

# COMOX VALLEY WATER SYSTEM



## SANDWICK WATERWORKS DISTRICT WATER SYSTEM ASSESSMENT

### FINAL REPORT

February 2016



**KOERS  
& ASSOCIATES  
ENGINEERING LTD.**  
*Consulting Engineers*



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February 2, 2016  
1556- 01 (Final Report)

Comox Valley Regional District  
Engineering Services Branch  
600 Comox Road  
Courtenay, B.C. V9N 3P6

**Attention: Mr. Dave Leitch, AScT**  
**Senior Manager of Water/Wastewater Services**

**Re: Sandwich Waterworks District Water System Assessment - FINAL REPORT**

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We are pleased to submit three bound copies and a digital pdf copy of the final report entitled "Comox Valley Water System, Sandwich Waterworks District Water System Assessment."

This report presents: a brief history the water system; the properties it services; the current operation and maintenance status; a review of the condition of the various components of the water distribution system; a comparison of the water system construction to the CVRD design standards, and recommended upgrading works for short and long term design horizons.

The cost of short-term upgrading works total \$2,417,666 plus GST, including a 30% allowance for engineering and contingencies. This includes a one-time capital improvement charge per connection to join the Comox Valley Water System, two bulk water meters, individual service connections and the replacement of the 150 watermain on Virginia Drive southeast of Meadowbrook which is necessary to provide residual pressures throughout the system.

The cost of the long-term upgrading work, consisting of watermain replacement due to age, which would include the upgrading of the existing hydrants and isolation valves to meet current design standards, totals \$6,265,795 plus GST, including a 30% allowance for engineering and contingencies.

We thank you for the opportunity to be of service the Comox Valley Regional District on this interesting assignment. We have enjoyed working with you and your staff and would be pleased to assist in implementation of the report's recommendations.

Please do not hesitate to contact us to discuss the findings in greater detail and we look forward to your response.

Yours truly,

KOERS & ASSOCIATES ENGINEERING LTD.

Mitchell Brook, P.Eng  
Project Engineer

Chris Downey P.Eng  
Project Manager



# SANDWICK WATER SYSTEM ASSESSMENT REPORT

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# 1 INTRODUCTION

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## 1.1 AUTHORIZATION

In August 2015, the Comox Valley Regional District (CVRD) authorized Koers & Associates Engineering Ltd. to complete an assessment of the current condition of the Sandwick Water System for the areas located outside the City of Courtenay municipal boundary.

The study was authorized in response to residences of Sandwick asking the CVRD to consider taking over the water system.

## 1.2 STUDY OBJECTIVES

The objectives of the study are:

- review the current condition of the water system,
- assess operational and maintenance history and ongoing needs, and
- identify upgrading works, if any, and the estimated cost of the works to meet Island Health and CVRD water system operation requirements.

## 1.3 SCOPE OF WORK

To meet the study objectives, the following scope of work was adopted:

### Task 1 – Obtain Existing Information & Review

- Upon award Koers will:
  - Review Sandwick Waterworks District (SWWD) drawings and documentation to review system history, system design and operation information.

### Task 2 – Review the Water System and provide an Asset Table with Cost Estimates

- Prepare a detailed list of the works required to connect to the Comox Valley Water System and meet CVRD standards and prepare Class D cost estimates.
- Provide a listing of pipelines, pump stations, reservoirs, check valve stations, metering stations, and miscellaneous appurtenances would be prepared. For each item, a life cycle will be estimated, with anticipated remaining period to replacement, repair, or where applicable large maintenance expenditure such as reservoir repainting. Cost estimates will be provided in a tabular summary. This will also assist in assessing insurance coverage needs. From this data, a second summary table will be prepared, listing projected year of expenditure, resulting in a total cost estimate on a year to year basis.

### Task 3 - Prepare Draft Report

- Findings will be presented in a bound report.
- The report will include figures, cost estimates, and appendices.
- The report will include a detailed summary of the report findings with recommendations.
- An electronic pdf copy of the draft report will be submitted to the CVRD for review and comments.

### Task 4 –Draft Report Review with Client

- Koers will meet with CVRD staff to review the report and discuss the findings in detail.

### Task 5 – Prepare & Submit Final Report

- Upon receipt of CVRD comments the report will be finalized.
- Three bound copies will be provided to the CVRD along with an electronic pdf copy and digital (AutoCAD) copy of the system plan drawing.

## **1.4 ACKNOWLEDGEMENTS**

Koers & Associates acknowledges, with thanks, the assistance provided by the following CVRD staff in the preparation of this report:

- Dave Leitch, ASCT, Senior Manager of Water/Wastewater Services
- Mike Herschmiller, Manager of Water Services

## 2 BACKGROUND INFORMATION

### 2.1 SANDWICK WATER SYSTEM OVERVIEW

#### 2.1.2 Water Source

The SWWD obtains water from three sources; a surface water supply from the Courtenay River through an infiltration gallery at Lewis Park, a groundwater located on Mitchell Road adjacent to the existing Sandwick reservoir and a groundwater well on Dingwall Road (located within the City of Courtenay).

Until recently, the SWWD operated a third groundwater well; the Huband Road well located near Hwy 19A but it is no longer in use due to water quality issues. The well pump and electrical controls have been removed and the BC Hydro power service disconnected. The concrete block building is still in place.

#### 2.1.3 Pressure Zones

The SWWD consists of two pressure zones; the 87 m pressure zone established by the top water level of the Mitchell Road reservoir; and the 110 m pressure zone created by the booster pump station at the reservoir servicing the higher elevation areas around it. There are check valves between the two zones, which permit feeding from the 87 m zone into the 110, in the event of failure of the booster pump station.

#### 2.1.4 Distribution System

The entire SWWD supply and distribution system consists of 25 kilometres of mains, of which approximately 10 kms (42%) are located within the City of Courtenay. The lengths of each diameter and material type located within the SWWD are presented in Table 1.

**Table 1 – SWWD Pipe Materials, Diameters & Lengths**

<b>Pipe Material &amp; Diameter<sup>1</sup></b>	<b>Length<sup>1</sup> (m)</b>
<i>Asbestos Cement (AC)</i>	
100 mm	1,650
150 mm	10,530
200 mm	1,210
Total AC	13,890
<i>Poly Vinyl Chloride (PVC)</i>	
250 mm	1,455
Total PVC	1,455
<b>Combined Total</b>	<b>14,845</b>

Note:

1 Derived from SWWD water maps.

## 2.2 WATER DEMANDS

In evaluating the capacity of a water supply and distribution system, three types of water demands are normally considered. These are:

Average Day Demand =  $\frac{\text{Total annual consumption.}}{365 \text{ days}}$

Maximum Day Demand = Day with highest demand for the year.

Peak Hour Demand = Highest flow rate maintained for one hour (generally occurring on maximum day of the year).

The SWWD bulk meter flow records for total annual and maximum month usage for the most current six years of record (2007 to 2012) were reviewed. These are presented below in Table 2.

**Table 2 – SWWD Annual Usage**

Year	Annual Usage	
	Lps	igpm
2007	11.8	156
2008	12.5	165
2009	11.1	146
2010	12.0	158
2011	13.5	178
2012	12.8	169
<b>Average</b>	<b>12.3</b>	<b>162</b>

SWWD Maximum Day and Peak Hour usage were not available. To estimate these, a peaking typical in the Comox Valley Water System where more frequent meter reading is available, were applied to the average and maximum month usages; respectively. The actual average day, and estimated maximum day, and estimated peak hour design demands are presented in Table 3.

