms, etc.)
5. Overall bank slope
6. Surface drainage

The geotechnical upgrading measures that were considered as part of this study consist of future geotechnical monitoring and inspection programs, construction of improved erosion protection works, and construction of shear keys at select high risk sites.

The condition assessments of the pumping station substructures and gates are based on a visual inspection of each of the stations. The inspections were performed during the winter months to take advantage of lower river levels, which corresponds to low water levels in the gate chambers. A review of the available construction drawings was also performed to further define the repair history of the stations.

The electrical assessment considered the results of the KGS report "Flood Control Adequacy Study" which looked at 14 representative stations and examined the electrical aspects of the flood pumping stations. The study determined that the existing motors, motor starters, main distribution, pump controls, and SCADA system, (with the exception of a concern with the interrupting rating of older ITE breakers) are in acceptable condition and typically do not require upgrade.

Further study was performed to ensure that the original fault current ratings for electrical equipment is still valid.

Due to the age of many of the circuit breakers in the flood pump station, a concern was raised by the City that the breakers may no longer be capable of safely interrupting their rated fault current.

To determine if the breakers are still capable of meeting their rated performance, three breakers were removed and tested by ABB in Winnipeg. The breakers removed were as follows:

SELKIRK FPS	PUMP P-16
(Infrequent use)	ITE KA Breaker 225 A Frame 225 A Trip 15 KA Interrupting rating
Jessie FPS (Infrequent Use) (Standby)	Pump P-25 ITE KB2 Breaker 225 A-Frame 225 A-Trip 15 KA Interrupting rating
Marion FPS (Frequent Use)	Pump P-32 ITE KA Breaker 220 A-Frame 285 A- Trip 25KA Interrupting Ratings

The tests on these breakers concluded that the three breakers were capable of interrupting their rated fault current provided they are refurbished (cleaned and lubricated). In addition the dashpot style of trip mechanisms no longer work reliably and replacement is recommended. Details on the test report can be found in Appendix F.

The Test shop did find that the trip sensor on one of the three breakers did not function. This is the original "dash pot style of trip that has already been replaced on some of the similar breakers.

Based on the acceptable results from the tests on these three breakers replacement of all outstanding breakers is not recommended. However a program to refurbish the remaining inventory of breakers is recommended. This refurbishment would remove and overhaul all the remaining ITE breakers as well as replace all dash pot style trip mechanisms over a five year period. The scope and estimated cost of this program is $330,000 and further identified in Table 1 of Appendix F.

Generally for each FPS, the lighting on the interior was found to be insufficient for work without supplemental lighting. Exterior lighting was generally absent or minimal. Lighting on the interior

should be upgraded to a more modern fluorescent fixture to allow for ease of working without the installation of task lights.

Where the information on available fault current rating of existing equipment is not available and the available fault current is an issue, it is recommended that the electrical distributions for the sites be upgraded to ensure that there is not a failure in the event of a significant fault.

The estimated upgrade costs for the next 10 years (i.e. 2006 to 2016) and the cost estimated for the remaining 50 year life of the stations (i.e. 11 to 50 years) for each of the 29 station assessments are as follows:

- 10 year $13,479,000.00
- 11 to 50 year $8,230,000.00

A summary of these costs, allocated by work area, is shown on the Table below:

WORK AREA	0 – 10 YR ESTIMATED COSTS	11 – 50 YR ESTIMATED COST
Building and Site	$2,449,000	$1,181,000
Mechanical	$2,109,000	$1,027,000
Geotechnical	$2,282,000	$959,000
Substructures and Gates	$2,316,000	$2,317,000
Electrical	$473,000	$394,000
Sub-total	***$9,628,000***	***$5,879,000***
Contingency – 20%	***$1,926,000***	***$1,176,000***
Engineering and Administration – 20%	***$1,926,000***	***$1,176,000***
Total Estimated Cost	***$13,479,000***	***$8,230,000***
GRAND TOTAL (10 YR PLUS FUTURE COSTS)	**$21,709,000**	

It is recommended that the Water and Waste Department proceed with the 10 year work program and the on-going monitoring programs described in this report. A number of general and specific monitoring requirements have been outlined for each of the work areas.

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Note: * - Station was removed from scope of work (not a typical flood pumping station)

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- August 2005 Summary Report
  - Annex C.1 – Reviewing Vibration Testing Methods
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- August 2005 Summary Report
  - Annex D.1 – Volume 2
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    - Metcalfe
    - Jessie
    - Roland
    - Mission
    - Selkirk
    - Dumoulin
    - Hart
    - Syndicate
    - Linden
    - Bannatyne
    - Newton
    - Baltimore
    - Cornish

E. **Ultrasonic Test Data – Suction and Discharge Piping Wall Thickness for Dumoulin, Jessie, Linden and Newton FPS**

F. **ITE Breaker Investigation**

1.0 INTRODUCTION

1.1 GENERAL

The majority of the City of Winnipeg Flood Pumping Stations were constructed in the 1950's and the City is now faced with managing the maintenance and rehabilitation/renewal of an aging Flood Pump Station infrastructure. In July 2004, KGS Group was retained to conduct a condition assessment, prepare cost estimates and determine priorities for recommended upgrades. The following components were assessed, for each of the 29 Flood Pumping Stations listed in the City of Winnipeg RFP:

- Building (superstructures, security & site improvements)
- Mechanical (ventilation, piping & pumps)
- Geotechnical (riverbank slope stabilities)
- Structural (substructures & control gates)
- Electrical (power and lighting, distribution and controls)
- Information Management (GIS database, operation & maintenance manuals)

This condition assessment follows previous assessments by KGS Group of the Flood Pump Station reliability (Flood Control Adequacy Review Study, September 2003) and a cursory assessment of the Flood Protection Upgrade requirements following the 1997 Flood (Memo – City of Winnipeg Flood Pump Station, Upgrade Requirements, Capital Cost Estimates, 2004).

The Flood Pumping Stations investigated are permanent stations on the combined sewer systems that function to pump storm water runoff to the river when the river level is high. The long term reliability of these flood pump stations is required to minimize the potential for basement flooding that could occur during periods of high river levels.

1.2 TERMS OF REFERENCE

1.2.1 Overview

The scope of services is based on the Water and Waste Departments RFP, dated March 18, 2004 and consists of the following:

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Note: * - Station was removed from scope of work (not a typical flood pumping station)

The location of each of the Flood Pumping Stations considered in this assessment is shown on Drawings 1.1 and 1.2.

1.2.2 Work Scope

The detailed scope of work for each of the work areas assessed is described below:

Ventilation Systems

- Visually inspect and document condition of the existing ventilation systems.
- Prepare recommendations to provide ventilation of the FPS for summer ambient design conditions to provide reliable summer (warm weather) operation.
- Prepare recommendations to address noise concerns related to fan selection, exhaust and intake orientation and sound attenuation devices such as acoustic lining.
- Review man entry requirements below grade (15 air changes per hour)

Piping

- Visually inspect and document the general condition of the existing station process and miscellaneous seal water piping systems.
- Prepare recommendations for painting and/or replacement of miscellaneous seal water piping systems. Should the visual inspection indicate that process piping requires more just than painting, the observations will be documented and recommendations for follow-up steps identified.

Pumps

- Visually inspect and document the general condition of existing pumps in each Flood Pumping Station.
- Prepare a spreadsheet describing each FPS and the approximate range of river levels within which vibration testing can be achieved. A priority list of FPS pumps to be tested will be developed from this assessment.
- Using the FPS Baseline Data spreadsheet and isometric drawing information, define the steps required to prepare each FPS for vibration testing. Meet with WWD to review and finalize test procedure preparations and actual test activities. Resolve unique operational concerns that may arise at a specific station during the testing process.
- Before the minimum river level necessary for vibration testing the targeted FPS is reached, implement the test procedure preparations, including propping the flap gate open, providing access to shaft bearings, etc.
- When the minimum river level necessary for testing is reached, implement vibration testing of each pump in the station. Perform vibration tests for flood pump systems in up to 28 stations (test each pump in the station). A qualified subcontractor will perform installation of vibration sensors and actual vibration testing.

- Obtain a report from the testing subcontractor presenting the vibration baseline test results along with an analysis of these results.

- If operating problems are identified, an assessment of the situation and a follow-up action plan and cost estimate will be prepared.
- Co-ordinate tests with WWD electrical and instrumentation personnel to enable them to conduct concurrent testing of the station electrical components as applicable.

- Prepare a brief report compiling the vibration test results, the analysis report and recommendations for a remedial action plan as required.

Power & Lighting

- Perform qualitative inspection of the condition of the existing lighting, electrical services and controls as part of the Mechanical and Building Condition Assessment.

- Prepare recommendations for minor electrical modifications, such as wiring affected by superstructure repairs or controls related to ventilation equipment upgrades, as required.

- Coordinate costs associated with architectural upgrades requiring removal and reinstallation of electrical equipment on the exterior walls.

Review of Electrical Distribution

Phase 1

- Prepare a spreadsheet listing the breakers at each station so that WWD staff can undertake a field investigation and document the interrupting capacity of the circuit breakers as described on their nameplates.

- Consult with Manitoba Hydro to identify the fault level at each of the stations, with the exception of the five stations currently under design by SNC Lavalin.

- Identify areas where the fault level exceeds the breaker capacity and develop proposed solutions. In general this will consist of replacing the existing breakers with new breakers or fuses of adequate interrupting capacity.

Phase 2 (this work requires that the stations be de-activated and will be completed during Fall / Winter 2005 / 2006)

- Coordinate an inspection and test of circuit breakers at three flood pump stations by Siemens service Department (ITE equipment representatives). The tests would include a visual inspection, review of cleanliness, check of contact resistance and an over current trip test. Two or three breakers would actually be tested with a short circuit.

- On the basis of these tests, an opinion will be reached as to whether the balance of the breakers in all the flood pump stations can be considered to be in an acceptable condition or not.

- An allowance for this item has been carried while investigation is in progress.

Riverbank Slope Stability

- Review all available background geotechnical information for the FPS sites on file at the WWD library and the City of Winnipeg Waterways Authority.
- Visually inspect condition and perform qualitative risk assessment of riverbank stability for all Flood Pump Stations (i.e. classify risk of failure as high, low or minimal).
- Install a slope monitoring system (minimum two slope indicators and three piezometers) to measure bank movements with time at the high-risk sites.
- Perform topographic riverbank survey, including river bottom soundings, at the high-risk sites.
- Monitor slope indicators twice annually, once in the fall and once in the spring (first two inspections only are included in the current cost estimate).
- Perform visual bank inspection plus inspection of the inside of the outfall pipes every second year at the remaining sites (first inspection only is included in the current cost estimate).
- Prepare recommendations for remedial measures and upgrades as required.

