CHERRY CREEK WATERWORKS DISTRICT

WATER INFRASTRUCTURE ASSESSMENT

February 2016

Prepared by:
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Project Reference: 3294

TABLE OF CONTENTS

1 INTRODUCTION

The Cherry Creek Waterworks District (CCWD) has requested that McGill and Associates Engineering Ltd. (McGill) prepare an assessment of their existing water infrastructure. This assessment will analyze the current state of the infrastructure and develop a long term plan that will assist the CCWD in budgeting for the future. Upon completion of the assessment, the CCWD will be able to develop a long term plan to replace aging infrastructure and continue to provide reliable access to safe drinking water for the community.

2 EXISTING WATER SYSTEM

A summary of the existing water supply, treatment and distribution system is provided below.

2.1 Water Source

The water supply for the CCWD is Cold Creek with headwater storage at Lacy Lake. The source is secured with the following Water licenses:

- C34830 storage license for Lacy Lake, 300 ac.ft. (370,000 m^3)
- C34829 withdrawal license on Cold Creek, 800,000 gpd (3028 m^3/d)

2.2 Lacy Lake

Lacy Lake is located approximately 2.5 km northeast of the Cherry Creek area. Lacy Lake is the single water source for the CCWD. In 1958 the water system was constructed, under a provincially funded program, to provide water to rural areas. A low level dam was constructed at Lacy Lake at that time. In 1968 the water storage capacity was expanded by the extension of the original dam and addition of two further earthwork dams (see Figure 1 in Appendix A). The lake covers an area of approximately 143,000 m^2 at full pool with an estimated total volume of approximately 600,000 m^3. Live storage volume allocated to the CCWD is approximately 370,000 m^3.

The Lacy Lake watershed is comprised of approximately 243 hectares of undeveloped forested land. Lacy Lake and its watershed are located within Area H of the Nanaimo Regional District and is owned by Island Timberlands Limited Partnership (Island Timberlands). The CCWD currently holds a lease with Island Timberlands for approximately 32 acres, including the lake and surrounding area.

2.3 Cold Creek

Water is released into Cold Creek through a 450 diameter control valve at the Lacy Lake dam and by an overflow spillway when the lake level exceeds full pool. The creek starts at an elevation of 238 m at the toe of the Lacy Lake dam.

A diversion dam at an elevation of approximately 210 m ponds the water for the intake to the Cherry Creek water distribution system.

2.4 Diversion Dam & Intake Structure

The small dam downstream on Cold Creek is a concrete structure with an overflow weir and a recently installed (2013) high capacity stainless steel intake screen (drum screen) that supplies the CCWD water distribution system. The dam was raised at some time in the past to create a deeper head pool for the intake. The concrete structure is in a reasonable state of repair.

2.5 Chlorination

Chlorination is currently the only form of treatment for the water. The existing chlorination system was installed in 1989. The chlorination building, located downstream of the diversion dam, houses two chlorine pumps and a liquid hypochlorite supply. Chlorine residual is measured every three minutes and recorded on fifteen minute increments (using SCADA) downstream of the point of injection. A telemetry alarm system notifies system operators if the residual is low. In addition, weekly chlorine residuals tests are completed at the extremities of the system near the McLean Mill and Coombs Country Candy. These areas are dead ends and therefore sometimes have lower readings. Regular flushing at these locations brings chlorine residuals back to normal levels.

2.6 Distribution System

A trunk supply main takes the water from the chlorination station to the distribution system. Pressure reducing valves are located on the system, prior to any services. As the Cherry Creek area is rural and covers a large area, the system has many branches and is looped whenever possible. The current distribution system functions as it was designed for the supply of potable water to rural residential areas. Its firefighting capabilities are limited and vary throughout the system. A plan showing the distribution system along with associated pipe sizes and types is provided as Figure 2 in Appendix A.

A large portion of the water distribution system remains from the original construction completed in 1958. The system was installed in accordance with typical standards of the day, which was using asbestos cement (AC) mains. Since the original construction, CCWD has completed various watermain replacement projects, additions, and leak repairs. The majority

of pipe that was installed following the original construction was polyvinyl chloride pipe (PVC). CCWD is continually repairing breakages and leaks in the old AC pipe due to the softening of the AC due to aging of the material.

There is approximately 38,000 metres of watermain in the CCWD. Of this, there is approximately 17,300 metres of AC pipe (46%), and 20,400 metres of PVC pipe (53%). The remaining 1% of pipe is of minimal length and includes ductile iron, steel and high density polyethylene pipe.

The majority of the watermain in the system is 100mm, 150mm, 200mm, and 250mm diameter. CCWD has adopted a minimum diameter of 150 mm for any new watermains that are installed. Therefore, the existing 50mm and 100mm watermains in the system are undersized and will be upsized as the AC watermain replacement projects continue. We recommend that any future additions to the distribution system be reviewed by the consulting Engineer.

The system contains many dead ends and lacks redundancy which can affect the water quality and available flows within the system. The southern portion of the system is only serviced via the watermain at Mozart Road and the western portion of the system is serviced via the watermain on Cowley Road. As there is no looping of the distribution system past Mozart or Cowley, the available fire flows decrease as you move further along the system from these locations. In addition, breaks or shutdowns in these mains will cause service interruption to a significant portion of users.

As of March 2016, there are 830 residential connections and 44 commercial/industrial connections. These services are all fully metered and the age of the meters vary from original construction to current day. While the majority of connections are single family residences, other users include office buildings, a car dealership, two mobile home parks and a few farms.

2.7 Fire Protection

Fire protection in the CCWD is primarily a function of the elevation of the area being protected and its relevant distance from the Milligan Road and Maebelle Road pressure reducing valves (PRVs). Notable weaknesses are in the Batty Road area and on the Old Nanaimo Highway. Fire flow tests indicated that there is very limited flow available, particularly under peak day and peak hour conditions. A full system fire flow availability study will be completed when the design implications of the proposed water treatment plant are known. Further details regarding the water treatment plant can be found in Section 5.

The majority (~70%) of the fire hydrants in the CCWD were installed based on old standards and only have two ports. The new fire hydrants that are installed to current standards have

an additional pumper port. In addition, most areas in the system do not meet the required hydrant spacing for modern fire protection standards.

3 WATER CONSUMPTION

3.1 Current Water Consumption

Current water consumption records have been reviewed to estimate actual system demands. Based on historic usage the current expected average day flow of 159 IGPM and a peak day flow of 326 IGPM could be considered appropriate for 2016.

3.2 Future Water Consumption

Service connections provided by CCWD indicate a growth of 0.5% per year in recent years.

Koers completed a study in 2010, '*Alberni Valley Regional Water Study*', that indicated an estimated low growth rate of 0.5% and a high growth rate of 1% for the CCWD.

The Alberni-Clayoquot Regional District would estimate a growth rate of 2% for Cherry Creek.

Based on the above information, McGill & Associates Engineering Ltd. feels that a growth rate of 1% is appropriate for the CCWD. Using this projection, for a 20 year design horizon, the estimated peak day flow is 398 IGPM and for the 40 year design horizon the estimated peak day flow is 486 IGPM.