**Table 3 – Average Day, Maximum Day, and Peak Hour Design Demands**

Service Area	Bulk Metered Ave. Day (lps)	Estimated Max. Day <sup>2</sup> (lps)	Estimated Peak Hour <sup>3</sup> (lps)
Within City <sup>1</sup>	4.9	11.8	18.8
Within Sandwick <sup>1</sup>	7.4	17.8	28.4
<b>Combined Total:</b>	12.3	29.6	47.2

Notes:

- The demands for each service area have been estimated by the ratio of service connections. The SWWD is reported to service 657 lots, for which there are an estimated 706 service connections. Of these, 282 connections (40% of the total) are within the City of Courtenay.

- 2 The Maximum Day Demand is estimated by multiplying the average day demand by 2.4.
- 3 The Peak Hour Demand is estimated by multiplying the estimated maximum day by 1.6.

### **2.3 OPERATION & MAINTENANCE**

The existing water system is operated and maintained by the SWWD. The SWWD completes regular monthly water quality testing in the distribution system as well as yearly full spectrum testing of the source water. As noted on the SWWD website there have been no failed tests in the past 15 months.

Prior to the switch over the CVRD should request and review all maintenance records for the applicable areas of the SWWD as well as any planned improvements.

### **2.4 DRAWINGS**

The following drawings have been reviewed:

- Willis Cunliff Tait Water Study Drawings CR 5123-02 to 04 dated 1979
- McElhanney Drawings 24364 W 10 and 11 dated 1983 for the 200 mm dia. main on Wentworth and 250 mm dia. main on Huband from Childs to Willis Way

Copies of each are located in Appendix A.

## **3 SYSTEM REVIEW**

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### **3.0 WELLS & RIVER INTAKE**

As part of the system switch over, the two operating wells and the river intake will be decommissioned and abandoned.

### **3.1 STORAGE RESERVOIR**

The existing SWWD system storage consists of a 908 m<sup>3</sup> (200,000 iga) bolted steel reservoir located near the intersection of Mitchell and Elmo roads with a top water level of 87 m geodetic.

With the connection to the CVRD water system the storage for the SWWD will be provided by the East Courtenay Reservoirs which have a top water level of 120 m. With the increase in the HGL of the SWWD the existing reservoir will need to be abandoned.

A detailed review of the condition of the existing tank should be completed to determine if the tank is in suitable condition to be sold as a water storage facility or if the tank should be sold for scrap.

### **3.2 MITCHELL ROAD PUMP STATION**

As part of this review no detailed drawings or photos of the existing pump station were provided. Based on a review of the existing water model with the proposed connections to the CVRD water system and the updated demands the resulting minimum peak hour pressure in the system is approximately 40 psi. As the peak hour pressure meets the minimum pressure requirements, the pump station is no longer required and can be abandoned. The closed valves and the check valves located throughout the system can be opened or removed to eliminate the pumped zone.

It should be noted that if the demands in the distribution system increase above 30 lps, future works may be required to maintain the required 40 psi pressure. The CVRD should monitor the flows through the bulk flow meter and record the pressure along Elmo Road during peak demand periods.

### **3.3 METERING**

There is bulk water meters located at the three sources. The daily and monthly usage is recorded for information purposes. The SWWD does not have residential metering and the users are billed on a fixed rate structure. As part of the service switchover the existing bulk meters will be abandoned.

Two new bulk meter stations will be required at the connection point to the Comox Valley Water System on Wentworth Road and Highway 19A near Cotton Road.

### **3.4 DISTRIBUTION SYSTEM**

#### **Mains, Valves, Hydrants and Stand Pipes**

The majority of the watermains in the SWWD are asbestos cement. It has been assumed for the purposes of this study that all the asbestos cement piping in the SWWD is class 150. We do not suspect that there is any class 100 AC pipe in system; however should any be found below the 50 m contour, it will need to be replaced.

Based on a review of the available drawings there are approximately 26 fire hydrants located in the SWWD. The fire hydrants should be reviewed on an individual basis to determine the condition, manufacturer and style of the hydrant. It should be noted that a detailed review of the hydrant spacing has not been completed. It is recommended that as the existing watermains are replaced that the hydrant spacing be reviewed and additional hydrants be added to the water system as required.

There are approximately 50 isolation valves in the system and the current configuration should be reviewed in order to determine the valve closures required to isolate sections of the distribution system in the event of a main break or yearly flushing. It is recommended that the valve locations be reviewed as the existing watermains are replaced and additional valves be added as required.

There are 18 standpipes located on dead-end sections of watermain throughout the distribution system; however there are several dead-ends that do not have a standpipe or flushout specifically:

- 1) Fredrick Place
- 2) Veronica Place
- 3) Lillian Place
- 4) Short Place

#### **Service Connections**

The SWWD is reported to service 657 lots, for which there are an estimated 706 service connections. Of these, 424 connections (60% of the total) are located outside the City of Courtenay municipal boundary and will be part of the CVWS local service area.

There are four lots located on Wentworth Road, near Highway 19A, that are currently serviced by a 100 mm dia. watermain that is located within the City of Courtenay Municipal Boundary. It is recommended that these lots remain connected to this existing watermain in place of constructing approximately 150 m of watermain to service the affected lots. Individual meters would be required for these lots for billing purposes.

### 3.5 ALTERNATIVE SUPPLY OPTIONS

As part of this review we have considered three options for supply to the Sandwich service area rather than a direct connection to the 200 mm dia main on Wentworth Road and the 150 mm dia main crossing Hwy 19 A north of Cotton Road. These options are detailed below and shown on [Figure 1](#).

Option 1 – Supply from CVRD 750 mm dia main on Lerwick at Mission Road

- 300 mm dia main on Veterans Memorial Parkway from Mission Road to Wentworth and a 200 mm main from Wentworth to Hwy 19A.

Option 2 – Supply from CVRD Dingwall Pump Station

- 250 mm connection from Dingwall Pump Station to 250 mm dia main on Dingwall Road.
- 300 mm dia main on Highway 19A from Muir Road to Wentworth and a 200 mm dia main on Wentworth Road.