Building Superstructure

- Inspect and document condition of the following building components:
  - Wall framing components (wood, masonry, steel)
  - Wall interior sheathing
  - Wall exterior cladding and finish (siding, masonry, stucco, metal cladding)
  - Wall insulation and air/vapour barrier
  - Roof framing components (wood, steel)
  - Roof sheathing or decking (wood, steel)
  - Roof insulation, and air/vapour barrier
  - Ceiling (where appropriate)
  - Roof weather-barrier (shingles, membrane, associated flashing)
  - Roof overhangs and soffits
  - Exterior doors
  - Windows and/or glass block
  - Miscellaneous interior elements as applicable (partitions, hatches)
- Address fire concerns associated with exposed polystyrene insulation in the dry wells where applicable.
- Prepare recommendations for remedial measures and potential exterior aesthetic upgrading options.

Building Site & Security

- Inspect and document condition of existing building site including sidewalks, site drainage, fencing, exterior lighting, general security (vandalism, graffiti, etc.) and safety.

- Prepare recommendations for remedial measures and upgrades as required.

Structural Condition Assessment

Substructures

- Review safety requirements for substructure access.
- Inspect and document condition of existing concrete building foundations, pump wet and dry wells, pump bases and gate chambers.
- Inspect and document condition of existing discharge chamber concrete (wet well), and measure stop log elevation relating to flood protection level.
- Prepare recommendations for remedial measures and upgrades as required.

Control Gates

- Inspect and document condition of existing cast iron flap gates, slide gates, frames, fasteners, embedded thimbles and lifting assemblies, and assess level of corrosion.
- Use feeler gauges to measure any gaps between gate and seating face at various locations around the perimeter.
- Manually lift flap gate to observe hinge operation and to facilitate visual inspection of seating face.
- Manually lower slide gate to observe gate operation.
- Inspect seating face for pitting, coatings or corrosion that may hinder sealing of the gate and inspect slide gate wedges for cracks.
- Document any debris accumulations in the gate chambers.
- Perform qualitative analysis on the extent of deterioration found, and assess the capability of each gate to function safely and effectively.
- Prepare recommendations for remedial measures and upgrades as required.
- Gate leakage tests were not warranted/feasible and therefore were not performed as a part of the condition assessment.

1.2.3 Information Management

Based on discussions with WWD personnel, it was agreed that all of the cost estimate data would initially be compiled in spreadsheet format. The spreadsheets would be prepared in a format readily convertible to a database. Following WWD's review of the costs and proposed implementation scenarios, data base forms would be developed to allow the cost data to be sorted, formatted and printed to best facilitate future planning and implementation. For example, cost forms could be sorted and printed by station, by work area (i.e. building or mechanical) by priority, geographic area or any combination of these sorting parameters.

Monitoring requirements for each of the stations have also initially been compiled in text format. Following review by WWD, these requirements can also be organized in a database to facilitate future coordination of the multidisciplinary ongoing inspections.

City of Winnipeg Flood Pumping Station Condition Assessment
Summary Report

Table 3.1 - Condition Assessment Summary - Building and Site

Number	Flood Pumping Station	STATION BUILDING																							
		Exterior Walls										Roof													
		Framing				Exterior Cladding				Exterior Finish		Framing					Roofing					Miscellaneous			
		Wood	Brick	Conc. Block	Cond.	Wood Siding	Brick	Other	Cond.	Paint	Cond.	Wood	Steel & Conc.	Other	Framing Cond.	Slope	Felt & Gravel	SBS Mod.	Asphalt Shingles	Other	Roofing Cond.	Drain Cond.	Trim Cond.	Soffit Cond.	Trim & Soffit Finish Cond.
1	Ash		x		G/P		x		G/P		G			Steel Trusses	G	<3/12		x			G	P	G	G	G/P
2	Assiniboine	x			G		x		G		G	x			G	Flat		x			G	F	G		G
3	Aubrey		x		G		x		G		G		x		G	Flat	x				P	F	G	F	F
4	Baltimore	x			G/P	x			F	x	P	x			G	Flat	x		Mansard Parapet		F	F	F	G	G/P
5	Bannatyne	x			G		x		G		F	x			G	Flat	x				P	P	P		F
6	Clifton	x	x		G	x	x		G	x	F	x			G	<3/12	x				P	F/P	F	F	P
7	Cockburn		x		G		x		G		G	x	x		G	>4/12				Prefin. Metal	G	G	G	G	G
8	Colony		x		G		x		G		G		x		G	Flat	x				F	F	F		F
9	Cornish		x		G		x		G		G		x		G	Flat	x				P	F	F		P
10	Despins	x			G		x		G		G	x			G	Flat	x				F	G	G		F
11	Dumoulin	x			G		x		G		G	x			G	Flat		x		Prefin. Metal	G	G	G		F
12	Galt	x			G			Splitface conc. block	G		G			steel	G	>4/12				Prefin. Metal	G	G	G		G
13	Hart	x			G/P	x			G/F	x	F	x			G/P	>4/12			x		G/P	F	P	F	P
14	Hawthorne	NO BUILDING																							
15	Jefferson	x			G	x			F	x	F	x			G	Flat	x				P	P	P	P	P
16	Jessie		x		G		x		G	x	G		x		G	Flat	x				F	G	F		G
17	Larchdale (LDPS)	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							
18	Laverendrye	x			G	x			G	x	F	x			G	Flat	x				F	G	F	G	F/P
19	Linden	x			G	x			F	x	P	x			G	3/12			x		P	P	P	P	P
20	Mager Drive	x			G			Stucco	G	x	F	x			G	>4/12			x		G	F	F	G	P
21	Marion	x			G		x		G		G	x			G	Flat		x			G	F	G		G
22	Mayfair			x	G		x		G		G			Steel Trusses	G	Flat		x			G	G	G		G
23	Metcalfe	x			G	x			G	x	P	x			G	>4/12			x		G	F	F	G	P
24	Mission	x			G	x			F	x	P	x			G	Flat		x			G	F/P	G/P	P	P
25	Munroe	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							
26	Newton (Armstrong)	x			G	x			F	x	P	x			G	4/12			x		G	F/P	P	F	P
27	Polson	x		x	G	x			F	x	P	x			G	>4/12			x		G	P	G/P	G/P	G/P
28	Roland		x		G		x		G		G			Steel & Precast	G	Flat		x			G	P	G		P
29	Selkirk	x			G	x			G	x	P	x			G	Flat	x				P	P	F	F	P
30	St. John's	x			G	x			G	x	F	x			G	Flat	x				F	P	F	F	F
31	Syndicate	x			G		x		F		F	x			G	Flat	x				P	F	F		P
32	Ravelston	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							

Condition Definitions

G - Good	G/F - Good to Fair
F - Fair	G/P - Good to Poor
P - Poor	F/P - Fair to Poor

City of Winnipeg Flood Pumping Station Condition Assessment
Summary Report

Table 3.1 - Condition Assessment Summary - Building and Site

Number	Flood Pumping Station	STATION BUILDING													BUILDING SITE AND SECURITY									
		Doors and Windows							Interior Features and Safety Issues						Site Features					Security				
		Doors and Frames				Glazing & Frames			Stairs (Drywell Access)	Stair or Landing Hand Rail Deficiency	Ladder (Drywell Access)	Ladder Deficiency	Guard Rail Provided Around Hatches	Foamed Plastic Insul						Security Features			Vandalism		
		Wood Painted	Steel Painted	General Cond.	Finish Cond.	Glazing Panels	General Cond.	Finish Cond.							Paved Driveway Cond.	Paved Sidewalk Cond.	Entry Stair Cond.	Fence	Site Drainage Cond.	Lights	Fence	Other	Graffiti	Damage	Theft
1	Ash	Doors	Frames	G	F				X					X		F		X	F		X				
2	Assiniboine		X	G	G					Top Rail only	X	Clearance & Cage	X	X	G				G	X			X		
3	Aubrey	X		F	F				X					X	F				F	X			X		
4	Baltimore	X		F	P	X	F	P	Steep	Clearance & Rail	X	Cage	X	X				X	P		X		X		
5	Bannatyne	X		P	F				Steep	Clearance & Rail			X	X		G		X	F				X		
6	Clifton	X		G	G	X	G	F	Steep	Clearance & Rail			X	X	G	G	G	X	F	X			X		
7	Cockburn		X	G	G				Steep	Clearance & Rail			X	X			F	X	G				X		
8	Colony	X		F	F					Clearance & Rail			X	X	F				F	X			X		
9	Cornish	X		F	F				Steep	Clearance & Rail			X	X					P						
10	Despins		X	G	G							Clearance & Cage	X	X			F		F				X		
11	Dumoulin		X	X	X				Steep	Clearance & Rail			X	X			G	X	G				X		
12	Galt			G	G					Only Top Rail	X	Clearance & Cage	X	X					G				X		
13	Hart	X		F	F	X	G	G		Only Top Rail	X	Clearance & Cage	X	X			G		F						
14	Hawthorne	NO BUILDING																							
15	Jefferson	X		G	F	X	F	P			X	Clearance & Cage	X	X	G			X	G	X	X				
16	Jessie	X		F	P				Steep	Clearance & Rail			X	X					G				X		
17	Larchdale (LDPS)	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							
18	Laverendrye	X		P	F						X	Clearance & Cage		X					F				X		
19	Linden	X		F	P	X	F	P	Steep	Clearance & Rail	X	Clearance & Cage	X	X					P						
20	Mager Drive	X		F	P				Steep	Clearance & Rail	X	Clearance & Cage	X	X	F			X	F	X	X		X		
21	Marion		X	G	G				Steep	Clearance & Rail			X	X	G	G	G	X	G		X		X		
22	Mayfair		X	G	G				X				X	X					G				X		
23	Metcalfe	X		F	P						X	Clearance & Cage	X	X					F	X					
24	Mission	X		F	P				Steep	Clearance			X	X		G			F				X		
25	Munroe	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							
26	Newton (Armstrong)	X		P	F	X	P	P	Steep	Clearance & Rail			X	X			G	X	F						
27	Polson	X		F	F				X	Clearance & Rail	X	Clearance & Cage	X	X	F			X	P	X					
28	Roland		X	F	F				Steep	Clearance & Rail			X	X					G				X		
29	Selkirk	X		F	F				Steep	Clearance & Rail			X	X		P	F	X	F		X		X		X
30	St. John's	X		F	F	X	P	F	Steep	Clearance			X	X	G				F						
31	Syndicate	X		P	P						X	Clearance & Cage	X	X	G	G			F	X			X	X	
32	Ravelston	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																							

Condition Definitions

G - Good G/F - Good to Fair
F - Fair G/P - Good to Poor
P - Poor F/P - Fair to Poor