These flows shows that the current withdrawal capacity of the water license exceeds the projected 40 year peak day flow.

3.3 System Pressures

In order to review the water system performance, a computer model was prepared using the United States Environmental Protection Agency's EPANET 2, Version 2.0. The model shows that the system is generally capable of providing greater than 40 psi pressures during peak hour demands with the exception of the furthest extremity toward Coombs Country Candy. CCWD has begun upsizing one of the main supply lines to this area, and plan to continue improvements, to increase the pressure and fire flow availability in this area. Further evaluation of the system will be completed when new design constraints are determined during the water treatment plant design discussed in Section 5.

4 MAINTENANCE

The CCWD currently has a maintenance contractor that provides the required maintenance on the system. The contractor has two 'Level 2' certified operators that coordinate with additional staff to complete the required maintenance tasks or emergency repairs on the system.

The CCWD has installed a SCADA system at the chlorination plant that provides data for flow rate, turbidity, UVT, and chlorine residuals.

The typical maintenance activities (data not provided by SCADA) that are completed include:

- Bi-Weekly Chlorine Tests at system extremities (Coombs Country Candy and McLean Mill). Flushing completed if low residuals.
- Weekly – Pre-treatment water quality samples (prior to chlorine injection) for Island Health.
- Monthly – Water quality samples for Island Health at Mclean's Mill, Cherry Creek Golf Course, Hollies Executive Golf Course, and the Alberni Valley Chamber of Commerce.
- Every few days – Inspection at the Chlorination Building and Dam. In addition, manual readings are taken of the water meter, pre-treatment pressure, UVT, turbidity, dam level, and level of chlorine in tank.
- Annual inspection and maintenance of fire hydrants.
- Semi-annual flushing of system.
- Weekly Dam Inspections.

5 PROPOSED WATER TREATMENT PLANT

In 2008, the Island Health created the 4-3-2-1 Policy. This policy requires all water systems that take water from surface water sources (lakes, creeks, etc.) to increase the amount of water treatment needed. As CCWD water comes from Lacy Lake, the water system must be upgraded to meet the requirements of the 4-3-2-1 Policy.

The CCWD is currently in the design phase for meeting the 4-3-2-1 policy. The design will include a water treatment plant and a water storage reservoir (tank) proposed at the base of the supply main, prior to entering the distribution system. This location allows easy access and utilizes hydrostatic pressure of the gravity fed supply main. The final design requirements are

currently being analyzed and the existing water distribution system will be re-evaluated to determine if any additional works will be required with the new constraints.

The current estimated cost for the water treatment plant capital project is $3,000,000. The CCWD has increased their tax base for the last few years to start saving for the project so that less money will be required to be borrowed. The CCWD has saved approximately $464,000 to put towards the project at this time.

6 PROPOSED SYSTEM UPGRADES

Various upgrades have been identified that would improve the performance of the existing water distribution system. These upgrades are listed below. Following these upgrades and the replacement of AC pipe, additional projects may be identified for looping of deadend watermains to improve water quality and pressures.

a) Upsize watermain on Bexley Road to 150mm and extend to tie-in to watermain on Cherry Creek Road. Approximate watermain length 190m (~$45,000).

b) Connect watermain loop from Cherry Creek Road, to existing 150mm PVC watermain on Moore Road, west of Cottam Road. Approximate watermain length 362m (~$90,000).

c) Complete looping of watermain on Highmoor Road. Approximate watermain length 70m (~$20,000).

d) Provide connection from Timberlane Road to Sherwood Road to provide looping. Approximate watermain length 315m (~$75,000).

e) Upsize watermain on Mozart Road from Albert Street to Maebelle Road to 250mm. Costs accounted for in AC replacement table in Appendices B & C.

f) Continue with upsizing of the watermain supply line from Milligan Road to Albert Street from 200mm to 250mm. Costs accounted for in AC replacement table in Appendices B & C.

In addition to the upgrades listed above, several large projects have been discussed in the past and may be re-evaluated following the installation of the water treatment plant. These projects include:

- Water Storage Reservoirs near Coombs Country Candy and Mclean's Mill.
- Looping from McLean Mill to the supply line from Lacy Lake.
- Looping from Cherry Creek Road to Cypress Boulevard.
- Looping from Best Road to Salfour Road.
- Providing an additional connection to the southern area of the water system (in addition to Mozart connection).

7 EXISTING PIPE INVENTORY

As part of this assessment, an inventory of the existing watermains that make up with the CCWD water supply and distribution system was completed. Figure 2 in Appendix A provides a schematic of the distribution system and pipe sizes and materials. In addition to the Figure, a Table 1 is provided in Appendix B that summarizes:

- Pipe lengths
- Pipe materials
- Associated appurtenances - fire hydrants, gate valves, air valves, pressure reducing valves, standpipes
- Known or estimated construction dates
- Estimated service life remaining
- Unit rate ($/m) for replacement (2016 rate)
- 2016 expected replacement costs
- Future replacement costs (based on estimated service life remaining)
- Annual Contribution (based on estimated service life remaining)

The 'Future Replacement Cost' provided in the table is based on an annual inflation rate of 1.75% over the estimated service life remaining of each item. The 'Annual Contribution Required' provided in the table was calculated using an interest rate of 2.75% over the estimated service life remaining of each item.

The unit rate per meter of pipe replacement is an estimated average and the costs for each individual project may vary dependent on location and constraints.

The total estimated replacement costs for the all of the pipelines in the CCWD and associated appurtenances is $10,409,000 (in 2016 dollars).

Based on the future replacement costs the annual contribution that is required is $735,782. Using the current number of serviced parcels in the CCWD of 874, the annual cost per parcel would be $842.

The inventory listed in the table is only a summary of pipeline and associated appurtenances and does not include the following infrastructure works:

- The majority of water meters are required to be replaced with newer models. The estimated cost to replace all of the water meters in the system is approximately $500/meter. Therefore the overall cost to replace the meters for 874 parcels is approximately $437,000.
- Diversion Dam and Intake – Intake recently upgraded in 2013.

- Lacy Lake Dam and Spillway.
- Water Treatment Plant and Reservoir (currently in design phase)

8 ASBESTOS CEMENT PIPE REPLACEMENT

The CCWD recognizes that the AC pipe is nearing the end of its expected life span and has experienced many breakages in recent years. CCWD has been replacing old AC watermain as funding becomes available to complete sections identified, in order of importance. The order of importance is typically determined by the number of breaks in the watermain that have occurred and been repaired in recent years. There is small amount of original pipe that is PVC or steel that is also identified to be replaced, though these may be lower priority.

Attached in Appendix C is Table 2 that is similar to Table 1, except only AC pipe and pipe from original construction are listed.

The total replacement costs for only the AC and original pipelines in the CCWD and associated appurtenances is estimated at $4,900,000 (in 2016 dollars).

