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**REPORT TO STICKS ALLISON WATER LOCAL SERVICE COMMITTEE
MEETING OF TUESDAY, SEPTEMBER 22, 2015**

**SUBJECT DRAFT STRATEGIC ASSET MANAGEMENT PLAN FOR STICKS ALLISON
WATER SYSTEM**

ISSUE

To provide the Sticks Allison Water Local Service Committee a draft copy of the Strategic Asset Management Plan for the water system for it's consideration.

BACKGROUND

The Sticks Allison Water Local Service Committee (committee) requested that the Capital Regional District (CRD) staff deliver the draft Strategic Asset Management Plan (SAMP) with proposed future expenditures to inform the 2016 capital and operating budget preparation.

It should be noted that the capital reserve fund account at the beginning of 2015 was \$5,795 and no new capital projects were approved for 2015 and it is estimated that the fund balance would be \$11,125 at the end of 2015, should there be no unexpected expenditures.

Draft Strategic Asset Management Plan

The scope of the draft SAMP was to identify issues related to aging infrastructure, changes in legislative obligations, level-of-service expectations, financial issues and water quality aspects of the water service. The Committee may desire to pursue other issues and direct the CRD staff to review and report back to the Committee.

In general, the water system performs well, although it is proposed to request approval of several capital expenditures related to safety equipment, ground water and water audit studies, and to maintain a maintenance equipment reserve fund balance and a slight increase in the water quality testing allocation in the operating budget.

Operating Budget Implications (annual):

Maintenance Reserve Account – The existing equipment, such as pumps, instruments and appurtenances are aging and there is often a need to repair or replace small equipment that is in service without having to utilize the capital reserve fund. It is proposed that the water service maintain a maintenance reserve account balance in the order for \$5,000 for such minor type expenditure.

Water Quality Budget Implications (annual):

Water Quality Sampling – It is proposed to increase water quality sampling allocation in the operating budget by \$115 per annum, to total \$1,840 in the operating budget annually. The water sample plan is proposed to be enhanced to provide a better representation of the water quality and expectations by the Island Health Authority.

Capital Budget Implications

The following summarizes the proposed capital expenditures, the estimated cost and proposed year of completion:

- 1) Safety Equipment \$2,000 (2016) – the CRD's safety advisor has undertaken a review of the treatment facility in consultation with the WorkSafe BC officer and determined that additional eyewash safety equipment and drench hose is required.
- 2) Ground water study \$5,000 (2016) – Due to the observed decrease in the Sticks Allison well water level, it is proposed to conduct a high-level ground water study of the existing aquifer. A more detailed study may be required pending the information gathered during the high-level study.
- 3) Water Audit Study \$5,000 (2017) – It is proposed to conduct a water audit of the system to determine if there are any appreciable leaks in the system and further determine the condition of the asbestos cement pipe.

The proposed 2016 capital work as noted above totals \$7,000. Should the committee decide to complete and fund the proposed 2016 work from the Capital Reserve Fund estimated to be \$11,125 at the end of 2015, then the balance would be approximately \$4,125 and available for future capital expenditures.

The committee should consider maintaining a capital reserve fund balance using a percentage of the total asset replacement value. Considering that the estimated total replacement value of the water system is in the order of \$1,800,000 and its fair condition, a reserve amount in the order of 2 to 5% of the replacement value or \$36,000 to \$90,000 would be reasonable at this time.

However, the CRD Finance Department will review reserve fund balances and types to determine the best strategy in order to sustain the service area. Any major future capital improvements may utilize the reserve amount solely or in combination with an increase in parcel tax and/or supplementary funding opportunities/grants.

ALTERNATIVES

Alternative 1

That the Sticks Allison Water Local Service Committee accept this report and draft Strategic Asset Management Plan and direct the CRD staff to include the proposed operating and capital expenditures in the draft 2016 Operating and Capital budget.

Alternative 2

That the Sticks Allison Water Local Service Committee accept this report and draft Strategic Asset Management Plan and direct the CRD staff to revise the proposed operating and capital expenditures in the draft 2016 Operating and Capital budget.