Table 3.1 - Condition Assessment Summary - Building and Site

Number	Flood Pumping Station	GENERAL		Additional Notes
		Aesthetics	Sanitary	
		Recommended Candidates for Aesthetic Upgrade	Building Linked to Sanitary Chamber "Combination Station"	
1	Ash			Deteriorated brick due to faulty roof drainage or failed roof membrane on east side of Hydro enclosure - Considerable deadfall on west side of roof - Rusted out rain gutter on west side of roof - Hydro enclosure felt & gravel roof covered with deadfall and in poor condition - Hydro enclosure concrete parapet
2	Assiniboine			Station exterior completely renovated around 2000 - Some ponding on roof due to location of scupper
3	Aubrey			Roof in very poor condition - Missing roof drain cover - Remove pulley type level indicator at next reroofing - Soffit overhang not serving any purpose and deteriorating due to rot (remove and redsign roof trim at next reroofing - Considerable graffiti and youths get on roof
4	Baltimore	X		Lower part of east wall rotting above discharge block - Exterior paint flaking badly - Rainwater leader missing - Station surrounded by chainlink fence enclosure (Yard an eyesore due to uncut grass etc.) - Although building is set back from street site is open and building aesthetics below standard for street
5	Bannatyne	X		Building scheduled for future exterior renovation to suit Waterfront Drive develpement - Roof in very poor condition (flooded with considerable vegetation - rusting counter flashings) - Grade above lower brick courses on west side (no noticable damage) - Some exterior brick damage due to Hydro changes - Parging spalling on discharge block
6	Clifton			Roof in poor condition (considerable deadfall on main roof and discharge block roof, vegetation, bare spots) - Drainage gutters full of debris and many rainwater leaders missing - Paint flaking on siding and roof trim - Potential for rot in wall above west discharge block (no visible evidence)
7	Cockburn		X	Station roof rebuilt as sloped metal on wood trusses approximatel 10 years ago after an arson fire which destroyed original flat roofing - Complaints of steel door freezing shut in winter due to high humidity in station - No handrail on main entry stair - Station linked to sanitary chamber -
8	Colony			Face shell of much of the exterior brickwork blasted off by grafifiti removal methods (may contribute to accelerated wear of brick in future) - Minor localized brick damage - Debris accumulating in wall void at Hydro enclosure - Settling at site of replaced water service to be backfilled -
9	Cornish			Some cosmetic damage to brick at removed Hydro enclosure on south side (clean & repoint brick and mortar on this side) - Roof in poor condition due to vegetation, bare spots, blisters - Drain cover missing - Building floor level with surrounding grade (some brick below grade - no noticable damage)
10	Despins			Station exterior completely renovated at least 10 years ago - Generally in good condition - Roof trim and flashing faded - Tyndall stone base around stair landing (ledge angle rusting, some shifting cracks, failed sealant joint) - Rusted handrail - Repoint localized mortar joints and reseal control joints - enlarge brick weep holes
11	Dumoulin		X	Station exterior completely renovated at least 10 years ago - Generally in good condition - Roof trim and flashing faded - No counter flashings along concrete block parapets on discharge blocks (generally good condition)
12	Galt			Station exterior was reconstructed in 2005
13	Hart			Lean-to addition over discharge block and north wall of station rotting (Repaired in past) - Roof shingles (one side almost new - the other old and in very poor condition) - White deposits on some roof framing (crystallized sap) - Some damaged siding at removed Hydro enclosure and othe localized areas - Considerable flaking paint on siding and trim
14	Hawthorne			**NO BUILDING**
15	Jefferson	X		Station houses a federal weather station (no access to room - some roof mounted equipment) - Roof drains off back edge of roof and down wall (has damaged roof trim and soffit - Roof leaking at west end - Remove sections of soffit in damaged areas (dry inside - damage limited to exterior surface and finish)
16	Jessie	X		Station has been painted repeatedly due to chronic graffiti problem - Consideration for aesthetic upgrade due to proximity to walking path - Some brick faces have spalled at courses immediately above discharge block (no curb or flashing provided)
17	Larchdale (LDPS)			**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**
18	Laverendrye			Small station - Existing glass block window panels covered over with painted plywood panels - Station set back from the street
19	Linden		X	Station linked to sanitary sewer chamber (above average corrosion in drywell bbut not noticable in building) - Roof well worn and in need of replacement - Uncontrolled roof run-off deteriorating fascia trim - Site buuilt-up around building to same level as main floor (no evidence of rot at bottom of wall) - Quiet neighbourhood) - Apparently painted approximately 5 years ago but in poor condition due to failure of multiple previous paint layers (Large flaking areas - some boards replaced recently)
20	Mager Drive	X		Fenced enclosure surrounding adjacent lift station - Some fencing around tops of discharge blocks - Gravel trip hazard at entry door - Minor stucco damage on east side and south sides - Abanadoned Hydro area attached on east side
21	Marion			Station exterior completely renovated approximately 5 years ago - Tyndall stone parapet cap in good condtion but tops getting mossy - Short rainwater leader causes wall and tyndall stone shelf to get wet (mossy)
22	Mayfair		X	New station built in accordance with latest codes and requirements approximately 6 years ago - Building completely insulated and heated - Numerous brick wall weep holes plugged with mortar or sealant (should be cleared to allow proper wall cavity drainage - Caulking along roof side of parapet cap debonding from galvanized flashing (remove and replace)
23	Metcalfe			Small station - Exposed sited at end of street near homes - Paint baldy flaking due to failure of previous mulitple layers of paint - Grade at main floor level on 2 sides (siding does not appear damaged other than from grass cutting etc.)
24	Mission			Poor exterior finish - Relatively new roof but location of overflow allows ponding over considerable area of roof - new metal cap flashing in good condition but wood fascia underneath in poor condition - Considerable odour in station (also report considerable condensation and icing inside during winter months) - Site relatively concealed and remote (in backyard of residence)
25	Munroe			**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**
26	Newton (Armstrong)		X	Station linked to sanitary sewer chamber (considerable odour - and reported condensation and ice during winter) - Poor exterior finish - 2 wall openings made (sills rotten in both - require replacement) - Glass block window sill framing rotten and requires replacement (considerable staining on inside of station especially below window)
27	Polson		X	Station linked to sanitary sewer chamber (considerable odour - and reported condensation and ice during winter) - Poor exterior finish - Rebuilt wall above discharge block and valve chambers with 150mm concrete block on 2 sides - Single plank entry step is slippery when wet - Site is relatively level and 2 sides at same level as main floor
28	Roland			Station generall in good condition - Some efflourescence on brick at discharge block - Roof drain too high and possibly plugged (approximately 40mm of water over entire roof) - some joints between wall caps require resealing
29	Selkirk			Station in fair to poor condition - Poor exterior finish due to flaking paint - Roof run-off enters top of wall at continuous screened vent condition along back of building causing rot - Metal discharge block covers stolen in past (replaced with plywood covers) - Main floor approximately 300mm below grade (no evidence or report of water entry despite cracked concrete foundation)
30	St. John's			Station generally in good condition - Recently repainted (no graffiti) - Roof drains over gravel stop on back side (runs down wall) - Wall rotting in this area between discharge blocks - Some wall deterioration on south side due to Hydro area removal - Window sills rotting - Normally considerable vandalism and damage at this site (arson and graffiti) -
31	Syndicate			Station in fair to poor condition - Front hit a number of years ago by a truck (wall slightly buckled due to impact - still visible - never really repaired) - Brick face damged by graffiti removal and carving of initials - Door frame split due to break-in - Grade on 2 sides approximately 100mm above main floor - Street slopes toward building (drain located at entry)
32	Ravelston			**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**