Based on the future replacement costs the annual contribution that is required is $647,709. Using the current number of serviced parcels in the CCWD of 874, the annual cost per parcel would be $741.

9 CLOSURE

McGill & Associates recommends that the CCWD plan to continue to replace the AC and original pipeline within the existing distribution system as funding becomes available. The existing AC watermains continue to break and not only cost money to repair, but interrupt service to the end users. The current estimated costs to replace all of the original and AC watermain is $4,900,000 (in 2016 dollars).

The CCWD will continue to upgrade the water meters in the system to the new standard, as funding becomes available or failure occurs in the existing meters, at a current estimated cost of $437,000 (in 2016 dollars).

There are proposed upgrades to the system that will benefit the CCWD (see Section 6). The proposed upgrades have a total estimated cost of $230,000 (in 2016 dollars).

In addition, McGill & Associates recommends that a further study be completed on the water distribution system when more details become available on the design of the proposed water treatment plant.

Yours truly,

for **McGill & Associates Engineering Ltd.**

Mike Lange, P. Eng.
Principal

This document was prepared by McGill & Associates Engineering Ltd. for the Cherry Creek Waterworks District. Its material, recommendations and conclusions represent the best material available to McGill & Associates Engineering Ltd. at the time of the report preparation.

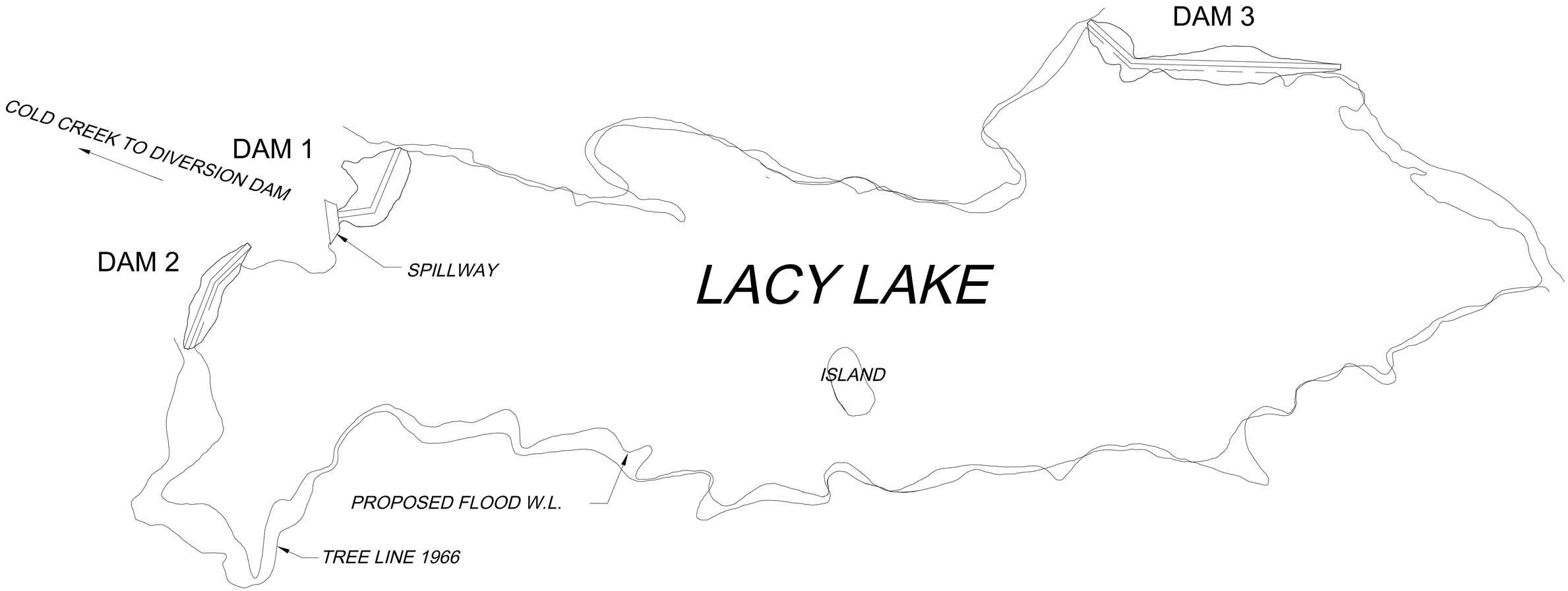
CHERRY CREEK
WATERWORKS DISTRICT

Water Infrastructure Assessment

APPENDIX A

FIGURES

McGill & Associates Engineering Ltd.



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DRAWN: CJM
CHECKED:
APPROVED:
DATE: DEC. 2015
SCALE:
FIELD BOOK No.
DWG File Name

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CHERRY CREEK WATER DISTRICT

WATER SYSTEM

LACY LAKE DAMS

SHEET No.
FIGURE 1
OF REV.
DRAWING No.

S:\3294 CCWD Water Infrastructure Assessment\DWG\FIGURE 1 - DAMS.dwg Mar 01, 2016 2:37:37pm