IMPLICATIONS

Alternative 1 – By receiving this report and directing the CRD staff to include the proposed operating and capital expenditures in the draft 2016 Operating and Capital budget the CRD staff will prepare the draft 2016 Operating and Capital budget based on the identified expenditures.

Alternative 2 – By receiving this report and directing the CRD staff to revise the proposed operating and capital expenditures in the draft 2016 Operating and Capital budget the CRD staff will prepare the draft 2016 Operating and Capital budget based on the revised items.

CONCLUSION

A draft Strategic Asset Management Plan has been prepared for the Sticks Allison Water Local Service Committee and overall the water system performs well, however, some improvements related to operating and capital are proposed to improve and maintain the water service.

RECOMMENDATION

That the Sticks Allison Water Local Service Committee accept this report and draft Strategic Asset Management Plan and direct the CRD staff to include the proposed operating and capital expenditures in the draft 2016 Operating and Capital budget.

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**STICKS ALLISON WATER SYSTEM
STRATEGIC ASSET MANAGEMENT PLAN
GALIANO ISLAND, BC
SOUTHERN GULF ISLANDS ELECTORAL AREA
CAPITAL REGIONAL DISTRICT**

DRAFT

Prepared by: Capital Regional District Integrated Water Services
September 2015

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1.0 BACKGROUND

1.1 Introduction

The Capital Regional District (CRD) identified a need to develop a Strategic Asset Management Plan (SAMP) to ensure that the ability of the Sticks Allison water system to deliver water is maintained and compliant with regulatory standards. An engineering study was approved to determine the quantity, age, condition and approximate life expectancy of the water system assets; estimate the cost to renew or replace infrastructure; and develop a long-term financial plan to fund infrastructure renewal or replacement as required to maintain an acceptable level of service and stable annual cost of service.

A feasibility study and comprehensive review was completed in January of 1996 for the Sticks Allison water system (Take Over Study of Sticks Allison Water Utility, January 1996, CRD). The feasibility study identified improvements that were required for the CRD to consider the conversion of ownership from the private utility owner to the CRD.

The following is summarized directly from the 1996 study:

- a) Storage Tank – Replace the existing 90.8 m³ (20,000 imperial gallon (lg)) wood stave storage tank with a 113.5 m³ steel tank.
- b) Pump Station Mechanical and Electrical – New electrical and plumbing required for the pump station facility due to the effect of a malfunctioning chlorine pump.
- c) Auxiliary Power Source – Provision of a gas driven generator and transfer switch to operate the well pump during a power outage unless emergency storage is provided at the storage tank.
- d) Hydrant, Standpipe and Valve Repair and Maintenance – The hydrants, valves, curb stops, meters, etc., need maintenance work along with a complete flushing of the system to safeguard water quality.
- e) Clear and Grub Pipeline R/W – The pipe alignment on Sticks Allison Road is completely overgrown with bush and alder; the roots from this vegetation will potentially cause damage to the AC (asbestos cement) distribution mains and numerous service connections.

The upgrades completed to-date since the feasibility study was completed in 1996, include the following:

- a) Storage Tank - A new 118 m³ (26,000 lg) bolted steel tank, modified chlorine system including wiring and plumbing.
- b) Clearing and Grubbing Pipeline R/W – the right of way was cleared and grubbed in the late 1990s.
- c) Water Disinfection Equipment - Ultraviolet (UV) disinfection equipment was added to the system in 2004.
- d) Standpipe Maintenance - Two standpipes were repaired in 2008.

- e) Customer Water Meters - New domestic customer water meters and backflow prevention device were installed on each customer service line in 2008 and 2009.
- f) Other Maintenance Work – other maintenance work is conducted on the system as required.

This SAMP serves to revisit the findings of the 1996 feasibility study and to develop an up-to-date engineering study to identify any system shortfalls to meet current and future demands. This study will consider the new legislation and regulations adopted since 1996 and discuss current and proposed level-of-service.