Option 3 – Supply from 600 mm dia CVRD main on Dingwall Road

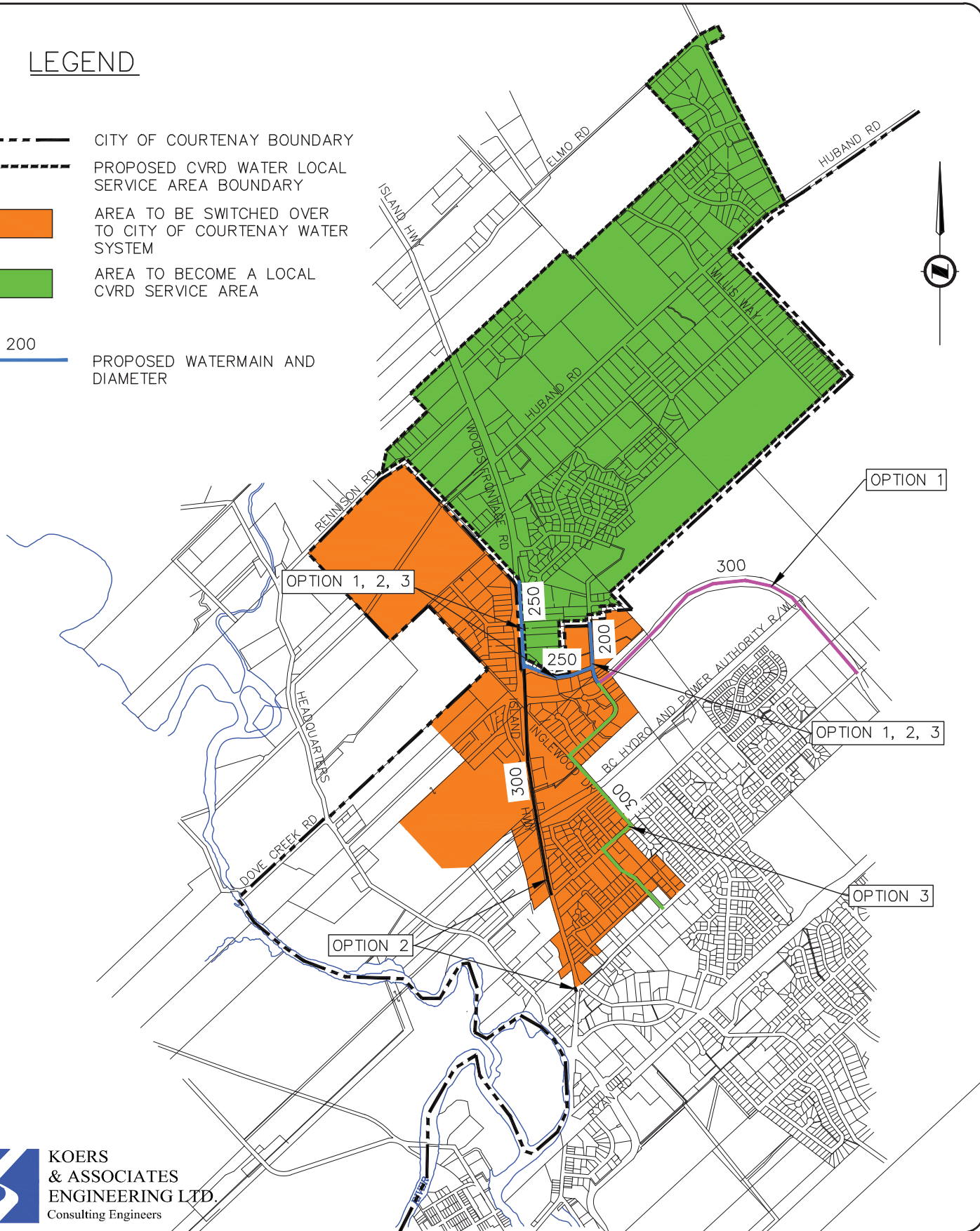
- 300 mm dia main on Inglewood and Muir from Dingwall to Wentworth and a 200 mm dia main on Wentworth Road.

### 3.6 FIRE FLOWS

In order to meet the current MMCD design fire flows the following watermains as shown on [Figure 2](#) on the following page will need replaced. This will involve approximately 600 of 150 mm dia., 3,100 m of 200 mm dia., and 2,050 m of 250 mm dia watermains.

# LEGEND

-  CITY OF COURTENAY BOUNDARY
-  PROPOSED CVRD WATER LOCAL SERVICE AREA BOUNDARY
-  AREA TO BE SWITCHED OVER TO CITY OF COURTENAY WATER SYSTEM
-  AREA TO BECOME A LOCAL CVRD SERVICE AREA
-  200 PROPOSED WATERMAIN AND DIAMETER








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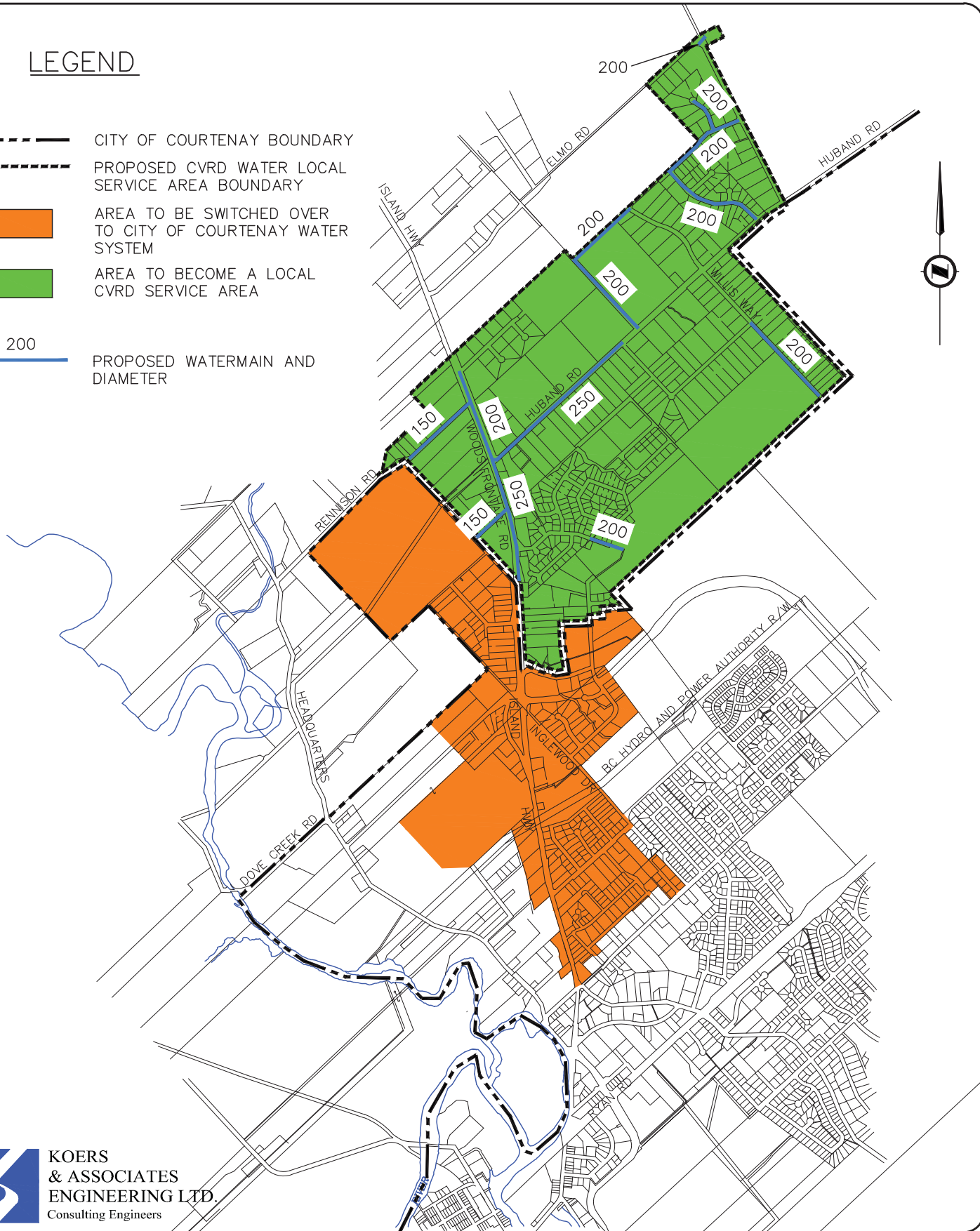
CLIENT  
**COMOX VALLEY REGIONAL DISTRICT**

PROJECT  
**SANDWICK WATERWORKS DISTRICT SYSTEM ASSESSMENT STUDY**

TITLE		<b>ALTERNATIVE SUPPLY OPTIONS</b>			
PROJECT #	1556	SCALE	1:25,000	DATE	AUG 2015
DRAWN	MB	DESIGNED	DWG No.	REV.	—
CHECKED		APPROVED	<b>Figure 1</b>		SHEET 1/3