50mm (2") PVC

100mm (4") PVC

100mm (4") AC

150mm (6") AC

200mm (8") AC

150mm (6") PVC

200mm (8") PVC

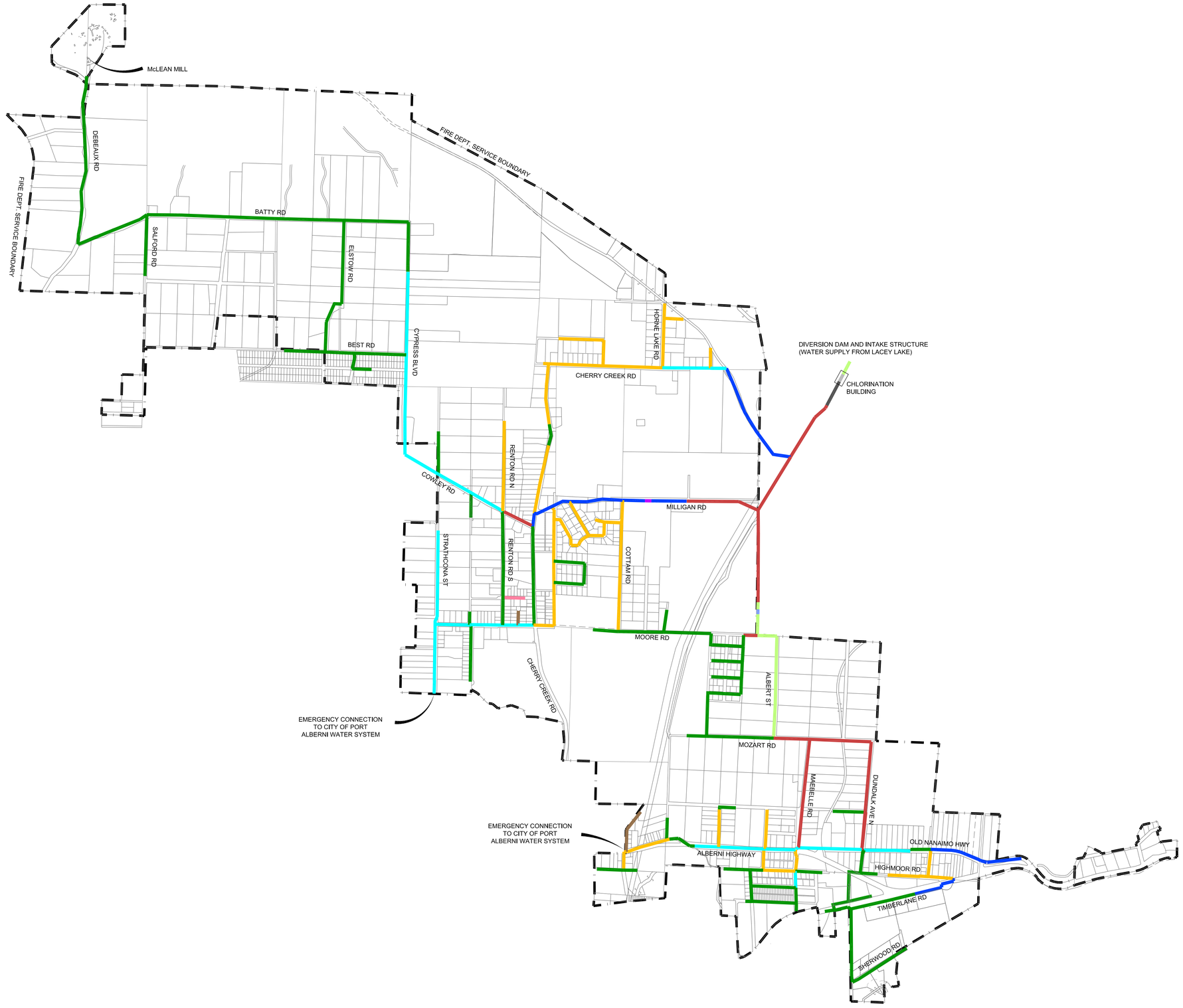
250mm (10") PVC

250mm (10") DI

250mm (10)" STEEL

250mm (10") HDPE DR11

300mm (12") HDPE DR11



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DATE: DEC. 2015
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FIELD BOOK No.
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SEAL

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CHERRY CREEK WATER DISTRICT

WATER SYSTEM

SIZE CHART

SHEET No.
FIGURE 2
OF | REV.
DRAWING No.

CHERRY CREEK
WATERWORKS DISTRICT

Water Infrastructure Assessment

APPENDIX B

FULL SYSTEM PIPE REPLACEMENT SUMMARY

McGill & Associates Engineering Ltd.

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
DeBeaux Road		1042	150	PVC	2006	100	90	$220	$229,240	$1,092,416	$2,769
	Valves	8			2006	60	50	$1,200	$9,600	$22,856	$213
	Fire Hydrants	6			2006	60	50	$7,500	$45,000	$107,136	$999
Batty Road		1100	150	PVC	2006	100	90	$220	$242,059	$1,153,503	$2,924
		382	150	PVC	2004	100	88	$220	$83,954	$386,430	$1,040
		588	150	PVC	1986	100	70	$220	$129,367	$435,744	$2,052
	Valves	7			2006	60	50	$1,200	$8,400	$19,999	$186
	Valves	2			2004	60	48	$1,200	$2,400	$5,519	$55
	Valves	5			1986	60	30	$1,200	$6,000	$10,097	$217
	Fire Hydrants	5			2006	60	50	$7,500	$37,500	$89,280	$833
	Fire Hydrants	2			2004	60	48	$7,500	$15,000	$34,494	$346
	Fire Hydrants	2			1986	60	30	$7,500	$15,000	$25,242	$542
	Air Valve	1			2006	60	50	$3,000	$3,000	$7,142	$67
	Air Valve	1			1986	60	30	$3,000	$3,000	$5,048	$108
Salford Road		377	150	PVC	2010	100	94	$220	$82,877	$423,322	$952
	Valves	3			2010	60	54	$1,200	$3,600	$9,187	$74
	Fire Hydrants	2			2010	60	54	$7,500	$15,000	$38,278	$309
Elstow Road		867	150	PVC	1986	100	70	$220	$190,825	$642,755	$3,027
	Valves	3			1986	60	30	$1,200	$3,600	$6,058	$130
	Fire Hydrants	1			1986	60	30	$7,500	$7,500	$12,621	$271
Best Road		969	150	PVC	1986	100	70	$220	$213,145	$717,934	$3,381
(With South Lateral	Valves	8				60	30	$1,200	$9,600	$16,155	$347
To Residential	Fire Hydrants	3				60	30	$7,500	$22,500	$37,863	$814
Service)	Stand Pipe	1				60	30	$1,000	$1,000	$1,683	$36
Cypress Road		511	150	PVC	1986	100	70	$220	$112,311	$378,295	$1,781
		920	150	AC	1958	70	12	$220	$202,343	$249,173	$17,550
	Valves	2			1986	60	30	$1,200	$2,400	$4,039	$87
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Fire Hydrants	1			1986	60	30	$7,500	$7,500	$12,621	$271
	Fire Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Cowley Road		711	150	AC	1958	70	12	$220	$156,420	$192,622	$13,567
		189	200	AC	1958	70	12	$260	$49,205	$60,593	$4,268
	Valves	1			2013	60	57	$1,200	$1,200	$3,226	$23
	Valves	6			1958	60	2	$1,200	$7,200	$7,454	$3,630
	Fire Hydrants	1			2013	60	57	$7,500	$7,500	$20,162	$146
	Fire Hydrants	3			1958	60	2	$7,500	$22,500	$23,294	$11,343
	Air Valves	1			1958	60	2	$3,000	$3,000	$3,106	$1,512
Cowley Road N Lateral		240	150	PVC	2005	100	89	$220	$52,800	$247,285	$646
	Valves	3			2005	60	49	$1,200	$3,600	$8,423	$82
	Fire Hydrants	1			2005	60	49	$7,500	$7,500	$17,549	$170
	Stand Pipe	1			2005	60	49	$1,000	$1,000	$2,340	$23