1.2 Regulatory Compliance

The operation and maintenance of a water utility shall be compliant with a number of Provincial and Federal legislation, regulations, guidelines and standards as listed below, but not limited to:

- a) Guidelines for Canadian Drinking Water Quality, Canada
- b) Drinking Water Protection Act and Regulations, British Columbia
- c) British Columbia Groundwater Protection Act and Regulations, B.C. and
- d) WorkSafe BC

The Sticks Allison water service has many bylaws related to the service including:

- a) Sticks Allison Water Local Service Establishment Bylaw No.1, 1997, 2556
- b) Southern Gulf Island and Juan de Fuca Electoral Areas Utilities and Street Lighting Fees and Charges Bylaw No. 1, 3987
- c) Water Regulations Bylaw No.1, 1792

Other guidelines and standards to consider when designing or evaluating a water system may include the following:

- a) Design Guidelines for Rural Residential Community Water System
- b) Master Municipal Construction Document Design (MMCD) Guidelines, and
- c) Fire Underwriters Survey – Water Supply for Public Fire Protection (FUS)

1.3 Level-of-Service

The level-of-service that a water system should provide represents a significant factor in determining the required system configuration. The imposition of a large utility model system on smaller utilities can have significant cost implications to the users. The level-of-service can be generally categorized in a few key areas such as; water system production capacity, water quality, water storage volume, system conveyance and pressures, system reliability and fire protection.

The level-of-service to provide average per capita demands, fire protection and water quality generally have the most impact on the water system configuration and associated capital and operating and maintenance costs. There is a mandatory level of service that must be achieved to adhere to legislation and regulations such as the treatment and quality of water versus an optional level of service such as the level-of-fire protection and best management practices.

1.4 Study Area

The community of Sticks Allison is a rural residential development located on the east side of Galiano Island in the Southern Gulf Islands Electoral Area of the CRD (see Figure 1-Sticks Allison Water Service Area). All of the properties served by this water system front Sticks Allison Road. The road frontage for the water service area is

approximately one kilometer. The topography of the area varies between sea level and approximately 30m with the majority of properties at or below 20m elevation. The climate is generally cool and dry in the summer with mild winters and an average annual rainfall of 625 mm.

The Sticks Allison water service area is made up of 39 parcels encompassing a total area of approximately 23 hectares. Of the 39 parcels, 34 are connected to the water system as of 2015.