Table 3.2 - Condition Assessment Summary - Mechanical

Number	Flood Pumping Station	VENTILATION			PUMPS								PIPING																							
		Cooling Fan	Drywell Ventilation										Flood Pump Piping														Shaft Seal Water Piping									
													Suction Side				Discharge Side				Joint Corrosion**				Piping			Joints			Valves	
		Recommendation	Supply Fan Recommendation	Exhaust Fan Recommendation	No. of Flood Pumps (not incl.dewatering)	Total Motor HP	Vibration Test Summary	Packing Gland Cover Corrosion	Packing Gland Cover Nuts/Bolts Corrosion	Packing Gland Cover Nuts/Bolts Corrosion	Bearing Cover Nuts / Bolts Corrosion	Shroud Nuts / Bolts Corrosion	Paint** (on Pump Base, not incl. Suction Bell)	Material	Corrosion**	Paint**	Ultrasonic Test Summary	Material	Corrosion**	Paint**	Ultrasonic Test Summary	Suction Pipe Flanged	Suction Pipe Victaulic*	Pump Discharge Flanged	Discharge Pipe Victaulic	Material	Corrosion**	Paint**	Type	Corrosion**	Condition	Corrosion**
1	Ash	Install new 18000 cfm cooling fan.	Remove existing 1,200 cfm fan, install new 3,400 cfm fan.	Install new 3,600 cfm fan.	4	925	NT	C2-C4	C2-C5	NA/ C3-C5	C0-C1	P4	D.I.	C2-C3	P3	NT	C.S.	C1	P1	NT	C2-C3	C2-C3/ NA	C1-C2	C1	Cu	C2-C4	Cu	SOL/ THR TEF / THR	C2-C4	J2-J3	C1-C5
2	Assiniboine	Install new 3000 cfm cooling fan.	Remove existing 700 cfm fan, install new 1,000 cfm fan.	Install new 1,100 cfm fan.	1	175	NT	C1	C1	C1	NA	P3	D.I.	C2	P2	NT	C.S.	C1	P1	NT	C1	C2	C1	NA	PVC/ Cu	C2-C3	PVC/C u	THR TEF/ CEM	C1-C2	J1-J2	C1-C3
3	Aubrey	Install new 18000 cfm cooling fan.	Remove existing 1,200 cfm fan, install new 2,700 cfm fan.	Install new 2,800 cfm fan.	4	925	NT	C1-C2	C1-C2	C1-C2	C1	P2-P3	D.I.	C1	P1-P2	NT	C.S.	C1	P1	NT	C1-C4	C1-C4, J4	C1-C2	C1-C2	Cu/ PVC,	C2-C3	Cu/ PVC/ P1	SOL/ THR TEF/ TEF/ CEM	C2-C3	J2-J4	C2-C5
4	Baltimore	Install new 9000 cfm cooling fan.	Remove existing 700 cfm fan, install new 2,200 cfm fan.	Install new 2,300 cfm fan.	3	425	T6	C2-C3	C3-C4	C3 C4	NA/ C0-C2	P3	D.I.	C2-C3	P2-P5	NT	C.S.	C2-C4	P2-P5	NT	C1-C5	C2-C5	C1-C4	C1-C3	PVC/ Cu/ C.S.	C0-C3	PVC/C u/ P0	THRTEF/ CEM/ THR	N.A./C 1-C2	J1-J2	C3-C4
5	Bannatyne	Fan is oversized but this cooling fan should remain at this FPS.	Remove existing 700 cfm fan, install new 1,800 cfm fan.	Install new 1,900 cfm fan.	4	395	T6	C1-C2	C1	C0-C3	NA	P1-P3	D.I.	C2	P2-P3	NT	C.S.	C1-C2	P1-P2	NT	C1-C3	C1-C3	C0-C2	N.A	PVC/ Cu	C1-C4	PVC/C u	THRTEF/ CEM	C1-C3	J1-J3	C0-C1
6	Clifton	Transfer Linden's 14000 cfm fan to Clifton FPS.	Remove existing 1,200 cfm fan, install new 3,100 cfm fan.	Install new 3,300 cfm fan.	4		NT	C3	C1	NA	C0	P2-P3	D.I.	C1-C2	P2	NT	C.S.	C0-C1	P1	NT	C1-C3	N.A	C0	C0-C1	PVC/ Cu	C1	PVC/C u/ P1	THRTEF / CEM / SOL	C1-C3	J1-J3	C1
7	Cockburn	Install new 12000 cfm cooling fan.	Leave existing 1,200 cfm fan for SPS, install new 2,800 cfm fan for FPS.	Install new 2,900 cfm fan for FPS.	3	600	NT	C1-C3	C1-C4	NA/C3	NA/ C2-C4	P2-P3	D.I.	C2-C4	P4-P5	NT	C.S.	C0-C1	P1-P2	NT	C1-C5	C1-C4	C0-C1	C0-C2	Cu/ PVC	C1-C2	Cu/ PVC	THRTEF/ CEM / SOL	C1-C2	J1-J2	C1-C2
8	Colony	Install new 8000 cfm cooling fan.	Remove existing 800 cfm fan, install new 2,200 cfm fan.	Install new 2,300 cfm fan.	2	400	NT	C0-C1	C0	C0	NA	P0	D.I.	C0	P0	NT	C.S.	C0	P0	NT	C0	J0	C0	C1/J4	Cu/ PVC	C0-C1	Cu	SOL/ CEM/ THRTEF	C0	J0	C0-C1
9	Cornish	Install new 7000 cfm cooling fan.	Remove existing 800 cfm fan, install new 1,900 cfm fan.	Install new 2,000 cfm fan.	3	325	T6	C1	C1-C4	C2 C3	C1	P2-P3	D.I.	C1-C4	P1-P5	NT	C.S./D.I.	C1-C5	P1-P6	NT	C1-C4	C1-C2	C1-C5	C1-C2	Cu/Galv	CI	N/A	SOL/THR	C1-C3	J2-J3	C1-C2
10	Despins	Install new 5000 cfm cooling fan.	Remove existing 700 cfm fan, install new 2,100 cfm fan.	Install new 2,200 cfm fan.	2	250	T0	C2-C3	C2-C3	C2 C5	NA	P2-P3	D.I.	C3	P3-P4	NT	C.S.	C1	P1	NT	C2-C4	C2	C1	N.A	PVC/ Nylon/Cu	C2	PVC/N ylon/C u	THRTEF/ CEM	C2	J0-J2	C1-C5
11	Dumoulin	Install new 5000 cfm cooling fan.	Leave existing 2,000 cfm fan for SPS. Install new 1,000 cfm fan for FPS.	Install new 1,100 cfm fan for FPS.	2	225	T0	C1	C2-C3	C1	NA	P2-P3	D.I.	C1-C2	P2-P3	T0	C.S.	C2-C3	P3-P4	T0	C1-C4	C1-C2	C1-C2	C1-C3	PVC/ Cu	C2	PVC/C u	THRTEF/ CEM	C1	J1	C2-C3
12	Galt	Install new 4000 cfm cooling fan.	Remove existing single speed 700 cfm fan. Install new 2-spd 900 cfm fan	Install new 1000 cfm fan.	2	150	NT	C1	C0-C2	C1-C4	NA	P1	D.I.	C2	P1-P2	NT	C.S.	C1	P1	NT	C2-C3	C1-C2	C1	N.A	Cu/ PVC	C1-C4	Cu/ PVC	THRTEF/ CEM	C1-C2	J1-J2	C1-C4
13	Hart	Install new 6000 cfm cooling fan.	Remove existing 700 cfm fan, install new 1,800 cfm fan.	Install new 1,900 cfm fan.	3	275	T6	C1	C1-C2	C1 C2	NA	P1-P2	D.I.	C3	P5	NT	C.S.	C1-C2	P1-P3	NT	C2-C5	C1-C2	C1	N.A	Cu/ PVC	C1-C3	Cu/ PVC	SOL / CEM / THRTEF	C1-C4	J1-J3	C1-C4
14	Hawthorne	This station is a subsurface chamber and does not require permanent cooling.	SUBSURFACE CHAMBER	SUBSURFACE CHAMBER	NA	NA	NT	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA	NA	NT	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	Jefferson	Install new 16000 cfm cooling fan.	DRYWELL 1 - Remove existing 700 cfm fan. DRYWELL 2 - Remove existing 700 cfm fan. Install new 3800 cfm 2 spd fan to service both D/W 1	Install new 4000 cfm fan to service both drywells	5	800	T6	C0-C2	C1	C1-C2	NA	P0-P1	D.I.	C2-C3	P2-P3	NT	C.S.	C1-C2	P1-P3	NT	C1-C2	C1-C2	C0-C1	N.A	Cu/ PVC	C0-C2	Cu/ PVC	THRTEF/ CEM	C0-C1	J1	C1-C4
16	Jessie	Transfer Newton's 14000 cfm fan to Jessie FPS.	Remove existing 1,100 cfm fan, install new 3,000 cfm fan.	Install new 3,100 cfm fan.	3	675	T0	C1-C2	C1-C2	NA/C2	NA/ C0-C2	P3	D.I.	C3-C4	P3-P5	T0	C.S.	C1-C2	P0-P3	T6	C2-C3	C2	C1-C2	C0-C2	PVC/ Cu	C2-C4	Cu/ PVC	SOL/ CEM/ THRTEF/ THR	C2-C3	J2-J3	C1-C2

* Indicates "where applicable" - victaulic is not present on all pump suctions.

** CORROSION, PAINT, and JOINT ratings represent the range of conditions found after inspecting all pumps in the FPS wetwell

Joint Condition Definitions

J0 - Joint is like new, excellent seal

J1 - Joint is good but not optimal

J2 - Joint seal (solder/cement/teflon/threads) is slightly worn, corroded or damaged

J3 - Joint seal (solder/cement/teflon/threads) is visibly worn, corroded or damaged, but not leaking

J4 - Joint condition may be the cause of periodic leakage

J5 - Joint has a definite small leak

J6 - Joint has a definite large leak

Joint Types

VIC - Victaulic Coupling

FLG - Flanged Connection

THR - Threaded

THR/TEF - Threaded w/ Teflon Tape

SOL - Soldered

CEM - PVC Cement

CLMP - Double Hose Clamp

Materials

D.I. - Ductile Iron

C.S. - Carbon Steel

Cu - Copper Pipe / Tubing

PVC - PVC Pipe

RR - Red Rubber Hose

Corrosion Definitions

C0 - No Corrosion - Surface is in like new condition

C1 - Very minor surface corrosion - Cross section is barely affected but minor corrosion is visible

C2 - Minor Surface Corrosion - Cross section is slightly affected, corrosion is visible.

C3 - Surface Corrosion - Cross section is affected, corrosion is clearly visible.

C4 - Advanced Surface Corrosion - Cross section is decreasing, structural integrity is still acceptable.

C5 - Heavy Surface Corrosion - Due to loss of base material, structural integrity is questionable.

C6 - Extreme Surface Corrosion - Major corrosive loss with rust-through at a minimum of one location.

Ultrasonic / Vibration Test Definitions

NT -Station has yet been tested

T0 - Test did not indicate presence of anomalies requiring corrective action.

T6 - Test indicated presence of anomalies requiring corrective action.

FOR T0 AND T6 RATED STATIONS, SEE REPORT FOR FURTHER DETAILS

Paint Condition Definitions

P1 - Very minor localized discoloration due to corrosion, paint is tightly adhering to surface

P2 - Minor discoloration due to corrosion, localized bubbling or flaking of paint