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Renton Road North		554	100	AC	1958	70	12	$220	$121,988	$150,221	$10,580
	Valves	1			1998	60	42	$1,200	$1,200	$2,487	$32
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Fire Hydrants	1			1998	60	42	$7,500	$7,500	$15,542	$197
	Fire Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Standpipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Renton Road South		319	150	PVC	1999	100	83	$220	$70,159	$296,101	$928
		375	150	PVC	1991	70	45	$250	$93,705	$204,556	$2,303
	Valves	6			1991	60	35	$1,200	$7,200	$13,214	$225
	Fire Hydrants	2			1991	60	35	$7,500	$15,000	$27,529	$469
Bexley Road		137	100	PVC	1986	100	70	$220	$30,140	$101,520	$478
	Valves	2			1986	60	30	$1,200	$2,400	$4,039	$87
	Stand Pipe	1			1986	60	30	$1,000	$1,000	$1,683	$36
Moore Road		866	150	PVC	1998	100	82	$220	$190,444	$789,932	$2,552
		126	100	AC	1958	70	12	$220	$27,670	$34,074	$2,400
		619	150	AC	1958	70	12	$220	$136,281	$167,821	$11,820
	Valves	1			2014	60	58	$1,200	$1,200	$3,282	$23
	Valves	5			1998	60	42	$1,200	$6,000	$12,434	$158
	Valves	7			1958	60	2	$1,200	$8,400	$8,697	$4,235
	Hydrants	1			2014	60	58	$7,500	$7,500	$20,514	$144
	Hydrants	2			1998	60	42	$7,500	$15,000	$31,084	$394
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Becker Place		89	50	PVC	1958	100	42	$220	$19,568	$40,550	$514
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Tebo Avenue		153	150	PVC	2007	100	91	$220	$33,598	$162,911	$401
		82	150	PVC	2001	100	85	$220	$17,944	$78,405	$231
		348	150	PVC	1996	100	80	$220	$76,532	$306,618	$1,054
	Valves	2			2007	60	51	$1,200	$2,400	$5,814	$52
	Valves	2			2001	60	45	$1,200	$2,400	$5,239	$59
	Valves	4			1996	60	40	$1,200	$4,800	$9,608	$132
	Hydrants	2			1996	60	40	$7,500	$15,000	$30,024	$413
	Stand Pipe	1			2007	60	51	$1,000	$1,000	$2,422	$22
	Stand Pipe	1			2001	60	45	$1,000	$1,000	$2,183	$25
Strathcona Street		1003	150	AC	1958	70	12	$220	$220,609	$271,666	$19,134
	Valves	11			1958	60	2	$1,200	$13,200	$13,666	$6,655
	Hydrants	4			1958	60	2	$7,500	$30,000	$31,059	$15,124
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
	Air Valve	1			1958	60	2	$3,000	$3,000	$3,106	$1,512
	Stand Pipe	2			1958	60	2	$1,000	$2,000	$2,071	$1,008

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Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Cherry Creek Road		335	150	PVC	2014	100	98	$220	$73,638	$403,157	$806
		81	200	PVC	2012	100	96	$270	$21,745	$114,989	$244
		273	150	PVC	2007	100	91	$250	$68,226	$330,814	$814
		134	150	PVC	2005	100	89	$250	$33,500	$156,895	$410
		1504	100	AC	1958	70	12	$250	$375,996	$463,016	$32,611
		394	150	AC	1958	70	12	$250	$98,393	$121,164	$8,534
	Valves	2			2014	60	58	$1,200	$2,400	$6,565	$46
	Valves	2			2012	60	56	$1,200	$2,400	$6,341	$48
	Valves	3			2007	60	51	$1,200	$3,600	$8,721	$78
	Valves	19			1958	60	2	$1,200	$22,800	$23,605	$11,494
	Hydrants	2			2014	60	58	$7,500	$15,000	$41,029	$288
	Hydrants	1			2007	60	51	$7,500	$7,500	$18,168	$163
	Hydrants	7			1958	60	2	$7,500	$52,500	$54,354	$26,467
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Mountain View Road		33	100	AC	1958	70	12	$220	$7,258	$8,937	$629
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Trevor Avenue		279	100	AC	1958	70	12	$220	$61,370	$75,573	$5,323
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Rosewood Avenue		157	100	AC	1958	70	12	$220	$34,642	$42,660	$3,005
Horne Lake Road		397	100	AC	1958	70	12	$220	$87,266	$107,463	$7,569
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Clayton Road		119	100	AC	1958	70	12	$220	$26,167	$32,224	$2,270
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Andrews Lane		125	100	AC	1987	70	41	$220	$27,599	$56,209	$742
	Valves	4			1987	60	31	$1,200	$4,800	$8,219	$168
	Stand Pipe	1			1987	60	31	$1,000	$1,000	$1,712	$35
Cherry Creek Road Lateral to		713	200	PVC	1981	100	65	$260	$185,279	$572,222	$3,171
Lacy Lake Water Supply Main	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
Milligan Road Lateral to Lacy Lake		131	200	AC	1958	70	12	$260	$33,999	$41,868	$2,949
Water Supply Main											

McGILL & ASSOCIATES ENGINEERING LTD.