# LEGEND

-  CITY OF COURTENAY BOUNDARY
-  PROPOSED CVRD WATER LOCAL SERVICE AREA BOUNDARY
-  AREA TO BE SWITCHED OVER TO CITY OF COURTENAY WATER SYSTEM
-  AREA TO BECOME A LOCAL CVRD SERVICE AREA
-  200 PROPOSED WATERMAIN AND DIAMETER



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CLIENT  
**COMOX VALLEY REGIONAL DISTRICT**

PROJECT  
**SANDWICK WATERWORKS DISTRICT SYSTEM ASSESSMENT STUDY**

TITLE		<b>IMPROVEMENTS REQUIRED TO MEET MMCD DESIGN FIRE FLOWS</b>			
PROJECT #	1556	SCALE	1:25,000	DATE	AUG 2015
DRAWN	MB	DESIGNED	DWG No.	REV.	—
CHECKED		APPROVED	<b>Figure 2</b>		SHEET 2/3

## 4 UPGRADES

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### 4.1 CAPITAL IMPROVEMENT COST CHARGE

If the Sandwich Waterworks District joins the Comox Valley Water System then a Capital Improvement Cost Charge would be assessed as follows:

Type of property	Capital improvement cost charge
Single family residential	\$3,702 per parcel
Multi-family residential	\$3,086 per dwelling unit
Congregate care facility	\$1,543 per unit
Commercial/institutional	\$10.80 per square metre of gross building area
Industrial/public utility	\$37,027 per hectare of lot area under development

There are 424 connections outside the City of Courtenay. The information available at the time of the study is that 423 are single family residential and 1 connection is institutional (Huband Park School). The gross building area of the institutional building is unknown at this time and has been estimated at 3,400 m<sup>2</sup> for the purposes of this report and will need to be verified. Therefore the estimated capital charges for the remaining Sandwich Waterworks District to join the CWVS is \$1,565,946 for the 423 single family connections and \$36,720 for institutional building.

### 4.2 SYSTEM IMPROVEMENTS

If the CVRD is to take over the operation and maintenance of the system, the following improvements will be required over the short term (0-5 years) and the long term (>10 years).

### 4.3 SHORT-TERM UPGRADES

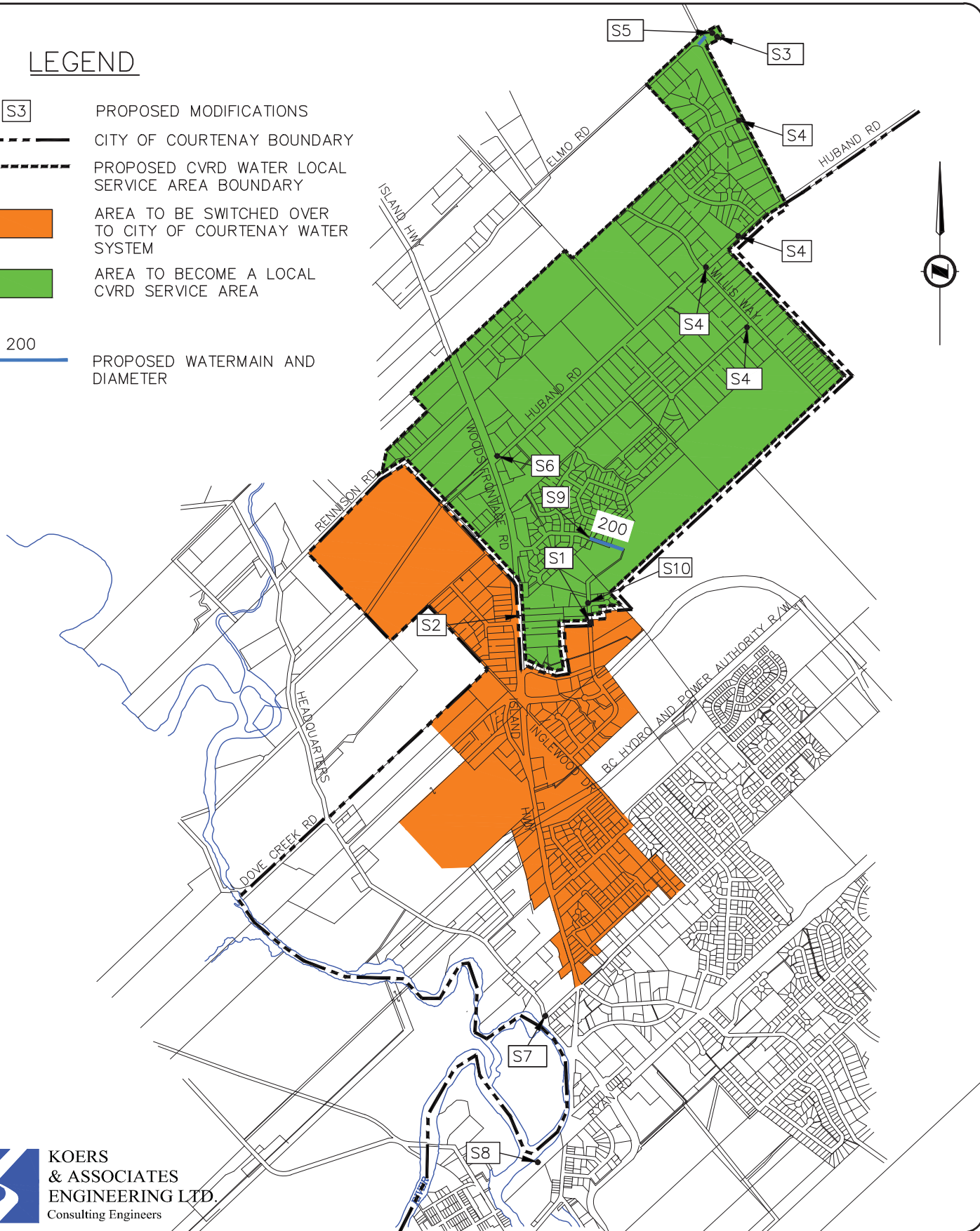
#### Required Distribution System Improvements

The following improvements as listed below and shown on **Figure 3** are required for SWWD to convert to a CVRD Water Local Service Area:

- S1 Install a bulk flow meter on the 200 mm dia. main on Wentworth Road, south of Exeter, at the City Boundary. *(To provide service to a CVRD Water Local Service Area)*
- S2 Install a bulk flow meter on the 150 mm main crossing Highway 19 A near Cotton Road. *(To provide service to a CVRD Water Local Service Area)*
- S3 Decommission Mitchell Road reservoir and pump station.
- S4 Remove the existing check valves and open closed valves that formed the pressure zone boundary between PZ 87 and PZ 110. *(To service area from the 120 m HGL)*
- S5 Decommission Mitchell Road well. *(To switch over to the Comox Valley Water System source)*

# LEGEND

- S3 PROPOSED MODIFICATIONS
- CITY OF COURTENAY BOUNDARY
- PROPOSED CVRD WATER LOCAL SERVICE AREA BOUNDARY
- AREA TO BE SWITCHED OVER TO CITY OF COURTENAY WATER SYSTEM
- AREA TO BECOME A LOCAL CVRD SERVICE AREA
- 200 PROPOSED WATERMAIN AND DIAMETER



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CLIENT  
**COMOX VALLEY REGIONAL DISTRICT**

PROJECT  
**SANDWICK WATERWORKS DISTRICT SYSTEM ASSESSMENT STUDY**

TITLE		<b>PROPOSED IMPROVEMENTS</b>				
PROJECT #	1556	SCALE	1: 25,000	DATE	AUG 2015	
DRAWN	MB	DESIGNED	DWG No.	REV.	—	
CHECKED		APPROVED	<b>Figure 3</b>		SHEET	3/3