P3 - Paint is flaking due to corrosion at several locations

P4 - Large sections of painted surfaces are flaking

P5 - Most surface paint has been lost due to corrosion

P6 - Paint is completely removed from surface

Cu - Copper piping - no paint

PVC - PVC piping - no paint

City of Winnipeg Flood Pump Station Condition Assessment
Summary Report

Table 3.2 - Condition Assessment Summary - Mechanical

Number	Flood Pumping Station	VENTILATION – Cooling Fan – Recommendation	VENTILATION – Drywell Ventilation – Supply Fan Recommendation	VENTILATION – Drywell Ventilation – Exhaust Fan Recommendation	PUMPS – No. of Flood Pumps (not incl.dewatering)	PUMPS – Total Motor HP	PUMPS – Vibration Test Summary	PUMPS – Packing Gland Cover Corrosion	PUMPS – Packing Gland Cover Nuts/Bolts Corrosion	PUMPS – Bearing Cover Nuts / Bolts Corrosion	PUMPS – Shroud Nuts / Bolts Corrosion	PUMPS – Paint** (on Pump Bowl, not incl. Stuffing box)	PIPING – Flood Pump Piping – Suction Side – Material	Suction Side – Corrosion**	Suction Side – Paint**	Suction Side – Ultrasonic Test Summary	Discharge Side – Material	Discharge Side – Corrosion**	Discharge Side – Paint**	Discharge Side – Ultrasonic Test Summary	Joint Corrosion** – Suction Pipe Flanged	Joint Corrosion** – Suction Pipe Victaulic*	Joint Corrosion** – Pump Disch. Flanged	Joint Corrosion** – Disch. Pipe Victaulic	Shaft Seal Water Piping – Piping – Material	Piping – Corrosion**	Piping – Paint**	Joints – Type	Joints – Corrosion**	Joints – Condition	Valves – Corrosion*
17	Larchdale (LDPS)	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																													
18	Laverendrye	Install new 2000 cfm cooling fan.	Install new 2-speed 650 cfm fan.	Use existing 700 cfm fan for exhaust.	1	45	T6	C3	C1	C4	NA	P2	D.I.	C2	P3	NT	C.S.	C1	P2	NT	C5	C3	C2	N.A	Cu/ PVC	C1	Cu/ PVC	THRTEF/ CEM	C1-C2	J1	C2-C4
19	Linden	Move the existing Linden fan to Clifton FPS. Install a new 6000 cfm fan at Linden.	Leave existing 700 cfm fan for SPS, install new 1,500 cfm fan for FPS.	Install new 1,600 cfm fan for FPS.	2	300	T0	C2	C3	C4	NA	P2	D.I.	C3-C4	P3-P5	T0	C.S.	C4	P4-P5	T0	C4	C3	C1-C4	C1-C2	PVC/ Cu	C4-C5	PVC/Cu	THRTEF/ CEM	C3-C5	J3	C4-C5
20	Mager Drive	Install new 7000 cfm cooling fan.	Remove existing 700 cfm fan, install new 1,800 cfm fan.	Install new 1,900 cfm fan.	2	325	NT	C1-C2	C2	C2-C3	NA	P1-P2	D.I.	C2-C3	P2	NT	C.S.	C2-C3	P3-P4	NT	C1-C2	C1-C2	C1-C3	C1-C3	PVC/ Cu	C2-C3	PVC/Cu	THRTEF/ CEM	C1-C2	J1-J3	C1-C2
21	Marion	Install new 12000 cfm cooling fan.	Remove existing 550 cfm fan, install new 2,500 cfm fan.	Install new 2,600 cfm fan.	3	625	NT	C1	C1	C5	NA	P2-P3	D.I.	C3	P3-P4	NT	C.S.	C2	P3	NT	C4	C3-C4	C1-C2	C2-C3	PVC/ Cu	C2-C4	PVC/Cu	THRTEF/ CEM	C1-C3	J2-J3	C3-C4
22	Mayfair	Fan is oversized but this cooling fan should remain at this FPS.	STATION HAS ADEQUATE VENTILATION	STATION HAS ADEQUATE VENTILATION	1	200	NT	C0	C0	NA	C1	P0	C.S	C0	P0	NT	C.S.	C0	P0	NT	C0	N.A.	C0	N.A.	PVC/ Cu/ Red Rubber	C0/ RR	PVC/Cu/ RR	CEM/ SOL/ THRTEF/ CLMP	C0	J0	C0
23	Metcalfe	Install new 5000 cfm cooling fan.	Remove existing 700 cfm fan, install new 1,300 cfm fan.	Install new 1,400 cfm fan.	2	250	T6	C1-C2	C2	C5	NA	P3	D.I.	C2	P3-P4	NT	C.S.	C2	P2	NT	C4-C5	C3	C1	N.A.	PVC/ Cu	C1	PVC/Cu	THRTEF/ CEM	C1	J1	C1-C2
24	Mission	Install new 9000 cfm cooling fan.	Remove existing 550 cfm fan, install new 1,900 cfm fan.	Install new 2,000 cfm fan.	3	450	T0	C1	C3-C4	C2-C4	NA	P2	D.I.	C2-C3	P3-P4	NT	C.S.	C3-C4	P4-P5	NT	C3-C4	C3-C4	C2-C4	C2-C4	Cu/ PVC	C2-C3	Cu/ PVC	THRTEF/ CEM	C2	J2	C3-C4
25	Munroe	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																													
26	Newton (Armstrong)	Move the existing Newton fan to Jessie FPS. Install a new 6000 cfm fan at Newton.	Leave existing 700 cfm fan for SPS, install new 1,300 cfm fan for FPS.	Install new 1,400 cfm fan for FPS.	2	275	T0	C2	C5	C2-C4	NA	P3	D.I.	C4	P6	T0	C.S.	C5	P6	T0	C5	C4	C4	C4-C5	Cu/ PVC	C4-C5	Cu/ PVC	THRTEF/ CEM	C4-C5	J3	C4-C5
27	Polson	Install 7000 cfm cooling fan.	Leave existing 700 cfm fan for SPS, install new 1,800 cfm fan for FPS.	Install new 1,900 cfm fan for FPS.	3	325	NT	C1	C1-C2	C0-C1	NA	P1-P2	D.I.	C2-C3	P2-P4	NT	C.S.	C2-C3	P2-P3	NT	C1-C2	C1-C2	C2	N.A.	PVC/ Cu	C1-C2	PVC/Cu	THRTEF/ CEM	C1-C2	J1-J2	C0-C3
28	Ravelston	NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																													
29	Roland	Install new 6000 cfm cooling fan.	Remove existing 1,200 cfm fan, install new 2,400 cfm fan.	Install new 2,500 cfm fan.	2	300	T0	C1-C2	C1-C2	C2	C1-C2	P3-P4	D.I.	C3	P3-P4	NT	C.S.	C4	P3	NT	C2-C3	C3	C2	C3	Cu/ PVC	C2	Cu/ PVC	THRTEF/ CEM	C1-C2	J1-J2	C1-C2
30	Selkirk	Install new 11000 cfm cooling fan.	Install new 2-spd 1900 cfm fan.	Install new 2000 cfm fan.	4	500	T0	C1	C1-C2	C1	NA	P1-P2	D.I.	C3-C4	P4	NT	C.S.	C1-C2	P1-P2	NT	C1-C2	C1	C1	N.A.	Cu/ PVC	C0-C5	Cu/ PVC	THRTEF/ CEM	C0-C3	J0-J3	C0-C4
31	St. John's	Install new 11000 cfm cooling fan.	Remove existing 700 cfm fan, install new 2,300 cfm fan.	Install new 2,400 cfm fan.	4	500	T6	C1	C1-C2	C1-C2	NA	P2	D.I.	C2-C3	P2-P3	NT	C.S.	C2-C5	P2-P5	NT	C0-C4	C0-C3	C1-C3	N.A.	Cu/ PVC	C0-C2	Cu/ PVC	THRTEF/ CEM	C0-C1	J0-J1	C0-C4
32	Syndicate	Install new 3000 cfm cooling fan.	Remove existing single speed 550 cfm fan. Install new 700 cfm 2-spd fan.	Install new 750 cfm fan.	2	110	T6	C1	C1-C2	C1-C2	NA	P2	D.I	C3	P3	NT	C.S.	C2	P2	NT	C1	C1-C2	C2	N.A.	Cu/ PVC	C1	Cu/ PVC	THRTEF/ CEM	C1-C3	J1-J4	C1-C3

* Indicates "where applicable" - victaulic is not present on all pump suctions.

** CORROSION, PAINT, and JOINT ratings represent the range of conditions found after inspecting all pumps in the FPS wetwell

Joint Condition Definitions

- J0 - Joint is like new, excellent seal
- J1 - Joint is good but not optimal
- J2 - Joint seal (solder/cement/teflon/threads) is slightly worn, corroded or damaged
- J3 - Joint seal (solder/cement/teflon/threads) is visibly worn, corroded or damaged, but not leaking
- J4 - Joint condition may be the cause of periodic leakage
- J5 - Joint has a definite small leak
- J6 - Joint has a definite large leak

Joint Types

- VIC - Victaulic Coupling
- FLG - Flanged Connection
- THR - Threaded
- THR/TEF - Threaded w/ Teflon Tape
- SOL - Soldered
- CEM - PVC Cement
- CLMP - Double Hose Clamp

Materials

- D.I. - Ductile Iron
- C.S. - Carbon Steel
- Cu - Copper Pipe / Tubing
- PVC - PVC Pipe
- RR - Red Rubber Hose

Corrosion Definitions

- C0 - No Corrosion - Surface is in like new condition
- C1 - Very minor surface corrosion - Cross section is barely affected but minor corrosion is visible
- C2 - Minor Surface Corrosion - Cross section is slightly affected, corrosion is visible
- C3 - Surface Corrosion - Cross section is affected, corrosion is clearly visible.
- C4 - Advanced Surface Corrosion - Cross section is decreasing, structural integrity is still acceptable.
- C5 - Heavy Surface Corrosion - Due to loss of base material, structural integrity is questionable.
- C6 - Extreme Surface Corrosion - Major corrosive loss with rust-through at a minimum of one location.

Ultrasonic / Vibration Test Definitions

- NT -Station has yot yet been tested
- T0 - Test did not indicate presence of anomalies requiring corrective action.
- T6 - Test indicated presence of anomalies requiring corrective action

FOR T0 AND T6 RATED STATIONS, SEE REPORT FOR FURTHER DETAILS

Paint Condition Definitions

- P1 - Very minor localized discoloration due to corrosion, paint is tightly adhering to surface
- P2 - Minor discoloration due to corrosion, localized bubbling or flaking of paint
- P3 - Paint is flaking due to corrosion at several locations
- P4 - Large sections of painted surfaces are flaking
- P5 - Most surface paint has been lost due to corrosion
- P6 - Paint is completely removed from surface
- Cu - Copper piping - no paint
- PVC - PVC piping - no paint

City of Winnipeg Flood Pump Station Condition Assessment

Table 3.3 - Condition Assessment Summary - Geotechnical

ID No.	LOCATION	RIVER MEANDER PATTERN	OVERALL BANK SLOPE	SURFACE DRAINAGE	EXISTING BANK WORKS	EROSION CONDITIONS	BANK STABILITY CONDITION	GEOTECHNICAL ASSESSMENT RATING
1	Ash	Inside bend	5H:1V	Generally positive, some potential for ponding mid-bank downstream properties.	Discontinuous pieces of concrete rubble and limestone riprap around pipe outlets.	Minor between vegetation line and O.H.W.M. (1)	No evidence of overall instability at FPS. Inactive head scarp downstream of site.	Low Risk
2	Assiniboine	Straight	4H:1V	Positive	Riprap below Assiniboine Riverwalk.	Minor above walkway.	No evidence of overall instability at FPS.	Minimal Risk
3	Aubrey	Inside bend	5H:1V	Positive	Some limestone riprap and concrete rubble around outfall pipes.	Localized undercutting at upstream pipe outlet.	No evidence of bank instability at FPS.	Low Risk
4	Baltimore	Inside bend	6.5H:1V	Generally positive; potential for minor ponding on bank.	Grouted stone riprap locally outfall pipe.	Toe scour and undercutting upstream and downstream of pipe.	No evidence of overall instability at FPS.	Low Risk
5	Bannatyne	Start of Outside Bend	10H:1V	Positive	Timber retaining and limestone riprap	Minor above riprap	No evidence of bank instability at FPS.	Low Risk
6	Clifton	Straight	3.5H:1V	Generally positive; potential for minor ponding immediately upslope of guard rail	Combination of grouted stone and limestone riprap around pipe outlet.	Minor shoreline erosion beyond limits of riprap between RSRL & O.H.W.M. .	No evidence of bank instability at FPS.	Low Risk
7	Cockburn	Straight	4H:1V	Generally positive; potential for minor ponding at gate chamber.	Limestone riprap/toe berm extending down to glacial till.	Active erosion and shoreline slumping upstream and downstream.	No evidence of overall instability at FPS. Active and inactive head scarps upstream and downstream of FPS.	Low Risk
8	Colony	Outside bend	6H:1V	Generally positive within R.O.W.; potential for ponding along mid/lower bank upstream	Some limestone riprap	Active undercutting above riprap. Erosion extends up to O.H.W.M. and is most severe at upstream end of site	No evidence of bank instability at FPS. Historic retrogressive slope failures along midbank upstream of station.	High Risk
9	Cornish	Outside bend	7H:1V	Positive	Stone riprap	Undercut and over steepened above existing riprap at bridge.	No evidence of overall instability.	Low Risk
10	Despins	Outside bend	5H:1V	Positive along upper bank; potential for water ponding along mid to lower bank	Riprap in place beginning 6m downstream of outfall pipes and extending downstream to watertaxi dock; No Riprap in place at FPS shoreline.	Active, tree roots exposed, bank moderately undercut	Active shallow slumping along shoreline extending 3 to 5 m upslope of outfall pipe outlet. Inactive head scarp along top of bank approximately 8 to 12 m downslope of station.	High Risk
11	Dumoulin	Straight	7H:1V	Positive	Limestone riprap and 6 m shear key	Active downstream of riprap	No evidence of overall instability at FPS.	Minimal Risk
12	Galt	Outside bend	8H:1V	Positive	Limestone riprap	None	No evidence of overall instability at FPS.	Minimal Risk
13	Hart	Inside bend	6H:1V	Generally positive, potential minor ponding riverside of FPS foundation wall.	Limestone riprap around pipe outlet; some concrete rubble downstream	Undercutting downstream	No evidence of overall instability at FPS; shallow slumping along shoreline.	Low Risk
14	Hawthorne	Outside bend	6H:1V	Positive	Reconstructed in 2006 with new rockfill riprap and rockfill columns to act as a shear key	None	No evidence of overall instability at FPS.	Low Risk
15	Jefferson	Outside bend	12H:1V	Positive	Grouted stone riprap and concrete wall structure around pipe outlet.	Active with exposed tree roots upstream of outfall.	No evidence of overall instability at FPS.	Low Risk
16	Jessie	Outside bend	6H:1V	Positive	6 m wide rockfill shear key and riprap blanket	None	No evidence of overall instability at FPS	Low Risk
17	Larchdale	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**						
18	La Verendrye	Straight	4H:1V	Positive	Riprap blanket	Active undercutting beyond limits of riprap.	No evidence of overall instability at FPS; shallow shoreline slumping beyond limits of riprap.	Low Risk