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Milligan Road		466	200	PVC	2013	100	97	$260	$121,156	$651,904	$1,342
		353	200	PVC	2009	100	93	$260	$91,780	$460,733	$1,068
		40	250	HDPE	2009	100	93	$300	$12,000	$60,240	$140
		91	200	PVC	2001	100	85	$260	$23,689	$103,508	$305
		449	200	AC	1958	60	2	$260	$116,773	$120,896	$58,870
	Valves	8			2013	60	57	$1,200	$9,600	$25,807	$187
	Valves	2			2009	60	53	$1,200	$2,400	$6,019	$50
	Valves	2			2001	60	45	$1,200	$2,400	$5,239	$59
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Hydrants	3			2013	60	57	$7,500	$22,500	$60,485	$439
	Hydrants	1			2009	60	53	$7,500	$7,500	$18,810	$157
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
Margot Road		741	100	AC	1958	70	12	$220	$163,020	$200,749	$14,139
	Valves	8			1958	60	2	$1,200	$9,600	$9,939	$4,840
	Valves	1			2013	60	57	$1,200	$1,200	$3,226	$23
	Hydrants	3			1958	60	2	$7,500	$22,500	$23,294	$11,343
Veldham Road		185	150	PVC	2005	100	89	$220	$40,592	$190,107	$497
	Valves	1			2005	60	49	$1,200	$1,200	$2,808	$27
Walmer Road		191	150	PVC	2007	70	61	$220	$42,011	$121,050	$767
	Valves	1			2007	60	51	$1,200	$1,200	$2,907	$26
										$0	
Walmer -Veldham Lateral		130	150	PVC	2007	100	91	$220	$28,622	$138,781	$341
Markham Road		635	100	AC	1958	70	12	$220	$139,591	$171,898	$12,107
	Valves	4			1958	60	2	$1,200	$4,800	$4,969	$2,420
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Markham Place		58	100	AC	1958	70	12	$220	$12,824	$15,792	$1,112
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Linton Avenue		240	100	AC	1958	70	12	$220	$52,844	$65,074	$4,583
	Valves	1			2013	60	57	$1,200	$1,200	$3,226	$23
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
Cottam Road		807	100	AC	1958	70	12	$220	$177,502	$218,583	$15,395
	Valves	1			2001	60	45	$1,200	$1,200	$2,620	$29
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Cherryvale Road		139	150	PVC	1998	100	82	$220	$30,556	$126,743	$410
	Valves	2			1998	60	42	$1,200	$2,400	$4,973	$63
	Hydrants	1			1998	60	42	$7,500	$7,500	$15,542	$197
	Stand Pipe	1			1998	60	42	$1,000	$1,000	$2,072	$26
William Street		346	150	PVC	2005	100	89	$220	$76,141	$356,599	$932
	Valves	4			2005	60	49	$1,200	$4,800	$11,231	$109
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Nixon Street		203	150	PVC	1981	100	65	$220	$44,693	$138,032	$765
	Valves	3			1981	60	25	$1,200	$3,600	$5,555	$155
	Hydrants	1			1981	60	25	$7,500	$7,500	$11,572	$322
Durham Street		186	150	PVC	1981	100	65	$220	$40,927	$126,399	$700
	Valves	2			1981	60	25	$1,200	$2,400	$3,703	$103
	Hydrants	1			1981	60	25	$7,500	$7,500	$11,572	$322
	Stand Pipe	1			1981	60	25	$1,000	$1,000	$1,543	$43
Stocton Street		190	150	PVC	1981	100	65	$220	$41,756	$128,959	$715
	Valves	2			1981	60	25	$1,200	$2,400	$3,703	$103
	Stand Pipe	1			1981	60	25	$1,000	$1,000	$1,543	$43
Harrison Street		191	150	PVC	1981	100	65	$220	$41,998	$129,708	$719
	Valves	1			1981	60	25	$1,200	$1,200	$1,852	$52
Rumsby Street		365	150	PVC	2007	100	91	$220	$80,275	$389,234	$958
	Valves	8			2007	60	51	$1,200	$9,600	$23,256	$209
	Hydrant	2			2007	60	51	$7,500	$15,000	$36,337	$327
Moore Road to		120	250	PVC	2014	100	98	$290	$34,785	$190,444	$381
Albert Street Lateral	Valves	2			2014	60	58	$1,200	$2,400	$6,565	$46
Albert Street		627	250	PVC	2015	100	99	$290	$181,928	$1,013,461	$1,967
	Valves	3			2015	60	59	$1,200	$3,600	$10,019	$68
	Hydrant	2			2015	60	59	$7,500	$15,000	$41,747	$283
Mozart Street		300	150	PVC	2004	100	88	$220	$66,000	$303,789	$818
		239	150	PVC	1994	100	78	$220	$52,580	$203,472	$744
		376	200	AC	1981	70	35	$260	$97,760	$179,418	$3,054
		223	200	AC	1958	70	12	$290	$64,624	$79,581	$5,605
	Valves	2			2014	60	58	$1,200	$2,400	$6,565	$46
	Valves	2			2004	60	48	$1,200	$2,400	$5,519	$55
	Valves	1			1994	60	38	$1,200	$1,200	$2,320	$35
	Valves	1			1981	60	25	$1,200	$1,200	$1,852	$52
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Hydrants	1			2004	60	48	$7,500	$7,500	$17,247	$173
	Hydrants	1			1994	60	38	$7,500	$7,500	$14,500	$217
	Hydrants	1			1981	60	25	$7,500	$7,500	$11,572	$322
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Maebelle Road		145	150	PVC	1986	100	70	$220	$31,900	$107,448	$506
		134	100	AC	1958	70	12	$220	$29,500	$36,327	$2,559
		105	150	AC	1958	70	12	$220	$23,100	$28,446	$2,004
		669	200	AC	1958	70	12	$260	$173,972	$214,236	$15,089
	Valves	1			2012	60	56	$1,200	$1,200	$3,170	$24
	Valves	3			1986	60	30	$1,200	$3,600	$6,058	$130
	Valves	7			1958	60	2	$1,200	$8,400	$8,697	$4,235
	Hydrants	1			2012	60	56	$7,500	$7,500	$19,815	$149
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Dundalk Road N		143	150	PVC	1985	100	69	$220	$31,460	$104,144	$506
		655	200	AC	1981	70	35	$260	$170,300	$312,550	$5,321
	Valves	5			1981	60	25	$1,200	$6,000	$9,258	$258
	Hydrants	2			1981	60	25	$7,500	$15,000	$23,145	$645
	Air Valves	1			1981	60	25	$3,000	$3,000	$4,629	$129
Foulcer Road		119	150	PVC	2001	100	85	$220	$26,231	$114,615	$338
		203	150	PVC	1984	100	68	$220	$44,604	$145,115	$729
	Valves	1			2001	60	45	$1,200	$1,200	$2,620	$29
	Valves	2			1984	60	28	$1,200	$2,400	$3,901	$93
	Stand Pipe	1			2001	60	45	$1,000	$1,000	$2,183	$25
	Stand Pipe	1			1984	60	28	$1,000	$1,000	$1,625	$39
Long Road		274	50	PVC	1958	100	42	$220	$60,375	$125,114	$1,586
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
John Street		114	100	AC	1976	70	30	$220	$25,073	$42,193	$907
	Valves	2			1976	60	20	$1,200	$2,400	$3,395	$128
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
Van Decar Avenue		249	150	PVC	1996	100	80	$220	$54,743	$219,324	$754
	Valves	4			1996	60	40	$1,200	$4,800	$9,608	$132
	Hydrants	2			1996	60	40	$7,500	$15,000	$30,024	$413
Alberni Highway		178	150	PVC	2001	100	85	$260	$46,244	$202,060	$596
		283	100	AC	1958	70	12	$260	$73,580	$90,609	$6,382
		641	150	AC	1958	70	12	$260	$166,660	$205,232	$14,455
	Valves	1			2001	60	45	$1,200	$1,200	$2,620	$29
	Valves	1			1998	60	42	$1,200	$1,200	$2,487	$32
	Valves	6			1958	60	2	$1,200	$7,200	$7,454	$3,630
	Hydrants	1			1998	60	42	$7,500	$7,500	$15,542	$197
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Old Nanaimo Highway W		304	200	PVC	2006	100	90	$290	$88,202	$420,315	$1,066
		266	200	PVC	1998	100	82	$290	$77,098	$319,791	$1,033
		135	150	PVC	1981	100	65	$260	$35,042	$108,225	$600
		409	100	AC	1958	70	12	$260	$106,323	$130,931	$9,222
		690	150	AC	1958	70	12	$260	$179,386	$220,903	$15,559
	Valves	1			2009	60	53	$1,200	$1,200	$3,010	$25
	Valves	2			2006	60	50	$1,200	$2,400	$5,714	$53
	Valves	4			1998	60	42	$1,200	$4,800	$9,947	$126
	Valves	6			1981	60	25	$1,200	$7,200	$11,109	$309
	Valves	4			1958	60	2	$1,200	$4,800	$4,969	$2,420
	Hydrants	1			2009	60	53	$7,500	$7,500	$18,810	$157
	Hydrants	1			2006	60	50	$7,500	$7,500	$17,856	$167
	Hydrants	1			1998	60	42	$7,500	$7,500	$15,542	$197
	Hydrants	2			1981	60	25	$7,500	$15,000	$23,145	$645
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Air Valves	1			1958	60	2	$3,000	$3,000	$3,106	$1,512