- S6 Decommission Huband Road well. *(To switch over to the Comox Valley Water System source)*
- S7 Decommission Dingwall Road well. *(To switch over to the Comox Valley Water System source)*
- S8 Decommission Courtenay River intake pump station and install a cap on the 250 main. *(To switch over to the Comox Valley Water System the section of 250 main between the pump station and project S1 at the intersection of 19A and Suffield Rd would transfer to the City. The main runs along Headquarters Rd, Dingwall Rd {Headquarters Rd to Hwy 19 A}, and Hwy 19A {Dingwall to Suffield})*
- S9 Upgrade the existing 150 mm dia. AC watermain on Virginia Drive from Meadowbrook Crescent 150 m southeast to 200 mm dia. *(The velocity in the existing 150 mm dia. watermain is greater than 1.5m/s under peak hour conditions. In order to reduce the velocity and headloss the watermain requires upgrading to 200 mm dia.)*
- S10 Cap the existing 100 mm dia. AC watermain on Wentworth Road, south of Exeter Place, at the SWWD boundary and connect the existing watermain on Exeter Place to the existing 200 mm dia. watermain on Wentworth Road.
- S11 Install individual meters on each service connection.

#### Resulting Pressure Changes

With the above noted changes, the CVRD Water Local Service Area would be fed from the East Courtenay reservoirs (HGL of 120 m). Static pressures in the former 87 m pressure zone and 110 m pressure zones would increase by 323 kPa (46 psi) and 98 kPa (14 psi); respectively.

The increase in pressure should be completed over a four week period by installing a temporary PRV between hydrants on Wentworth Road and incrementally increasing the pressure. The CVRD should be prepared to address some watermain breaks due to the increase in pressure.

#### **Bulk Metering Station**

The proposed bulk meter stations for the connections to the SWWD on Wentworth Road and Hwy 19A near Cotton Road will require a check valve and a flow meter at each location housed in a heated kiosk or below ground chamber.

#### **Water Distribution System**

It is recommended that for flushing purposes a below or above ground flushout be installed at the following locations:

- 1) Fredrick Place
- 2) Veronica Place
- 3) Lillian Place
- 4) Short Place

#### **4.4 LONG-TERM UPGRADES**

1. Establish a watermain replacement program for the existing watermains. A detailed asset plan of the existing watermains is included in Appendix B.
2. Replace watermains to meet design fire flow requirements as identified on **Figure 2**.
3. Review and install additional isolation valves as part of future watermain projects.
4. Review the existing hydrant spacing and install additional hydrants as part of future watermain projects.

## 5 COST ESTIMATES

Table 4 and 5 lists the recommended upgrading works, in order of priority, to complete the switch over of the SWWD system as well as other short term and long term project required for the water system.

The cost estimates with exception of the capital cost charges are order of magnitude (Class 'D'), made without preliminary design input. The estimates include a 30% allowance for engineering and contingencies. No allowance has been made for legal, financial or administration costs. The estimates are exclusive of 5% GST.

**Table 4 – Cost Estimates Short Term Improvements**

Project No. & Location	Project <sup>1</sup>	Length (m)	Cost (\$)
<b>S1</b> Wentworth Rd	Install a bulk flow meter and check valve on 200 mm dia. main at the City boundary south of Exeter Place	n/a	75,000
<b>S2</b> <b>Highway 19A</b>	Install a bulk flow meter and check on 150 mm dia main crossing Hwy 19A just north of Cotton Rd	n/a	75,000
<b>S3</b> Mitchell Rd	Abandon bolted steel reservoir and Mitchell Rd booster pump station	n/a	5,000
<b>S4</b> Multiple Locations	Remove check valves and open closed valves	n/a	5,000
<b>S5</b> Mitchell Rd	Decommission Mitchell Road well and remove building	n/a	10,000
<b>S6</b> Huband Rd	Decommission Huband Road well and remove building	n/a	7,000
<b>S7</b> Dingwall Rd	Decommission Dingwall Road well and remove building	n/a	15,000
<b>S8</b> Lewis Park	Decommission Courtenay River Intake Pump Station and remove building	n/a	30,000
<b>S9</b> Virginia Drive	Upgrade the existing 150 mm dia. watermain southeast of Meadowbrook Cres to 200 mm dia.	150	60,000
<b>S10</b> Wentworth Road	Cap existing 100 mm dia. AC watermain and connect the watermain on Exeter Place to the 200 mm dia. watermain on Wentworth Road	n/a	25,000
<b>S11</b>	Service Connection Meters (424)	\$1,200/ea	508,000
<b>S12</b>	CIC Charge (423 residential)	\$3,702/ea	1,565,946
	CIC Charge (3,400 m <sup>2</sup> School)	\$10.80/m <sup>2</sup>	36,720
<b>Total Estimated Cost:</b>			<b>\$2,417,666</b>

Note:

- 1 A description of the work included in each estimate is presented under section 4.2 Short-Term Upgrades.

**Table 5 - Cost Estimates Long Term Improvements**

<b>Item No.</b>	<b>Description</b>	<b>Year Installed *</b>	<b>Replacement Year <sup>(1)</sup></b>	<b>Length (m)</b>	<b>Dia. (mm)</b>	<b>Unit Price</b>	<b>Extension</b>
1	# Rennison Road	1966	2026	480	150	\$380	\$182,400
2	# Island Highway (Huband to Cotton)	1966	2026	790	250	\$445	\$351,550
3	# Island Highway (Huband to Parker)	1966	2026	450	200	\$390	\$175,500
4	Virginia Drive (Hwy to Meadowbrook)	1967	2027	545	150	\$380	\$207,100
5	Short Place	1967	2027	39	100	\$355	\$13,845
6	Lillian Place	1967	2027	40	100	\$355	\$14,200
7	O'Brian Road #	1967	2027	195	150	\$380	\$74,100
8	Gile Road	1967	2027	52	100	\$355	\$18,460
9	Meadowbrook Cres	1968	2028	165	150	\$380	\$62,700
10	Gail Cres	1969	2029	730	150	\$380	\$277,400
11	# Huband Road (Hwy to Childs)	1971	2031	840	250	\$390	\$327,600
12	Childs Road	1972	2032	335	150	\$380	\$127,300
13	Parker Road	1973	2033	475	150	\$380	\$180,500
14	Veronica Place	1973	2033	85	100	\$355	\$30,175
15	Fredrick Place	1973	2033	75	100	\$355	\$26,625
16	Gibson Road	1973	2033	486	150	\$380	\$184,680
17	Willis Way NW of Gibson	1973	2033	330	150	\$380	\$125,400
18	# Willis Way SE of Gibson	1976	2036	476	200	\$390	\$185,640
19	# Venture Road	1976	2036	487	200	\$390	\$189,930
20	# Barbara Road	1976	2036	388	200	\$390	\$151,320
21	Huband Road (Willis Way to Mitchell)	1976	2036	510	150	\$380	\$193,800
22	Mitchell Road	1976	2036	885	150	\$380	\$336,300
23	Mitchell Road (Barbara to Elmo)	1976	2036	475	200	\$390	\$185,250
24	Elmo Road	1976	2036	280	150	\$380	\$106,400
25	Demarais Place	1976	2036	135	150	\$380	\$51,300
26	Cooper Place	1976	2036	58	100	\$355	\$20,590
27	Rook Road	1976	2036	77	100	\$355	\$27,335
28	# Raven Road	1976	2036	192	200	\$390	\$74,880
29	Paula Place	1976	2036	330	150	\$380	\$125,400
30	Adrian Road	1976	2036	195	100	\$355	\$69,225
31	Willis Way NW of Huband Road	1977	2037	470	150	\$380	\$178,600
32	Exeter Place	1977	2037	97	100	\$355	\$34,435
33	Tatton Road	1977	2037	304	150	\$380	\$115,520
34	Mitchell Way to Reservoir Site	1978	2038	95	150	\$380	\$36,100
35	ROW (Gibson to Cathy)	1979	2039	163	150	\$380	\$61,940
36	Cathy Cres	1979	2039	150	200	\$390	\$58,500
37	Cathy Cres	1979	2039	551	150	\$380	\$209,380
38	ROW (Gail Cres to Cathy Cres)	1979	2039	108	150	\$380	\$41,040
39	ROW Wentworth Road to Virginia Drive	1979	2039	284	200	\$390	\$110,760
40	ROW from Willis Way to Venture Road	1980	2040	200	150	\$380	\$76,000
41	Huband Road (Childs to Mitchell) **	1983	2068	1,025	250	\$445	\$456,125
42	Wentworth Road **	1983	2068	300	200	\$390	\$117,000
43	Mitchell Road (Huband to Barbara) **	1985	2070	430	250	\$445	\$191,350