Table 3.3 - Condition Assessment Summary - Geotechnical

ID No.	LOCATION	RIVER MEANDER PATTERN	OVERALL BANK SLOPE	SURFACE DRAINAGE	EXISTING BANK WORKS	EROSION CONDITIONS	BANK STABILITY CONDITION	GEOTECHNICAL ASSESSMENT RATING
19	Linden	Inside bend	4.5H:1V	Positive	Limestone and concrete rubble riprap around pipe outlet.	Minor above riprap, tree roots exposed and undercut.	No evidence of overall instability at FPS.	Low Risk
20	Mager Drive	Straight	7H:1V	Positive	3m shear key, 8m wide granular ribs, riprap blanket.	Minor beyond limits of riprap	No evidence of overall instability at FPS; historic head scarps upstream and downstream.	Minimal Risk
21	Marion	Straight	6H:1V	Positive	Riprap in place downstream of pipe and extending to bridge. Riprap in place upstream at rowing club.	Active shoreline erosion above pipe outlet	Inactive deep-seated failure extending to top of bank extending from station to 100 m upstream.	High Risk
22	Mayfair	Straight	3H:1V	Positive	Limestone riprap	Active undercutting upstream of riprap.	No evidence of overall instability at FPS; shallow shoreline slumping upstream of riprap.	Low Risk
23	Metcalfe	Outside bend	5H:1V	Positive	Limestone riprap	None	No evidence of overall instability at FPS.	Minimal Risk
24	Mission	Straight	8H:1V	Positive	None	Minor	No evidence of overall instability at FPS.	Minimal Risk
25	Munroe	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**						
26	Newton	End of outside bend	3H:1V	Potential for ponding along upper bank	Riprap between RSRL and WRL	Minor above existing riprap, upstream bank undercut and over steepened	No evidence of overall instability at FPS	Low Risk
27	Polson	Inside bend	5.5H:1V	Positive	Grouted stone riprap and shear key at outlet.	Active upstream and downstream of pipe.	No evidence of overall instability at FPS; shallow shoreline slumping upstream of riprap.	Low Risk
28	Roland	Outside bend	7H:1V	Positive	Limestone riprap in place along shoreline from CPR bridge to outfall pipe	Minor shoreline erosion above existing riprap	No evidence of instability at FPS. Historic instability upstream and downstream of site.	Low Risk
29	Selkirk	Outside bend	7H:1V	Positive at station; potential for ponding upstream	Stone riprap 10m downstream of pipe and 5m upstream of pipe	Minor above riprap	Inactive head scarps 100 m upstream of FPS. Inactive head scarp along mid bank area immediately downstream of station.	High Risk
30	St. John's	Outside bend	5H:1V	Positive	Grouted stone riprap and concrete collar at pipe outlet. Some limestone either side of grouted stone.	Minor beyond limits of riprap	Potential inactive slump block along O.H.W.M. Inactive slope failure upstream.	High Risk
31	Syndicate	Straight	2.5H:1V	Positive	Grouted limestone riprap and concrete collar around pipe outlet.	Active undercutting and over steepening upstream and downstream of outfall.	No evidence of overall instability at FPS; possible inactive scarps upstream and downstream.	Low Risk
32	Ravelston	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**						

Notes: 1. O.H.W.M. - Ordinary High Water Mark

Table 3.4 - Condition Assessment Summary - Substructures & Gates

		STATION SUBSTRUCTURE																GATE CHAMBER							
			Stairs / Ladders					Dry Well		Pump Bases				Discharge Box						Flap	Slide				
Number	Flood Pumping Station	Grade BM Cracks & Spalling	Steep	Low Rails	Angle bracket support	Insulation too close (rung/rail)	Other	Wall Cracks	Floor Swale	Exposed Reinforcing Steel	Spalled Grout Shoulder	A.bolts& baseplate	Pump Flange Bolts	Wall Cracks	Wall/Roof Condensation	Roof Cracks & Spalling	Guides Corroded	Other	Concrete	Gate	Frame	Gate	Frame	Anchor Bolts	Operator	Additional Notes
1	Ash		X	X				Minor			X		X							G	G	P	F/P	P	G	Steel Shims Protruding From Grout pad- Corroded
2	Assiniboine					X	X	Minor	X	X				Minor		Medium	Medium	X		G	G/F	G/F	G/F		G	No Handrails(Drywell Access Hatch)- Discharge box access ladder heavily corroded at the top rungs
3	Aubrey	Minor	X																P	P	P	F	F	P	G	Concrete Chamber(b/t gates)- Poor Condition
4	Baltimore	Minor	X	X				Minor	X		X	Heavy	X	Medium			Medium			G	G	F	F/P	P	P	Motor base pad(Spalled)-ShaftMount(Corroded) -Steel Shims Protruding From Grout pad- Corroded
5	Bannatyne	Minor	X	X	X			Minor		X	X			Large	X	Medium	Medium	X		G/F	G	G	G		G	Steel Shims exposed(pump base)- Underside of roof slab anchor bolts/angle support(no embedment&corroded)
6	Clifton	Minor	X								X		X		X					F/P	F/P	F	F	P	G	
7	Cockburn		X	X				Minor			X	Medium	X				Minor	X		G	G	G	G		G	Steel rebar/plate protruding from discharge wall - corroded
8	Colony	Large	X	X			X	Minor						Minor	X	Minor		X	F	G/F	G/F	F	F		G	Top concrete stairs(spalled/cracked)- Lower platform checkered plate corroded-Dry Well Wall Minor cracks but multiple stains & segregation -Pump grout base single crack- Past restoration work (wall opening sawcut) exposed reinforcing steel-exterior discharge box wall exposed reinforcing steel corroded- Gate concrete chamber minor cracks & past injections
9	Cornish		X				X	Minor				Minor a.bolt	X	No access permitted						G	G	P	F/P		G	Lower stair platform top of checkered plate corroded - Toe plate 2" high on platform
10	Despins							Minor	X			Medium	X		X	Minor	Minor			G	G	G	G		G	Pump hatch missing handles - Dry well walls minor cracks and multiple patching & stains- Inside face of pump base mechanically chipped out- Top of CMP spalled & exposed reinforcing steel
11	Dumoulin		X	X		X		Minor	Minor			Minor a.bolt	X			Minor		X		G	G	G	G		G	Multiple minor cracks main floor- Minor floor swale chipped out (2.5 ft length) near sump pit- Inside face of pump base mechanically chipped out- Snap ties original wall (discharge box) construction corroded
12	Galt					X	X	Minor			X		X	Medium		Minor	Medium	X		F	F	F/P	F/P	P	F/P	Minor cracks/spalled grout pad shaft- Deformity of dry well wall from poor construction(bulge) no visible signs of cracking- Dry well wall base (near ladder) concrete chipped out-Steel shims protruding from grout pad (corroded)- Gates concrete chamber medium cracks and spalling
13	Hart	Minor							X		X						Heavy			F/P	F/P	P	P		P	Dry well walls previously patched & multiple stains- Grout pad and steel shims rough shape on pump base- Outfall concrete chamber spalled off areas
14	Hawthorne	NOT APPLICABLE (NEW SUBSURFACE CHAMBER CONSTRUCTED IN 2006)																	F/P	G	G	P	P	P	F/P	Both concrete gate chambers have large horizontal cracks & spalling and poor concrete mixing
15	Jefferson	Minor				X	X	Medium			X			Minor	X		Medium	X		G	G	G	G		G	No Handrails(Drywell Access Hatch)- Continuous crack running from interior grade bm along the slab up to 3 motor (from east)- Exposed reinforcing steel on dry well wall- Snap ties from original construction corroded - Stoplog sheared off
16	Jessie	Minor	X	X						X				Minor						G	G	P	F		G	Multiple minor cracks on dry well floor
17	Larchdale	STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																								
18	Laverendrye						X	Minor		X	X		X	Medium	X		Medium			G	G	G	G		G	No Handrails(Drywell Access Hatch)- Grout pad (shaft mount) top face minor spalling at shoulder- Dry well floor slab chipped and gouges
19	Linden		X	X			X	Minor	X		X	Medium	X	Minor	X	Medium	Medium			G/F	F/P	P	P	P	P	Underside of intermediate beams(dry well) exposed reinforcing steel corroded- Shaft mounts(baseplate/anchor bolts) surface corrosion-Underside of beam near column dry well wall structural crack-Snap ties corroded(dry well & discharge box wall)
20	Mager Drive		X	X	X		X	Minor	X	X	X	Minor			X	Minor	Medium			G	G	G	G		G	Underside of one intermediate beam(dry well) exposed reinforcing steel corroded- Shaft mounts(baseplate/anchor bolts) surface corrosion- Minor cracks concrete chamber and concrete segregation present
21	Marion		X	X	X			Minor		X	X	Medium a.bolt	X	Minor	X	Medium	Medium			G/F	F	F/P	F/P		P	Underside of intermediate beams(dry well) exposed reinforcing steel corroded- Near hatch opening underside of roof slab and corner exposed reinforcing steel
22	Mayfair																			G	G/F	F	F		F/P	Top of base grout shoulders minor cracks - vertical/horizontal
23	Metcalfe							Minor			Major	Minor	X		X					G	G	G	G		G	Top of wall exposed reinforcing steel corroded - spalled area
24	Mission	Minor	X	X					X			Minor	X	Large		Medium	Medium			F	F	F	F		F/P	Larger Horizontal cracks (1/8") on exterior wall of Discharge box area- Outfall concrete chamber appears to be in rough shape, multiple large cracks in tunnel and chamber (wide cracks and various location concrete spalling)
25	Munroe	STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																								
26	Newton		X	X	X			Minor		X	X	Heavy		Minor	X	Medium	Medium			G/F	G/F	F/P	F/P	P	F/P	Spalling of main floor slab near drywell access stairs and chipped concrete- Motor grout pad minor spalling- 3rd beam (from east dry well wall) underside reinforced steel bars (stirrups) corroded-Two columns North dry well wall larger crack and spalling at corner edge (exposed reinforcing steel corroded) Steel shims protruding from grout pad corroded
27	Polson	Medium					X	Minor	X	X	X	Medium a.bolt		Minor	X	Medium	Heavy			G	G/F	F/P	F/P		G	No Handrails(Drywell Access Hatch)-Wood trim frame along the hatch opening(discharge box) rotting- Outfall gate chamber spalling at foot level north corner-
28	Roland		X					Minor		X					X	Minor				(East)G	G	P	P		G	(Shaft mounts)anchor bolts and steel plates appear corroded/section loss (visual)-
																				(west)G	G	G	G		G	
29	Selkirk	Large	X	X	X			Minor		X				Medium		Medium	Heavy	X	F	G	G/F	P	P	P	P	Outfall concrete chamber horizontal cracks (1/16" gap) near bottom - at the same location the concrete chamber have spalled corners and larger voids - ice forming in concrete voids and North wall horizontal crack
30	St. John's		X	X		X		Minor	X	X	X	Medium a.bolt			X	Medium	Medium			F/P	F/P	F/P	F/P		G	3rd motor (from west) minor spalling and cracks in base plate grout-Dry well access hatch handle missing-
																						F/P	F/P		G	
31	Syndicate											Minor		Minor			Minor			G	G	F	F		F	Bearing baseplate of the vertical w section which supports the pipe has 1/2 " gap between the bearing plate and concrete base pump- Dry well floor minor cracks-
32	Ravelston	STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)																								