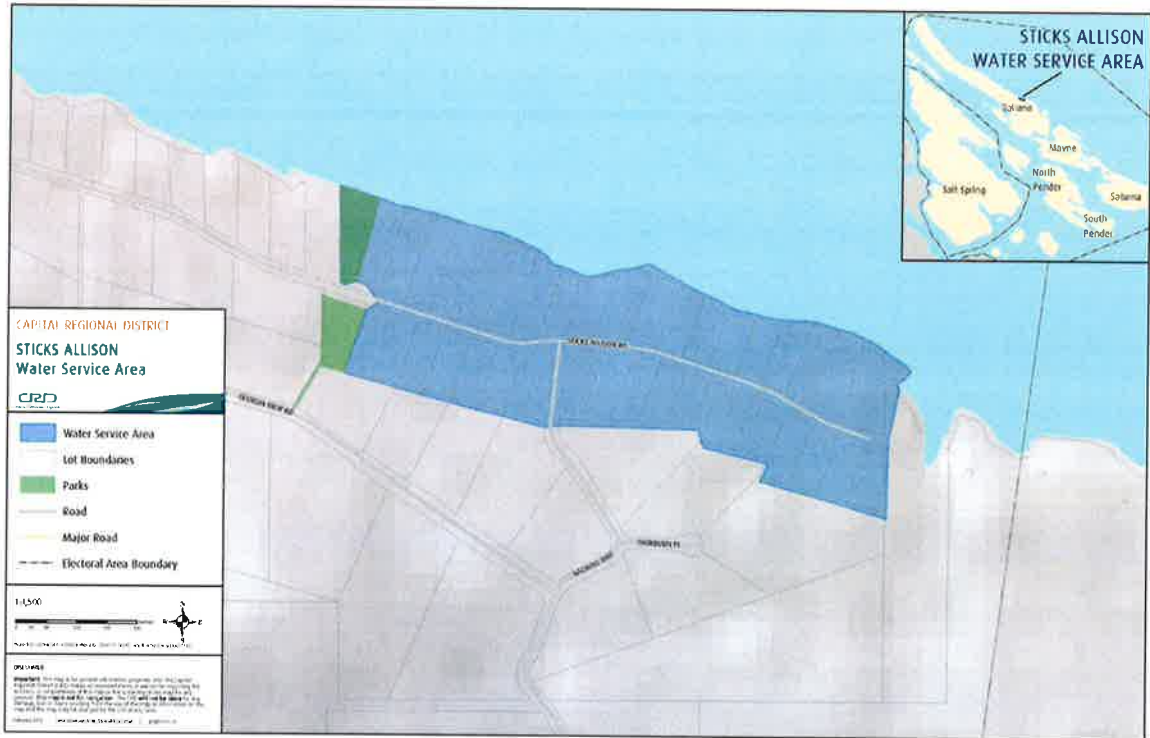


Figure 1 – Sticks Allison Water Service Area

2.0 EXISTING WATER SYSTEM

2.1 General

The Sticks Allison water system extracts groundwater from a well that is located on private property, with rights-of-way, at 1254 Galiano Way roughly 70m north of Thorburn Place, together with UV and chlorine disinfection facilities at the same site. The disinfected water is pumped into the distribution system and up to the storage tank roughly 80 m south of Thorburn Place. Water from the tank is then distributed through the mains within the Sticks Allison water service area. Refer to Figure 2 – Sticks Allison Water System



Figure 2- Sticks Allison Water System

2.2 Water Supply

Water Quantity

The Sticks Allison groundwater well is currently pumped at approximately 1.0 litres/second (15 gallons per minute (USgpm)), the maximum safe well yield is estimated to be 2.1 litres/second (33 USgpm) as noted in the 1996 study. The maximum current daily production rate of this well running 24 hours is 86 m³ or 2,215 liters per lot per day (based on 39 lots). Wells are typically not run 24 hours a day and running the wells 75% of the time yields a production rate of 65 m³ or 1,661 liters per lot per day. In 2014, a total of 5,677 m³ of water was produced or an average of 399 litres per customer per day.

The CRD has measured and recorded the static ground well water level of the aquifer since 2010 and the trend over the last five years indicates that the static water level is declining. Refer to Figure 3 – Sticks Allison Well Static Ground Water Level.