Item No.	Description	Year Installed *	Replacement Year <sup>(1)</sup>	Length (m)	Dia. (mm)	Unit Price	Extension
<b>System Improvements</b>							
44	26 Hydrants					\$5,000	\$130,000
45	Add Isolation Valves					Allowance	\$30,000
46	Loop main from Huband to Willis Way			826	200	\$390	\$322,140
						<b>Subtotal</b>	<b>\$6,265,795</b>

\* Assumed based on registration of legal plans.

\*\* Installation year based on record drawing information.

# upgrade required to meet MMCD design fire flows with diameter in **red**.

<sup>(1)</sup> Replacement year based on a service life of 60 years for AC watermains and 85 years for PVC watermains. A detailed asset plan is included in Appendix B

## **6 CONCLUSIONS & RECOMMENDATIONS**

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### **6.1 CONCLUSIONS**

Based on the findings of this report, the following conclusions are made:

- 1 SWWD requested that the CVRD consider creating a local service area that would take over the service connections located outside the City of Courtenay which is supplied by the Comox Valley Water System (CVWS).
- 2 Joining the CVWS will require the SWWD to pay a Capital Improvement Charge for each service connection.
- 3 The average day demands for the last 8 years is 12.3 lps for the entire SWWD of that 7.4 lps will be taken over by the CVRD.
- 4 Maximum day and peak hour demands are based on peaking factors derived from the previous CVRD report.
- 5 The existing 150 mm dia. watermain on Virginia Drive from Meadowbrook Crescent southeast has a velocity > 1.5 m/s under peak hour demands.
- 6 The existing water sources for the SWWD will need to be abandoned as part of the service switchover.
- 7 The existing Mitchell Road reservoir and pump station will need to be abandoned as part of the service switchover.
- 8 The existing closed valves and check valves will need to be opened / removed to create one pressure zone.
- 9 The existing hydrant spacing should be reviewed and additional hydrants installed when the future watermain replacements occur.
- 10 There are several dead ends that do not have standpipes for flushing.
- 11 Additional line valves should be installed to improve the ability to isolate the system when the future watermain replacements occur.
- 12 There have been no water quality issues in the distribution system based on the results of the SWWD testing program.
- 13 The SWWD has completed a flushing program however the frequency is not known.
- 14 Approximately 60% of the SWWD is located outside of the City of Courtenay.

### **6.2 RECOMMENDATIONS**

Based on the conclusions listed in this report, the following recommendations are made:

#### Short-Term Upgrades

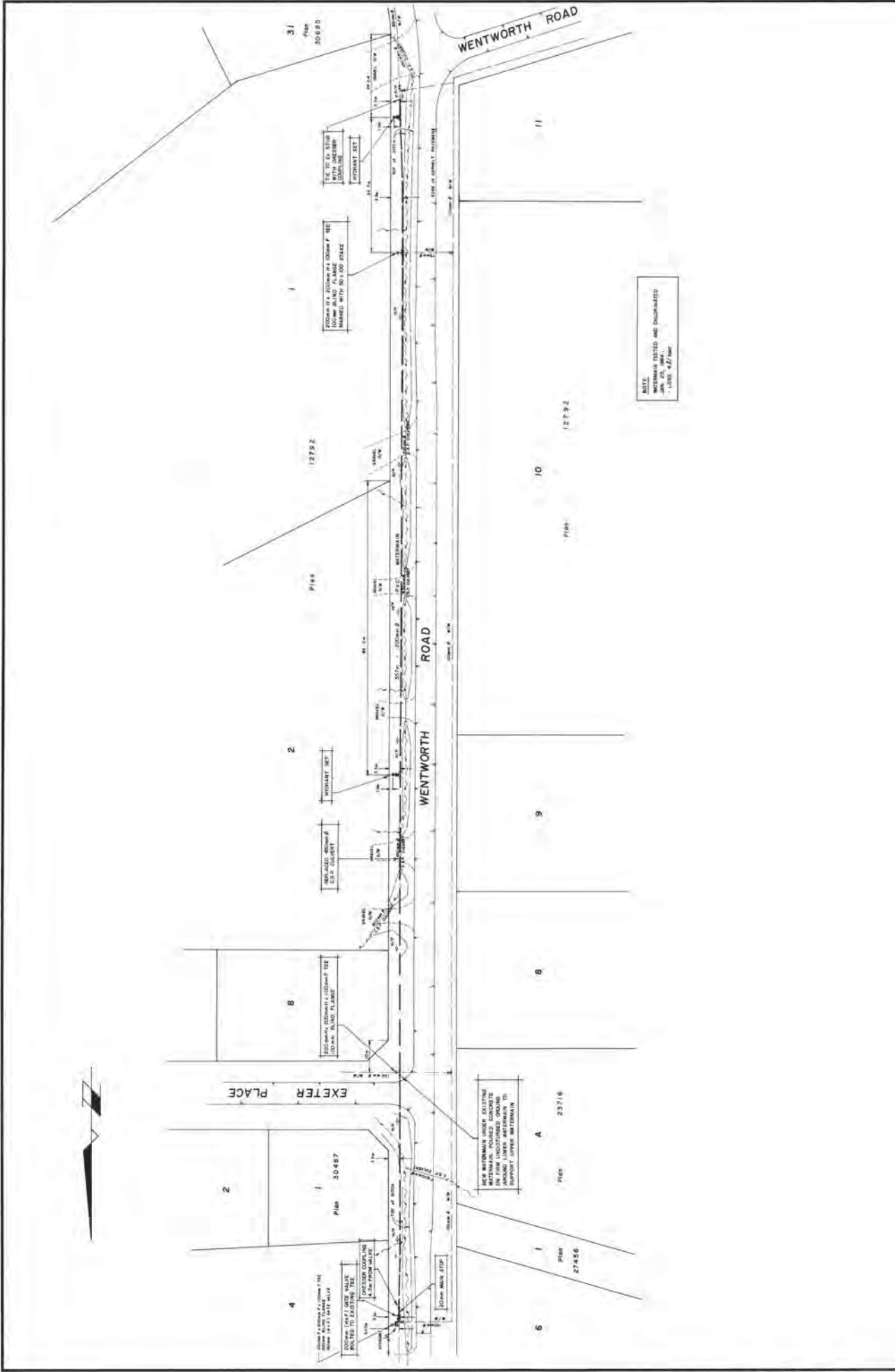
- 1 Review the operational and maintenance records of the SWWD.
- 2 Implement the items listed in Section 4.3.