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Port Alberni Highway		148	150	PVC	2011	100	95	$220	$32,557	$169,205	$370
To Highmoor		249	150	PVC	2001	100	85	$220	$54,826	$239,560	$706
Road Lateral		126	150	PVC	1986	100	70	$220	$27,720	$93,369	$440
	Valves	3			2011	60	55	$1,200	$3,600	$9,348	$73
	Valves	7			1986	60	30	$1,200	$8,400	$14,136	$304
	Valves	1			2001	60	45	$1,200	$1,200	$2,620	$29
	Hydrants	3			2011	60	55	$7,500	$22,500	$58,422	$455
	Hydrants	1			1986	60	30	$7,500	$7,500	$12,621	$271
Port Alberni Highway		166	150	PVC	1986	100	70	$270	$44,953	$151,414	$713
	Valves	2			1986	60	30	$1,200	$2,400	$4,039	$87
	Standpipes	1			1986	60	30	$1,000	$1,000	$1,683	$36
Timberlane Road		268	200	PVC	2004	100	88	$260	$69,684	$320,748	$864
		404	150	PVC	1996	70	50	$220	$88,785	$211,378	$1,971
		168	150	PVC	1986	100	70	$220	$36,916	$124,343	$586
	Valves	1			2009	60	53	$1,200	$1,200	$3,010	$25
	Valves	2			2004	60	48	$1,200	$2,400	$5,519	$55
	Valves	3			1996	60	40	$1,200	$3,600	$7,206	$99
	Hydrants	1			2009	60	53	$7,500	$7,500	$18,810	$157
	Hydrants	1			2004	60	48	$7,500	$7,500	$17,247	$173
	Hydrants	2			1996	60	40	$7,500	$15,000	$30,024	$413
Sherwood Road		85	150	PVC	2006	100	90	$220	$18,700	$89,113	$226
		141	150	PVC	2004	100	88	$220	$30,998	$142,680	$384
		167	150	PVC	1986	100	70	$220	$36,740	$123,751	$583
	Valves	1			2005	60	49	$1,200	$1,200	$2,808	$27
	Valves	3			2004	60	48	$1,200	$3,600	$8,279	$83
	Hydrants	1			2005	60	49	$7,500	$7,500	$17,549	$170
	Hydrants	2			2004	60	48	$7,500	$15,000	$34,494	$346
Dundalk Ave S		450	150	PVC	1986	100	70	$220	$99,036	$333,581	$1,571
Arden Road		133	150	PVC	1996	100	80	$220	$29,344	$117,564	$404
	Valves	2			1996	60	40	$1,200	$2,400	$4,804	$66
	Stand Pipe	1			1996	60	40	$1,000	$1,000	$2,002	$28
Athol Road		245	100	AC	1958	70	12	$220	$53,953	$66,440	$4,680
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
Edland Road		377	100	AC	1958	70	12	$220	$82,991	$102,199	$7,198
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 1
FULL SYSTEM PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Highmoor Road		70	150	PVC	2001	100	85	$220	$15,400	$67,289	$198
		515	150	PVC	1986	100	70	$220	$113,401	$381,966	$1,799
		656	100	AC	1958	70	12	$220	$144,371	$177,785	$12,522
	Valves	1			2009	60	53	$1,200	$1,200	$3,010	$25
	Valves	1			2001	60	45	$1,200	$1,200	$2,620	$29
	Valves	8			1986	60	30	$1,200	$9,600	$16,155	$347
	Valves	2			1981	60	25	$1,200	$2,400	$3,703	$103
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			2009	60	53	$7,500	$7,500	$18,810	$157
	Hydrants	1			1986	60	30	$7,500	$7,500	$12,621	$271
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	2			1986	60	30	$1,000	$2,000	$3,366	$72
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Locke Road		120	150	PVC	2009	100	93	$220	$26,400	$132,527	$307
		75	150	PVC	1996	100	80	$220	$16,500	$66,105	$227
	Valves	3			2004	60	48	$1,200	$3,600	$8,279	$83
	Valves	1			1996	60	40	$1,200	$1,200	$2,402	$33
	Hydrants	2			2004	60	48	$7,500	$15,000	$34,494	$346
Green Avenue		48	150	PVC	2009	100	93	$220	$10,629	$53,355	$124
		121	150	PVC	2004	100	88	$220	$26,588	$122,382	$329
		154	150	PVC	1986	100	70	$220	$33,825	$113,931	$536
	Valves	3			2009	60	53	$1,200	$3,600	$9,029	$76
	Stand Pipe	1			2009	60	53	$1,000	$1,000	$2,508	$21
Brandon Avenue		278	150	PVC	1996	100	80	$220	$61,219	$245,268	$843
	Valves	2			1996	60	40	$1,200	$2,400	$4,804	$66
Mann Road		168	100	AC	1976	70	30	$220	$36,947	$62,174	$1,336
	Valves	2			1976	60	20	$1,200	$2,400	$3,395	$128
Lacy Lake Water Supply		175	250	PVC	2015	100	99	$290	$50,623	$282,004	$547
To Moore Road Tie-in		27	300	HDPE	2015	100	99	$500	$13,545	$75,455	$146
		90	250	PVC	2006	100	90	$350	$31,466	$149,946	$380
		50	250	DI	1986	100	70	$350	$17,500	$58,945	$278
		1341	200	AC	1958	70	12	$350	$469,271	$577,879	$40,702
		165	250	STEEL	1958	100	42	$350	$57,610	$119,383	$1,513
	Valves	4			2006	60	50	$1,200	$4,800	$11,428	$107
	Valves	1			1986	60	30	$1,200	$1,200	$2,019	$43
	Valves	15			1958	60	2	$1,200	$18,000	$18,636	$9,075
	Air Valves	1			2015	60	59	$3,000	$3,000	$8,349	$57
	Air Valves	1			2006	60	50	$3,000	$3,000	$7,142	$67
	PRV	1			1958	60	2		$10,000	$10,353	$5,041
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
								TOTAL:	$10,409,081	$27,455,949	$735,782
										Number of Serviced Parcels	874
										Annual Cost per Parcel	$842

CHERRY CREEK
WATERWORKS DISTRICT

Water Infrastructure Assessment

APPENDIX C

ASBESTOS CEMENT PIPE REPLACEMENT SUMMARY

McGill & Associates Engineering Ltd.

McGILL & ASSOCIATES ENGINEERING LTD.