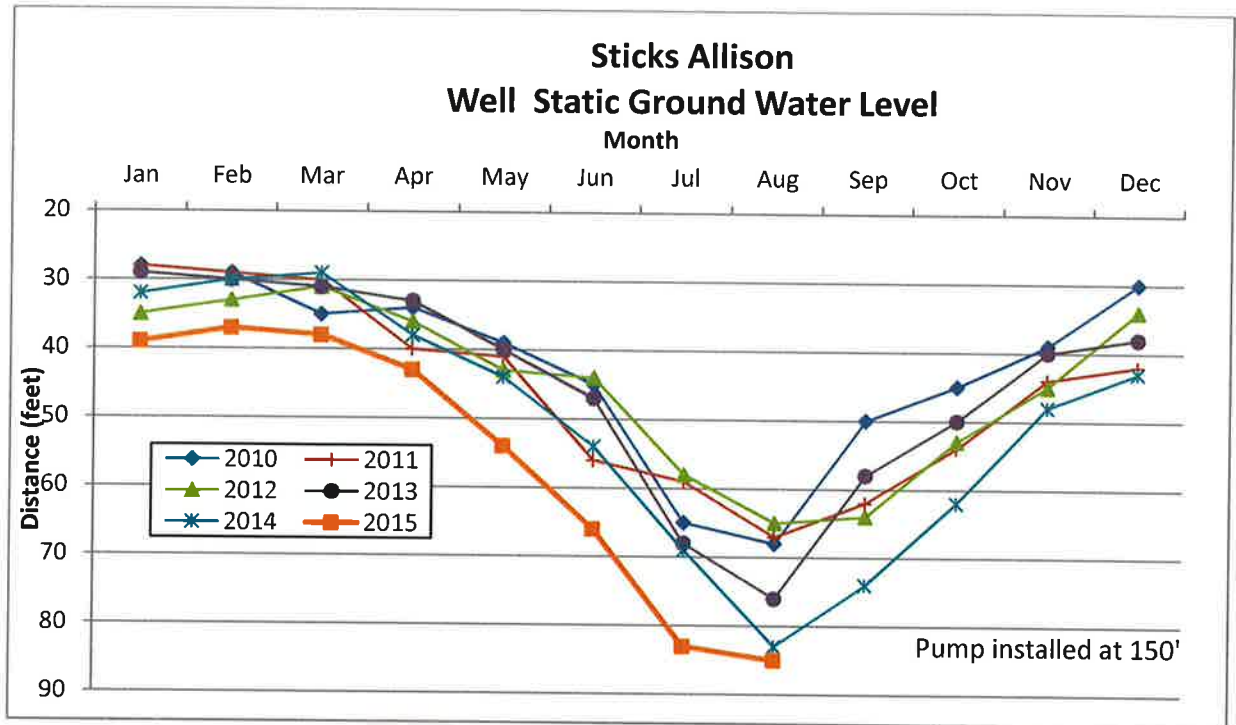


Figure 3 – Sticks Allison Well, Static Ground Water Level

Water Quality

The well source provides high quality raw water that meets all the Guidelines for Canadian Drinking Water.

The modifications made to the water supply since the 1996 Feasibility Study include the addition of UV disinfection and relocating of the chlorine injection to a building addition made to the pump station building.

2.3 Disinfection and Treatment

The raw well water receives UV and chlorine disinfection and no treatment or conditioning of the water is required to meet potability standards.

2.4 Storage Tank

The 118 m³ (26,000 lg) bolted steel tank was constructed in the late 1990s as part of the work required for the CRD to take on ownership and operate the water system. The storage tank is at an elevation of about 55 m and provides a residual pressure above 275 kPa (40 psi) at the customer water meters.

2.5 Distribution Mains

The existing distribution system consists of approximately 1,400 metres of 100 mm diameter mains primarily consisting of asbestos cement material and a minor amount of polyvinylchloride. Table 1 – Sticks Allison Water Mains, summarizes the size material, year of installation and lengths.

Material	Diameter (mm)	Year Installed	Length (m)
Asbestos Cement (AC)	100	1968	1,370
Polyvinyl Chloride (PVC)	100	1998	23

Total	1,393
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Table 1 – Sticks Allison Water Mains

The distribution system generally extends from the storage tank along Galiano Way to Sticks Allison Road where two mains extend east and west to terminate at the extent of the water service area.

There is no looping in the system as the water mains terminate at the end of the service area. Although looping of mains is generally desirable for water quality and hydraulic reasons, the configuration of the system does not allow for looping opportunities.

All of the mains are within road allowances except for the water mains that enter the well site and the reservoir site which are have related statutory right of way.

The water system includes other miscellaneous appurtenances, including;

- 34 service connections c/w with meter and dual check backflow preventer
- 4 fire hydrants
- 2 standpipes and
- 10 gate valves

The well production water is metered at the treatment building and at each customers service connection which allows the amount of non-revenue water volume to be quantified.

The total volume of water produced in 2014 was 5,677m³ and the total water demand of the customers was 5,356 m³ resulting in a net loss of 321m³ or 6% which is reasonable for a water system. Water loss generally can result from leakage, water main flushing, water main breaks or use of fire hydrants and standpipes.

In recent year there have been two service leaks noted in 2014 near 300 and 265 Sticks Allison Road and no leaks noted in 2013. Anecdotally, in the prior years there had been three leaks in the period that that the CRD has owned and operated the system of which one was known to be related to a water main and the other two were related to the stand pipes.