### Long-Term Upgrades

- 3 Upgrade existing watermain as shown on Figure 3 to meet MMCD design fire flow requirements.
- 4 Establish a watermain replacement program based on the watermain material service life as shown on Table 5.
- 5 Improve hydrant spacing and isolation valve placement with future improvement projects.

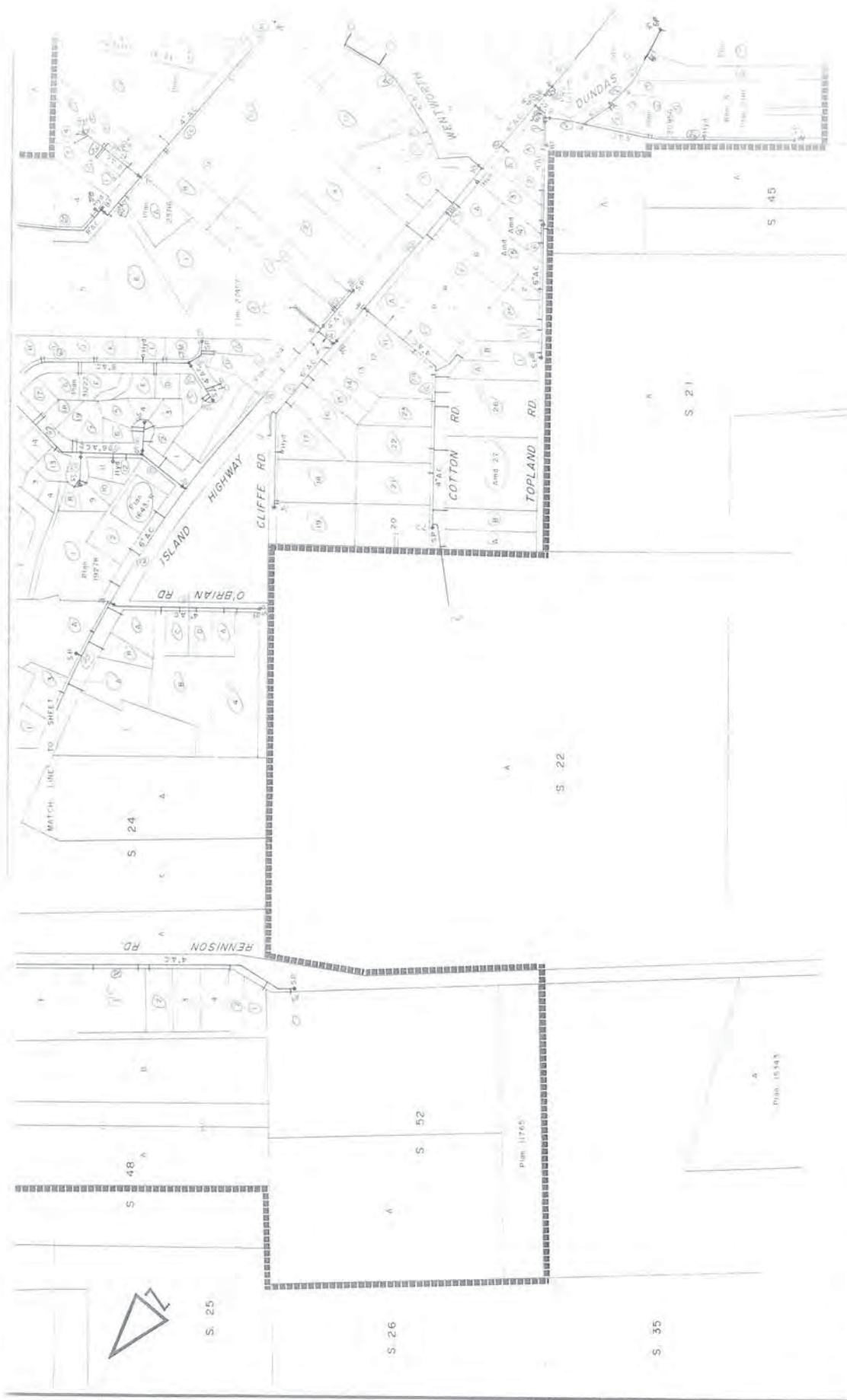
**APPENDIX A  
DRAWINGS**





		<b>SANDWICK WATERWORKS DISTRICT</b> <b>WATERMAIN - WENTWORTH ROAD</b> (1983/84) WATER IMPROVEMENT PROGRAM COURTESY, B.C.				Designed: CBS Drawn: JLU Checked: FMD Approved: [Signature]		Job No. 24364 Scale: 1/500 Date: NOVEMBER, 1983 Revision: 1		Drawing No. <b>W-10</b> of 11	
<b>McElhannay Surveying &amp; Engineering Ltd.</b> 495 Sixth Street, Courtenay, B.C. V9N6V4 Telephone 338-5495		1 2 3 4 5 6 7 8 9 10 11		1 2 3 4 5 6 7 8 9 10 11		1 2 3 4 5 6 7 8 9 10 11		1 2 3 4 5 6 7 8 9 10 11		1 2 3 4 5 6 7 8 9 10 11	

This drawing and design is the property of McElhannay Surveying and Engineering Ltd. and is loaned to the client for their use only. It is not to be reproduced or used in any way without the written consent of the author.