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 2
ASBESTOS CEMENT PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Cypress Road		920	150	AC	1958	70	12	$220	$202,343	$249,173	$17,550
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Fire Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Cowley Road		711	150	AC	1958	70	12	$220	$156,420	$192,622	$13,567
		189	200	AC	1958	70	12	$260	$49,205	$60,593	$4,268
	Valves	6			1958	60	2	$1,200	$7,200	$7,454	$3,630
	Fire Hydrants	3			1958	60	2	$7,500	$22,500	$23,294	$11,343
	Air Valves	1			1958	60	2	$3,000	$3,000	$3,106	$1,512
Renton Road North		554	100	AC	1958	70	12	$220	$121,988	$150,221	$10,580
	Valves	1			1998	60	42	$1,200	$1,200	$2,487	$32
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Fire Hydrants	1			1998	60	42	$7,500	$7,500	$15,542	$197
	Fire Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Standpipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Moore Road		126	100	AC	1958	70	12	$220	$27,670	$34,074	$2,400
		619	150	AC	1958	70	12	$220	$136,281	$167,821	$11,820
	Valves	7			1958	60	2	$1,200	$8,400	$8,697	$4,235
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Becker Place		89	50	PVC	1958	100	42	$220	$19,568	$40,550	$514
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Strathcona Street		1003	150	AC	1958	70	12	$220	$220,609	$271,666	$19,134
	Valves	11			1958	60	2	$1,200	$13,200	$13,666	$6,655
	Hydrants	4			1958	60	2	$7,500	$30,000	$31,059	$15,124
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
	Air Valve	1			1958	60	2	$3,000	$3,000	$3,106	$1,512
	Stand Pipe	2			1958	60	2	$1,000	$2,000	$2,071	$1,008
Cherry Creek Road		1504	100	AC	1958	70	12	$250	$375,996	$463,016	$32,611
		394	150	AC	1958	70	12	$250	$98,393	$121,164	$8,534
	Valves	19			1958	60	2	$1,200	$22,800	$23,605	$11,494
	Hydrants	7			1958	60	2	$7,500	$52,500	$54,354	$26,467
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Mountain View Road		33	100	AC	1958	70	12	$220	$7,258	$8,937	$629
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Trevor Avenue		279	100	AC	1958	70	12	$220	$61,370	$75,573	$5,323
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Rosewood Avenue		157	100	AC	1958	70	12	$220	$34,642	$42,660	$3,005
Horne Lake Road		397	100	AC	1958	70	12	$220	$87,266	$107,463	$7,569
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504

McGILL & ASSOCIATES ENGINEERING LTD.

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 2
ASBESTOS CEMENT PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Clayton Road		119	100	AC	1958	70	12	$220	$26,167	$32,224	$2,270
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Andrews Lane		125	100	AC	1987	70	41	$220	$27,599	$56,209	$742
	Valves	4			1987	60	31	$1,200	$4,800	$8,219	$168
	Stand Pipe	1			1987	60	31	$1,000	$1,000	$1,712	$35
Cherry Creek Road Lateral to	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
Lacy Lake Water Supply Main	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
Milligan Road Lateral to Lacy Lake		131	200	AC	1958	70	12	$260	$33,999	$41,868	$2,949
Water Supply Main											
Milligan Road		449	200	AC	1958	60	2	$260	$116,773	$120,896	$58,870
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
Margot Road		741	100	AC	1958	70	12	$220	$163,020	$200,749	$14,139
	Valves	8			1958	60	2	$1,200	$9,600	$9,939	$4,840
	Hydrants	3			1958	60	2	$7,500	$22,500	$23,294	$11,343
Markham Road		635	100	AC	1958	70	12	$220	$139,591	$171,898	$12,107
	Valves	4			1958	60	2	$1,200	$4,800	$4,969	$2,420
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Markham Place		58	100	AC	1958	70	12	$220	$12,824	$15,792	$1,112
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Linton Avenue		240	100	AC	1958	70	12	$220	$52,844	$65,074	$4,583
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
Cottam Road		807	100	AC	1958	70	12	$220	$177,502	$218,583	$15,395
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Mozart Street		376	200	AC	1981	70	35	$260	$97,760	$179,418	$3,054
		223	200	AC	1958	70	12	$290	$64,624	$79,581	$5,605
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Maebelle Road		134	100	AC	1958	70	12	$220	$29,500	$36,327	$2,559
		105	150	AC	1958	70	12	$220	$23,100	$28,446	$2,004
		669	200	AC	1958	70	12	$260	$173,972	$214,236	$15,089
	Valves	7			1958	60	2	$1,200	$8,400	$8,697	$4,235
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504

McGILL & ASSOCIATES ENGINEERING LTD.

Cherry Creek Improvement District
Water Infrastructure Assessment - February 2016
TABLE 2
ASBESTOS CEMENT PIPE REPLACEMENT SUMMARY

Road Name	Appurtenances	Length of Pipe (m)	Pipe Size (mm)	Pipe Material	Date Installed	Estimated Service Life (Years)	Remaining Life (Years)	Unit Rate ($/m)	2016 Replacement Cost	Future Replacement Cost	Annual Contribution Required
Dundalk Road N		655	200	AC	1981	70	35	$260	$170,300	$312,550	$5,321
	Valves	5			1981	60	25	$1,200	$6,000	$9,258	$258
	Hydrants	2			1981	60	25	$7,500	$15,000	$23,145	$645
	Air Valves	1			1981	60	25	$3,000	$3,000	$4,629	$129
Long Road		274	50	PVC	1958	100	42	$220	$60,375	$125,114	$1,586
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
John Street		114	100	AC	1976	70	30	$220	$25,073	$42,193	$907
	Valves	2			1976	60	20	$1,200	$2,400	$3,395	$128
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
Alberni Highway		283	100	AC	1958	70	12	$260	$73,580	$90,609	$6,382
		641	150	AC	1958	70	12	$260	$166,660	$205,232	$14,455
	Valves	6			1958	60	2	$1,200	$7,200	$7,454	$3,630
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
Old Nanaimo Highway W		409	100	AC	1958	70	12	$260	$106,323	$130,931	$9,222
		690	150	AC	1958	70	12	$260	$179,386	$220,903	$15,559
	Valves	4			1958	60	2	$1,200	$4,800	$4,969	$2,420
	Hydrants	2			1958	60	2	$7,500	$15,000	$15,530	$7,562
	Air Valves	1			1958	60	2	$3,000	$3,000	$3,106	$1,512
Athol Road		245	100	AC	1958	70	12	$220	$53,953	$66,440	$4,680
	Valves	1			1958	60	2	$1,200	$1,200	$1,242	$605
Edland Road		377	100	AC	1958	70	12	$220	$82,991	$102,199	$7,198
	Valves	3			1958	60	2	$1,200	$3,600	$3,727	$1,815
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Highmoor Road		656	100	AC	1958	70	12	$220	$144,371	$177,785	$12,522
	Valves	2			1958	60	2	$1,200	$2,400	$2,485	$1,210
	Hydrants	1			1958	60	2	$7,500	$7,500	$7,765	$3,781
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
Mann Road		168	100	AC	1976	70	30	$220	$36,947	$62,174	$1,336
	Valves	2			1976	60	20	$1,200	$2,400	$3,395	$128
Lacy Lake Water Supply		1341	200	AC	1958	70	12	$350	$469,271	$577,879	$40,702
To Moore Road Tie-in		165	250	STEEL	1958	100	42	$350	$57,610	$119,383	$1,513
	Valves	15			1958	60	2	$1,200	$18,000	$18,636	$9,075
	PRV	1			1958	60	2	$10,000	$10,000	$10,353	$5,041
	Stand Pipe	1			1958	60	2	$1,000	$1,000	$1,035	$504
								TOTAL:	$4,897,625	$6,258,480	$647,709
*** PVC and Steel pipe from original construction also identified***										Number of Serviced Parcels	874
										Annual Cost per Parcel	$741