For a year by year comparison of the Sticks Allison annual water production versus demand refer to Figure 4 –Sticks Allison Annual Water Production and Demand.

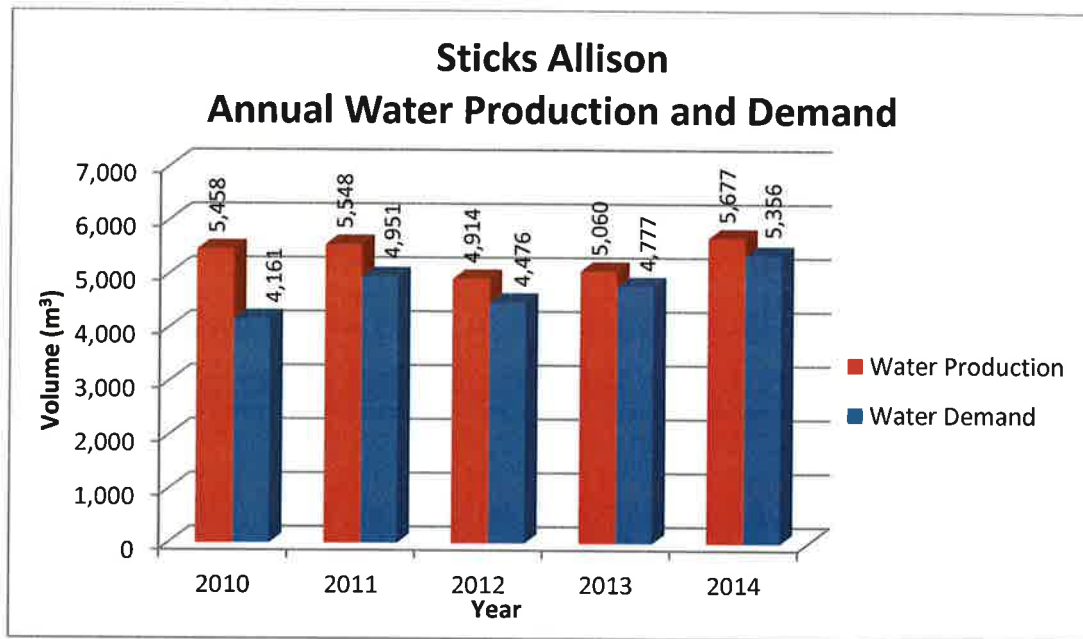


Figure 4 – Sticks Allison Annual Water Production and Demand

2.6 Supervisory Control and Data Acquisition – (SCADA)

The Sticks Allison water service currently has a SCADA system which includes a radio, remote terminal unit (RTU), transducers/level transmitters to continuously monitor water storage levels, pump run time indicator, BC Hydro power status and equipment monitoring.

The SCADA system reports remotely to the CRD duty operator of the water system's operational status and alerts the on island operator to respond to any emergency situations.

2.7 Fire Protection

The Fire Underwriters Survey (FUS) sets out minimum requirements for a water system to be “recognized” for fire protection purposes. The minimum main size recognized is 150 mm diameter.

“In general the gridiron of minor distributors supplying residential districts should consist of mains at least 150mm in size and arranged so that the lengths on the long sides of blocks between intersecting mains do not exceed 200 metres.” – FUS 1999

The minimum fire flow requirement for a rural residential development is 33 l/sec for one hour with a minimum residual pressure of 138 kPa (20 psi). This would require a minimum of 120 m³ to be available at all times from storage for fire protection (i.e. roughly all of the existing volume of 118 m³, with no residual volume for balancing or emergency storage).

The present system has four fire hydrants, three of which are located in the service area and the fourth located on Galliano Way. However, the system is undersized to convey sufficient flow (i.e. 33 l/sec) to meet fire flow requirements during normal system operation at the minimum required pressure of 138 kPa (20 psi). The existing fire hydrant coverage spacing ranges from approximately 240m to 290m which is greater than the FUS recommended spacing of 180m for single family residential

areas. Further, any fire hydrants required for fire service should be inspected, tested and maintained periodically to ensure they are ready for service.