Note:

Steel Corrosion Definitions
Minor - light surface corrosion
Medium - significant surface corrosion, minimal section loss
Heavy - major corrosion with section loss

Concrete Crack Definitions
Minor - hairline cracks to 1/32" gap
Medium - approx. 1/16" gap
Large - approx. 1/8" gap and greater

Gate Condition Definitions
G - Good G/F - Good to Fair
F - Fair F/P - Fair to Poor
P - Poor

Table 3.5 - Condition Assessment Summary - Electrical
Fault Levels and Interrupting Capacity Data

No.	Flood Pumping Station	Street Address on MH Billing Records	MH Account Number	Meter Number	Connected Load	Contract Demand	ITE Breaker	Vault Transformer Size (KVA)	Pad mount Transformer Size (KVA)	Pole Mount Transformer Size (KVA)	Manitoba Hydro Transforemr Impedence (%)	Calculated Fault level at 600 V bus	Switchgear Interrupting Rating		Notes
1	Ash	1059 Wellington Ave	22505105900011	#92554 for 600 V to flood pumps #72574 for 240 V service fo flood pumps #100356 for Sewage Lift Station	1 @ 175 HP 3 @ 250 HP	690 KVA			750 kVA						Service has been upgraded in 2006
2	Assiniboine	60 Main Street	28207006000022	#109307 is for 600 V pumps #42444 is for Park Lighting	1 @ 175 HP		*		150 KVA		4.5% Guess	3,333	10,000		
3	Aubrey	1016 Palmerston	08302101600001	#105123 is for the 600 V for the pumps #41238 is for the 240 V service #96739 is for the sewage lift station	1 @ 175 HP 3 @ 250 HP	690 KVA			? KVA				25,000		Service has been upgraded in 2004
4	Baltimore	246 Churchill Drive	2520024600001	#13810 in vault for 600 V service to flood pumps #80194 for 240 V service #18842 for 600 V service to sewage lift station	2@100 HP 1@225 HP	317 KVA			? KVA				25,000		Service has been upgraded in 2004
5	Bannatyne	10 Bannatyne Ave	19204001000001	#91952 for 600 V to pumps #47666 for 240 V service	2@ 125 HP 1@ 100 HP 1@ 45 HP	295 KVA	*		500 kVA		4.50%	11,111	25 kA Main 15 kA Subs		
6	Clifton	1256 Wolseley	02319125600001	#90413 is for 600 v for pumps #93259 is for 240 v service #90186 is for 600 V to sewae Lift Station	1@ 10 HP 4 @ 200 HP	649 KVA	*	3 @333 KVA		3 @37.5 KVA 1 @ 25 kVA			unknown		Carry $65,000 for future service (no transformers.)
7	Cockburn	905 Cockburn Street	01516090500001	#90107 in vault for 600 V service to flood pumps #49419 for 240 V service	1@ 150 HP 1@200 HP 1@250 HP	448 KVA	*	3@ 250 KVA		1 @ 37.5 kVA			unknown		Carry $65,000 for future service (no transformers.)
8	Colony	32 Mostyn Pl	23203003200001	#90424 is for 600 V pumps #63438 is for 240 V service	1 @ 175 HP 1 @ 225 HP	298 KVA			300 kVA	1@ 100 kVA non dedicated			25 kA Main		Cutler Hammer Panel
9	Cornish	85 Cornish St.	26309008500001	#105129 is for 600 V to pumps #1694 is for 240 V service #34424 is for 240 V for area lighting	1 @ 50 HP 1 @ 125 HP 1 @ 150 HP	243 KVA			300 kVA	3 @ 37.5 kVA			25 kA		Cutler Hammer Panel
10	Despins	151 Despins Tache & Despins	243037-020	#369746	1 @ 100 HP 1 @ 150 HP		*					7,500	15 kA Subs		Assume 300 KVA
11	Dumoulin	705 Tache Tach & Dumoulin	663037-020	#391402	1 @ 75 HP 1 @ 150 HP		*					7,500	15 kA Subs		Assume 300 KVA
12	Galt (Alexander)(Robert)	1 Galt Avenue	14217000100001	#14860 is for 600 V pumps;presently removed #36211 is for the 240 V service	2 @ 75 HP	Not Applicable	*		1 @ 150 kva		4.5% Guess	3,333	25 kA Main		
13	Hart	174 Glenwood Crescent or 1 Hart	04020101740000	#105135 for 600 V service to flood pumps #81116 for service to sewage lift station	2@100 hP 1@ 75 HP	205 KVA	*		1 @ 300 kva		4.50%	6,667	15 kA Subs		
14	Jefferson	297Scotia Ave	589912-001	#635251	3@ 150 HP 2 @ 175 HP		*					20,000	25 kA Subs		Assume 1000 KVA
15	Jessie	399 Mulvey Ave	11510039900001	# 92267 for 600 V to flood pumps #14537 for 240 V service #18301 is for sewage lift station	1@ 60 HP 1@ 175 HP 2@ 250 HP KGS records say no 60 HP pump	548 KVA		3 @ 250 kva,		3 @ 100 kva NON DEDICATED	Est 4%	18,750	25kA		
16	Laverendrye	755 Tache	297037-020	#097573	1 @ 45 HP							2,500	10 kA		Assume 100 KVA
17	Linden	856 Kildonan Drive	220063-020	#098006	1 @ 175 HP 1 @ 125 HP		*					12,500	25 kA		Assume 500 KVA
18	Mager Drive	5 Mager Drive	35038-020	#686782	1 @ 200 HP 1 @ 125 HP		*					12,500	25 kA		Assume 500 KVA
19	Marion	10 Lyndal Drive	214053-020	#606874	2 @ 225 HP 1 @ 175 HP		*					12,500	15 kA Sub 25 kA sub		Assume 500 KVA
20	Mayfair	Main Street & Mayfair			1 @ 200 HP, 1 @ 7.5 HP				1@ 500 KVA		0.04	12,500	35 kA Main 25 kA Subs		
21	Metcalfe	242 Metcalf	559951-001	#496875	2 @125 HP		*					6,000	15 kA		Assume 300kVA
22	Mission	91 Archibald at Mission	413159-021	#682276	3 @ 125 HP		*					12,500	15 kA		Assume 500kVA
23	Munroe	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**													
24	Newton (Armstrong)				1 @ 125 HP 1 @ 150 HP		*				Est. 5%	10,000	20 kA Main Subs 15 kA		Assume 500kVA
25	Polson	75 Scotia St.	07412007500001	#105042 for 600 V to pumps #104257 for 240 V service	2@ 100 HP 1@ 125 HP	243 KVA	*		1 @ 300 kva		4.50%	10,700	35 kA Main 15 kA Subs		
26	Ravelston	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**													
27	Roland	16 Watt St.	07213001600001	#18316 is for the 600 V to pumps #84949 is for 240 V service	1 @ 5 HP 2 @ 150 HP	265 KVA			3 @ 150 kva	1 @ 25kVA	Est. 3%	15,000	18 kA		
28	Selkirk	100 Selkirk	28423010000001	#89977 is for 600 V for pumps #58753 is for 240 V service	2 @ 75 HP 2 @ 175 HP	373 KVA	*		1 @ 500 kva		4.50%	14,400	35 kA Main 15 kA Subs		
29	St. John's	2 Anderson Avenue	08414000200011	No meter for 600 V pumps #446933 for 240 v service	2 @ 75 HP 2 @ 175 HP	373 KVA	*		1 @ 500 kva		4.50%	14,400	35 kA Main 15 kA Subs		
30	Syndicate	200 Syndicate	08205020000001	#18563 is for 600 V pump loads #89369 is for 240 V srvice # 6583 is for the sewage lift station	1 @ 35 HP 1 @ 75 HP	None	*			3 @ 50kVA 1 @ 25kVA	3%	5,000	15 kA		
31	Hawthorne				2 @ 220 HP				500 kva			12,500	25 kA		New Station 2006
32	Larchdale (S/FPS)	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**													

Table 4.1 - Aesthetic upgrade Candidates Summary - Building Superstructure

NO.	STATION NAME	PRESENT EXTERIOR FINISH	PROPOSED AESTHETIC UPGRADE COMMENTS & DETAILS	CONSIDERATIONS AFFECTING AESTHETIC UPGRADE RECOMMENDATIONS
1	Ash	Brick	Minor cosmetic repair	Generally in good condition - medium visibility
2	Assiniboine	Brick	Upgrade completed approximately 5 years ago	
3	Aubrey	Brick	Minor cosmetic repair	Generally in good condition - Does not blend into neighbourhood
4	Baltimore	Wood Siding (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In poor condition - high visibility - newer homes
5	Bannatyne	Brick	**MAJOR AESTHETIC UPGRADE RECOMMENDED**	Scheduled for upgrade as part of Waterfront Drive Development
6	Clifton	Wood Siding (Painted)	Medium cosmetic repair	Generally in good condition - blends in reasonably well with neighbourhood
7	Cockburn (C)	Brick	Recent prefinished metal roof	In good condition
8	Colony	Brick	Minor cosmetic repair	Generally in good condition - blends in reasonably well with neighbourhood
9	Cornish	Brick	Minor cosmetic repair	Generally in good condition - blends in reasonably well with neighbourhood
10	Despins	Brick	Upgrade completed approximately 10 years ago	
11	Dumoulin (C)	Brick	Upgrade completed approximately 10 years ago	
12	Galt	Brick	Upgrade completed spring of 2005	
13	Hart	Wood Siding (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In poor/fair condition - discharge block enclosure is rotten and must be removed
14	Hawthorne	**NO BUILDING**		
15	Jefferson	Wood Siding (Painted)	Medium cosmetic repair	Generally in good condition - blends in reasonably well with neighbourhood
16	Jessie	Brick (Painted)	Minor cosmetic repair	Generally in good condition - near walking path but in isolated industrial area
17	Larchdale	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**		
18	La Verendrye	Wood Siding (Painted)	Medium cosmetic repair	Industrial neighbourhood - medium visibility
19	Linden (C)	Wood Siding (Painted)	Medium cosmetic repair and construction of separate entry	In fair condition - medium visibility - blends in reasonably well with neighbourhood
20	Mager	Stucco (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In fair condition - medium visibility, incorporate sanitary station in new design
21	Marion	Brick	Upgrade Completed Approximately 5 years ago	
22	Mayfair (C)	Brick	New Station	
23	Metcalfe	Wood Siding (Painted)	Medium cosmetic repair	Generally in good condition - high visibility at front yard of newer home
24	Mission	Wood Siding (Painted)	Medium cosmetic repair	Low visibility - located in back yard of one older isolated residence
25	Munroe	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**		
26	Newton (C)	Wood Siding (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In poor/fair condition - close to street - requires construction of separate entry
27	Polson (C)	Wood Siding (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In poor/fair condition - close to street - requires construction of separate entry
28	Roland	Brick	Minor cosmetic repair	Generally in good condition - high visiblity - in mixed neighbourhood
29	Selkirk	Wood Siding (Painted)	**AESTHETIC UPGRADE RECOMMENDED**	In poor/fair condition - close to street
30	St. John's	Wood Siding (Painted)	Medium cosmetic repair	Generally in fair condition - in park setting
31	Syndicate	Brick	**AESTHETIC UPGRADE RECOMMENDED**	In poor/fair condition - high visibility
32	Ravelston	**NOTE: STATION WAS REMOVED FROM SCOPE OF WORK (NOT A TYPICAL FLOOD PUMPING STATION)**		