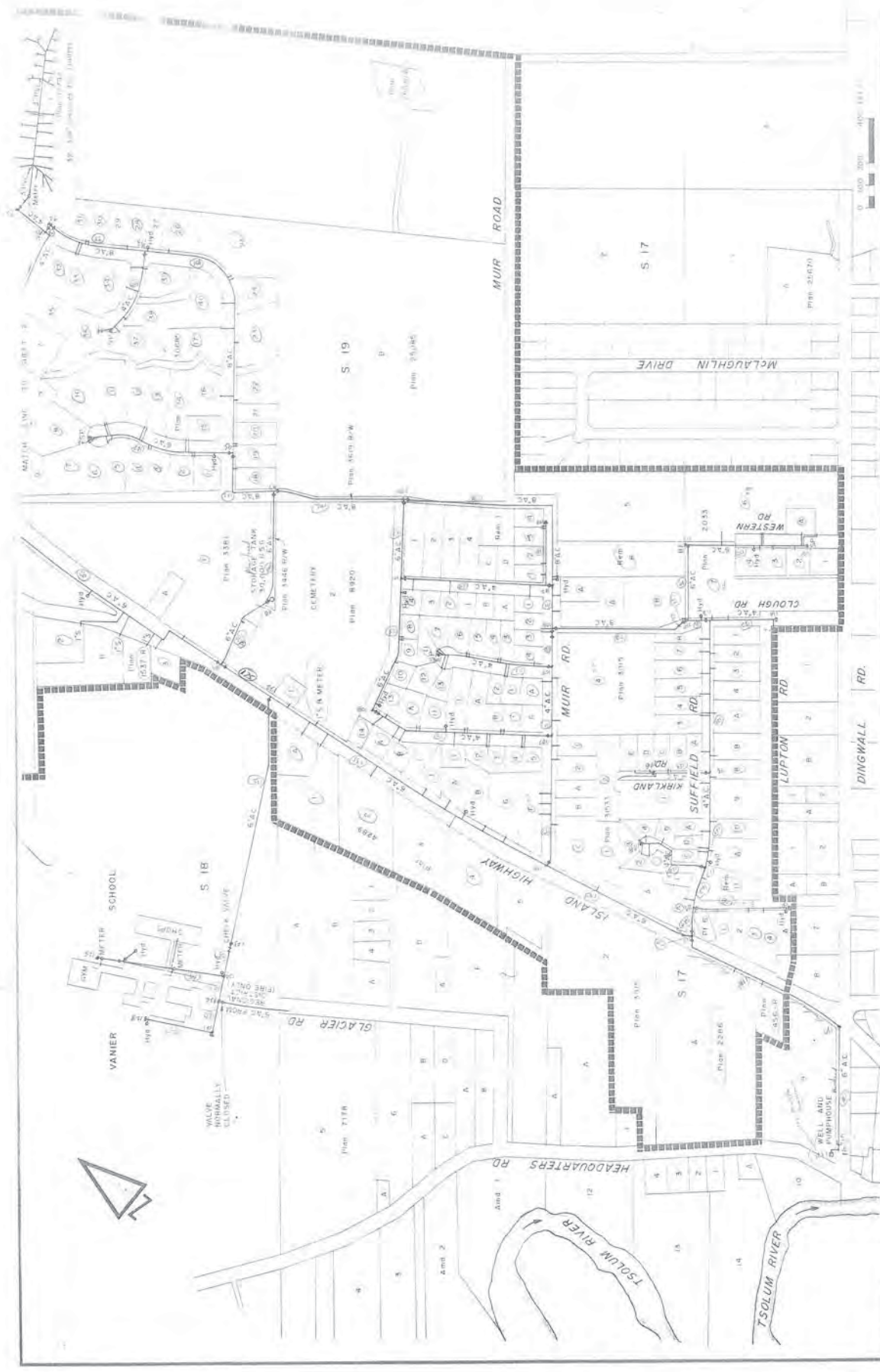


1" = 40' HORIZ. SCALE  
 1" = 4' VERT. SCALE

W.V. WATER LINE S.V. VALVE 1/2" & 1" S.P. STAND PIPE H. HYDRANT C. HYDRANT CABINET B.F. BLIND FLANGE	BOUNDARY OF SANDWICK WATERWORKS DISTRICT	D.M. JUNE 1976 BY A.S. SHAW	REVISION TO PLAN 1179 1179	WILLIS CHILDER TOWN ENGINEER	SANDWICK WATERWORKS DISTRICT WATER LINE 1179 EXISTING WATER SYSTEM	SHEET NO. 4 OF 4
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SANDWICK WATERWORKS DISTRICT WATER STUDY 1976 EXISTING WATER SYSTEM	
<b>WILLIS CUNLIFFE</b> TOWN ENGINEER	
DATE: JUNE 1976 DRAWN BY: AS SHOWN CHECKED BY:	SHEET NO. 1 OF 4 SCALE:
REVISIONS: A. REVISED TO APRIL 1975 B.	LEGEND: --- WATER LINE --- VALVE LOCATION --- HYDRANT --- PUMP --- CAP --- BOUNDARY OF SANDWICK WATERWORKS DISTRICT

**APPENDIX B  
ASSET TABLE**

Sandwick Water System - Replacement Costs for Works Located Outside the City of Courtenay Municipal Boundary

Item No.	Description	Year Constructed *	Age (years)	Life Cycle (years)	Replacement Year	Service Life Remaining	Existing		Proposed		Unit Price	Extension
							Dia	Material	Dia	Material		
1	Remison Road	1966	49	60	2026	11	100	AC	150	PVC	\$380	\$182,400
2	Island Highway (Hubband to Rennison)	1966	49	60	2026	11	150	AC	250	PVC	\$445	\$151,550
3	Island Highway (Hubband to Parker)	1966	49	60	2026	11	150	AC	200	PVC	\$390	\$175,500
4	Virginia Drive	1967	48	60	2027	12	150	AC	150	PVC	\$380	\$207,100
5	Short Place	1967	48	60	2027	12	100	AC	100	PVC	\$355	\$13,845
6	Lillian Place	1967	48	60	2027	12	100	AC	100	PVC	\$355	\$14,200
7	O'Brian Road	1967	48	60	2027	12	100	AC	150	PVC	\$380	\$74,100
8	Gile Road	1967	48	60	2027	12	100	AC	100	PVC	\$355	\$18,460
9	Meadowbrook Cres	1968	47	60	2028	13	150	AC	165	PVC	\$380	\$62,700
10	Gail Cres	1969	46	60	2029	14	150	AC	730	PVC	\$380	\$277,400
11	Hubband Road	1971	44	60	2031	16	150	AC	840	PVC	\$390	\$327,600
12	Childs Road	1972	43	60	2032	17	150	AC	335	PVC	\$380	\$127,300
13	Parker Road	1973	42	60	2033	18	150	AC	475	PVC	\$380	\$180,500
14	Veronica Place	1973	42	60	2033	18	100	AC	85	PVC	\$355	\$30,175
15	Fredrick Place	1973	42	60	2033	18	100	AC	75	PVC	\$355	\$26,625
16	Gibson Road	1973	42	60	2033	18	150	AC	486	PVC	\$380	\$184,680
17	Willis Way NW	1973	42	60	2033	18	150	AC	330	PVC	\$380	\$125,400
18	Willis Way SE	1976	39	60	2036	21	150	AC	476	PVC	\$390	\$185,640
19	Venture Road	1976	39	60	2036	21	150	AC	487	PVC	\$390	\$189,930
20	Barbara Road	1976	39	60	2036	21	150	AC	388	PVC	\$390	\$151,320
21	Hubband Road (Willis Way to Mitchell)	1976	39	60	2036	21	150	AC	510	PVC	\$380	\$193,800
22	Mitchell Road	1976	39	60	2036	21	150	AC	885	PVC	\$380	\$336,300
23	Mitchell Road (Barbara to Elmo)	1976	39	60	2036	21	200	AC	475	PVC	\$390	\$185,250
24	Elmo Road	1976	39	60	2036	21	150	AC	280	PVC	\$380	\$106,400
25	Demarais Place	1976	39	60	2036	21	150	AC	135	PVC	\$380	\$51,300
26	Cooper Place	1976	39	60	2036	21	100	AC	58	PVC	\$355	\$20,590
27	Rook Road	1976	39	60	2036	21	100	AC	77	PVC	\$355	\$27,335
28	Raven Road	1976	39	60	2036	21	100	AC	192	PVC	\$390	\$74,880
29	Paula Place	1976	39	60	2036	21	150	AC	330	PVC	\$380	\$125,400
30	Adrian Road	1976	39	60	2036	21	100	AC	195	PVC	\$355	\$69,225
31	Willis Way NW of Hubband Road	1977	38	60	2037	22	150	AC	470	PVC	\$380	\$178,600
32	Exeter Place	1977	38	60	2037	22	100	AC	97	PVC	\$355	\$34,435
33	Tatton Road	1977	38	60	2037	22	150	AC	304	PVC	\$380	\$115,520
34	Mitchell Way to Reservoir Site	1978	37	60	2038	23	150	AC	95	PVC	\$380	\$36,100
35	ROW (Gibson to Cathy)	1979	36	60	2039	24	150	AC	163	PVC	\$380	\$61,940
36	Cathy Cres	1979	36	60	2039	24	200	AC	150	PVC	\$390	\$58,500
37	Cathy Cres	1979	36	60	2039	24	150	AC	551	PVC	\$380	\$209,380
38	ROW (Gail Cres to Cathy Cres)	1979	36	60	2039	24	150	AC	108	PVC	\$380	\$41,040
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43	Mitchell Road (Hubband Road to Barbara Road) **	1983	32	85	2068	53	200	PVC	300	PVC	\$390	\$117,000
44	Mitchell Road (Hubband Road to Barbara Road) **	1985	30	85	2070	55	250	PVC	430	PVC	\$445	\$191,350

\* Assumed based on registration of legal plans

\*\* Installation year based on record drawing information