Rural fire departments will typically be outfitted with a portable reservoir to use as an on-site storage vessel and may achieve accreditation of the superior tanker shuttle service. A fire department's tanker truck will fill the portable reservoir from available sources with the pumper truck drawing water from the portable reservoir to fight the fire. The presence of fire hydrants on a system suggests the availability of water to fight a fire and certainly are a resource in the event of an emergency.

In order to achieve a minimum level of fire protection to FUS throughout the system, a network of at least 150 mm mains would most likely be required plus additional tank storage for balancing and emergency use as indicated above.

If an increase in the level-of-service for fire protection is desired, then the following capital improvements may be considered:

- a) Increase storage volume,
- b) Replace undersized mains and
- c) Inspection and replacement if need of the existing fire hydrants and installation of additional fire hydrants.

2.8 Water Quality

The CRD has developed for the Stick Allison Water System a custom water quality sampling plan that meets regulatory requirements and addresses system specific risks. This plan includes monthly testing of bacterial indicators at various locations, and less frequent testing for parameters such as metals, organic carbons and disinfection by-products and water chemistry parameters.

Unlike surface water sources, the characteristics of groundwater sources are generally less variable from season to season. Bacteria are detected from time to time in the raw water source. Generally, if a large increase in bacteria, often following a major weather event is detected this would indicate contamination of the aquifer that is often caused by inadequate sealing of a well allowing surface drainage to enter the casing.

The risk of aquifer contamination is the primary reason disinfection is provided. To date, the Sticks Allison water system well has been typically void of any coliform bacteria and usually has very low background bacteria concentrations. Also, specific testing during August 2015 revealed no indication of saltwater intrusion to the well during a period of drought conditions and aquifer drawdown.

Non-coliform or background bacteria are also present within the water main system. While these bacteria are not harmful to human health, when present in large numbers they have the potential to obscure other, more harmful bacteria in samples and cause error detection in the lab. For this reason, a maximum non-coliform bacteria count of 100 colony forming units (CFU) per 100 ml is a guideline the CRD strives to maintain. A residual concentration of chlorine is maintained in the system for this purpose. A periodic bacteria count may turn up in a section of water main, especially one with very little usage. If this should occur then the operators then flush that portion of the water main to re-establish the disinfection residual and a re-test is done to confirm the results.

Water delivered to the Sticks Allison water service area is safe to drink, and meets the guidelines set out in the Guidelines for Canadian Drinking Water Quality and the requirements of the BC Drinking Water Protection Act and Regulation as administered by the Island Health Authority.

2.9 Operation

Scheduled disconnections, installations, repairs, capital works are performed by CRD operating staff that are based out of the Saanich Peninsula wastewater treatment plant in North Saanich.

Planned water system operating duties include water treatment plant operation, hydrant servicing, seasonal water main flushing and valve exercising as the operating budget allows. The operators also respond to any customer complaints or leaking infrastructure as required.

Currently, the CRD operating staff is only able to undertake a minimum amount of the maintenance activities due to the availability of budget. The goal would be to achieve best management practices related to operation and maintenance activities which would result in improved longevity of assets, reliability and water quality.

3.0 DESIGN CRITERIA

3.1 General

Design criteria used to evaluate the Sticks Allison water system study have been taken from CRD Design Standards for the Juan de Fuca water system and from the *Ministry of Water, Land and Air Protection Water Management Branch, Fire Underwriters Survey, MMCD Design Guidelines Ministry of Health, Guidelines for Canadian Drinking Water Quality* in conjunction with the requirements of the Drinking Water Protection Act.

3.2 Water Supply

The British Columbia Ministry of Environment, Design Guidelines for Rural Residential Community Water Systems indicates that the dependable yield of the ground water source must equal or exceed the maximum day demand. The groundwater source should be capable of sustaining this rate of flow continuously for 100 days without recharge by precipitation and without utilizing more than the allowable portion of the available drawdown below the lowest seasonal groundwater table.