Notes:
1. (C) - Denotes Combination Station (Station includes sanitary function within same structure)

Definitions

1. Major Aesthetic Upgrade	Complete reconfiguration and upgrage of station and site, including complete removal of existing exterior cladding and finish and replacement with appropriate new material and finish system.
2. Aesthetic Upgrade	Complete removal of existing exterior cladding and finish and replacement with appropriate new material and finish system. May or may not include reconfiguration of roof.
3. Minor cosmetic repair	Replace/repair/refinish as required any trim and other exterior surfaces
4. Medium cosmetic repair	Strip existing paint to bare wood, replace damaged siding and repaint with high quality exterior paint. Replace/repair/refinish any trim as required. Consider medium tone colour scheme.

Table B7.1 - Estimated 10 Year & Future Upgrade Costs

Item	0 to 10 Year Upgrade Costs (2005$)				11 to 50 Year Upgrade Costs (2005$) (Future)			Comments
	Priority	0 to 5 Year	6 to 10 Year	10 Year Total Cost	Total Cost	Probability	Pro-rated Costs	
Building & Site								
Replace membrane roofing, flashing and trim (including hatch)				$ -			$ -	
Replace shingle roofing c/w new underlayment (including hatch)				$ -			$ -	
Roof trim repair or upgrade (including drainage system)				$ -	$ 5,800	50%	$ 2,900	
Install new sloped prefinished metal roof & trim over existing flat roof				$ -			$ -	
Localized wood frame wall repair				$ -			$ -	
Exterior siding and/or trim refinishing				$ -	$ 9,200	100%	$ 9,200	Every 10 years
Exterior siding and/or trim repair or replace with similar material				$ -			$ -	
Major aesthetic upgrade (and/or major building repair or alterations)				$ -			$ -	
Installation of separate access to sanitary sewer chamber	medium	$ 23,000		$ 23,000			$ -	
Replace entry door and frame				$ -	$ 3,500	50%	$ 1,750	
Replace interior door and frame				$ -	$ 1,400	50%	$ 700	
Remove existing window and infill wall opening				$ -			$ -	
Create/rework wall openings for ventilation upgrades				$ -			$ -	
Minor brick repair and mortar joint repointing				$ -	$ 3,500	50%	$ 1,750	
Wall repair and installation of flashing at discharge block				$ -			$ -	
Sealant joint replacement				$ -			$ -	
Install thermal barrier over foamed plastic insulation in drywell	medium	$ 17,300		$ 17,300			$ -	
Drywell stair safety upgrade (install intermediate rails on landings)				$ -			$ -	
Exterior stair safety upgrade (install handrails)	medium	$ 2,300		$ 2,300			$ -	
Driveway and/or sidewalk repair or replacement	high	$ 10,000		$ 10,000			$ -	Exterior stair concrete
Fencing repair, replacement or removal				$ -			$ -	
Site regrading				$ -			$ -	
Additional Unidentified Scope Items				$ 5,000			$ 5,000	
Sub-total		$ 52,600	$ -	$ 57,600	$ 23,400		$ 21,300	
Mechanical								
Drywell Ventilation System Upgrades	high	$ 10,000		$ 10,000			$ -	One Time Only
Main Floor Cooling Fan System Upgrades	high	$ 13,900		$ 13,900			$ -	One Time Only
Convert Copper and Carbon Steel Shaft Seal Piping to PVC	medium		$ 1,600	$ 1,600			$ -	One Time Only
Replace Existing Seal Water Valving	medium		$ 1,100	$ 1,100	$ 2,200	75%	$ 1,650	Every 20 Years
Replace Flood Pump Pipe Victaulic Coupling and/or Flanged Connection Nuts & Bolts	high	$ 6,300		$ 6,300	$ 12,600	75%	$ 9,450	Every 20 Years
Sandblast & Paint Pumps & Piping	high	$ 33,000		$ 33,000			$ -	One Time Only
Bearing Cover Hardware Replacement				$ -			$ -	
Packing Gland Cover Hardware Replacement				$ -	$ 600	75%	$ 450	Every 20 Years
Packing Gland Cover Replacement				$ -			$ -	
Replace Copper Pipe on Shaft Seal Line at Tie- in to Pump(s)				$ -			$ -	
Replace Copper Pipe on Shaft Seal Line at Drywell Entry Point				$ -			$ -	
Discharge Pipe Replacement				$ -	$ 9,000	45%	$ 4,050	
Replace Worn Shaft Bearing and/or Universal Joints				$ -	$ 25,000	10%	$ 2,500	
Straighten or Replace Bent Shaft				$ -	$ 25,000	40%	$ 10,000	
Assess Pump Bushing Clearances and Correct				$ -	$ 2,000	100%	$ 2,000	
Lower Shaft Bearing to Clear Shaft Coupling				$ -	$ 5,000	10%	$ 500	
Disassemble Shaft, Relieve Strain and Reinstall				$ -	$ 5,000	10%	$ 500	
Align Misaligned Shaft				$ -	$ 5,000	10%	$ 500	
Ultrasonic Testing of all Flood Pump Suction & Discharge Pipes	medium	$ 800		$ 800	$ 3,200	100%	$ 3,200	Every 10 Years
Vibration Test and Thermal Scan	medium	$ 2,300		$ 2,300	$ 9,200	100%	$ 9,200	Every 10 Years
Additional Unidentified Scope Items				$ 10,000	$ 10,000	100%	$ 10,000	
Sub-total		$ 66,300	$ 2,700	$ 79,000	$ 113,800		$ 54,000	

Table B7.1 - Estimated 10 Year & Future Upgrade Costs

Item	0 to 10 Year Upgrade Costs (2005$)				11 to 50 Year Upgrade Costs (2005$) (Future)			Comments
	Priority	0 to 5 Year	6 to 10 Year	10 Year Total Cost	Total Cost	Probability	Pro-rated Costs	
Geotechnical								
Visual inspection of riverbank and outfall pipe	high	$ 2,000	$ 2,000	$ 4,000	$ 16,000	100%	$ 16,000	
Install new inclinometers				$ -			$ -	
Monitoring of inclinometers				$ -			$ -	
Upgrde existing riprap blanket/install new riprap blanket				$ -	$ 51,000	75%	$ 38,250	
Drainage Improvements				$ -			$ -	
Shear Key				$ -			$ -	
Additional Unidentified Scope Items				$ -				
Sub-total		$ 2,000	$ 2,000	$ 4,000	$ 67,000		$ 54,250	
Substructure & Gates								
Repair grade beam cracks and/or spalling				$ -			$ -	
Upgrade/repair drywell stairs/ladders/handrails/hatches	medium	$ 1,100		$ 1,100			$ -	
Inject & patch cracks in dry well concrete walls and or beams	low		$ 18,700	$ 18,700			$ -	
Repair drywell floor/swale with new sloped concrete topping				$ -			$ -	
Repair spalled pump base concrete, grout and/or anchor bolts	medium	$ 4,400		$ 4,400			$ -	
Discharge box concrete repairs	medium	$ 6,400		$ 6,400			$ -	
Discharge stoplog and guide repairs				$ -			$ -	
Add vents to discharge box to reduce condensation				$ -			$ -	
Replace/Repair flap gate, frame, anchor bolts and/or thimble				$ -	$ 61,000	25%	$ 15,250	
Replace/Repair slide gate, frame, anchor bolts and/or thimble				$ -	$ 72,300	25%	$ 18,075	
Install new access platforms for pump shaft guide bearings	medium	$ 28,700		$ 28,700			$ -	
Gate chamber concrete repairs				$ -			$ -	
Repair wetwell roof, wall and column concrete (cracks and or spalling)				$ -	$ 6,000	75%	$ 4,500	
Repair wetwell intermediate slab and beam, floor slab and culvert (cracks and or spalling)	low		$ 1,500	$ 1,500			$ -	
Inspect & upgrade/repair wetwell trashracks	medium	$ 5,000		$ 5,000	$ 7,500	75%	$ 5,625	
Upgrade/repair wetwell ladders and railings				$ -			$ -	
Upgrade/repair wetwell slide gate shafts and shaft supports	low		$ 75,000	$ 75,000			$ -	
Clean wetwell floor				$ -			$ -	
Additional Unidentified Scope Items				$ 5,900			$ 5,000	
Sub-total		$ 45,600	$ 95,200	$ 146,700	$ 146,800		$ 48,450	
Electrical								
Upgrade exterior lighting	medium	$ 2,200		$ 2,200	$ 2,200	100%	$ 2,200	
Upgrade interior lighting	medium	$ 1,800		$ 1,800	$ 1,800	100%	$ 1,800	
Service entrance upgrade	high	$ 6,600		$ 6,600	$ 65,000	100%	$ 65,000	
Additional Unidentified Scope Items				$ 1,200	$ 5,000	100%	$ 5,000	
Sub-total		$ 10,600	$ -	$ 11,800	$ 74,000		$ 74,000	

			Grand Total (10 Year & Future)
Total Estimated Upgrade Costs (Excluding PST & GST)	$ 299,100	$ 252,000	$ 551,100
Contingency (20%)	$ 59,820	$ 50,400	$ 110,220
Engineering & Administration (20%)	$ 59,820	$ 50,400	$ 110,220
Total Estimated Cost (Excluding PST & GST)	$ 418,740	$ 352,800	$ 771,540

Notes:
All costs are in 2005 dollars
Any applicable provincial and federal taxes are not included in the above estimate