The maximum daily well production is estimated at 1,661 litres per lot per day as outlined in Section 2.2.

3.3 Water Demand

The annual average day demand (ADD) for 2014 was measured at 399 litres per lot per day. The estimated maximum day demand (MDD) for 2014 was 39 m³ or 997 litres per service connection per day and it occurred in the month of August.

By comparison, the CRD's design criteria for ADD for the Juan de Fuca water system is 1,744 litres per lot per day and the MDD is 4,360 litres per lot per day. The lower ADD and MDD rates for Sticks Allison water system could be a result of the awareness that the community has a limited water source, the rural land use and that the CRD's Juan de Fuca design criteria is more applicable to new urban development.

The Sticks Allison Water System should consider adoption of a water conservation plan and regulations in light of the recent dry weather, concerns of climate change and the observed lower aquifer water level.

3.4 Multiple Barrier Approach/Water Quality

The CRD applies a *multiple barrier approach* to prevent contamination of the drinking water supplied to customers. One of these 'barriers' for the protection of water quality is the management of risks from cross connections. Cross connections are sources that can introduce contaminants into the water distribution system. High risk cross connection sources are typically industrial or institutional connections to the water system.

Residential connections constitute a minor risk of introducing contaminants to the water and backflow prevention devices were installed. Due to the small number of exclusively residential water service connections in the Sticks Allison Water System, a comprehensive cross connection control program is not recommended for this utility.

The existing water quality monitoring and an adequate disinfectant (chlorine) residual concentration in the distribution system are sufficient to detect and address any possible contamination from potential cross connections.

3.5 Storage Volume

The following design criteria have been used to further assess the storage volume requirements for the Sticks Allison water system:

- 1) Average Day Demand – CRD's design standard of 545 litre per capita per day and 3.2 people per lot or 1,744 litres per lot per day. **39 lots equates to 68 m³**
- 2) Maximum Day Demand – CRD's design standards add a peaking factor of 2.5 to generate an MDD of 4,360 litres per lot per day. **39 lots equates to 170 m³**.
- 3) Peak Hour Demand – The peak hour demand has been used to evaluate the supply main. The peak hour demand is achieved from the storage tank draw down and is approximately three times maximum day demand.
- 4) Fire Flows – The minimum rural residential demand is 33 l/sec for one hour with a minimum residual pressure of 138 kPa (20 psi) in conjunction with the maximum day demand.
- 5) Distribution System Pressure – The generally acceptable range of pressure for a water distribution system is between 138 kPa (20 psi) and 820 kPa (120 psi).
- 6) Storage – There are three major components of reservoir storage:
 - a) **Equalization** – This is the volume of water required from storage to provide the difference between instantaneous system demand and maximum day demand system requirements which the pumping and treatment components are sized to provide. This amount is equal to 25% of the maximum day demand – 42.5 m³ for Sticks Allison water system.
 - b) **Fire Protection** – This is a volume of water set aside in storage equal to the potential fire demand within the storage tank supply area. **The minimum FUS value for a rural residential is 120 m³**. The Sticks Allison water system would require over twice the current storage volume, and upgrading all the 100 mm mains to 150 mm, as a minimum, in order to meet Fire Underwriters Survey recognized protection levels.

- c) **Emergency** – This is the volume of water held in storage for supply to the water system during extended power outages and is related to typical system demand and duration of outages. The amount is equal to 25% of the equalization and fire demand – **41 m³ for Sticks Allison**. The Sticks Allison Water service currently has SCADA monitoring of the tanks but no auxiliary generator (Gen-set) hook up at the treatment plant in the event of a power failure.

Reservoir sizing based on MMCD and rural design guidelines is usually taken as the sum of a + b + c. However, as fire protection for Sticks Allison will likely not be considered for the water system, a + c will provide the required storage tank volume. Therefore a total storage of, a + c, or 84 m³ of storage is required. The total existing storage volume is 118 m³ which meets the requirements for equalization and emergency storage but does not meet the requirements for fire storage (minimum rural requirement).

4.0 SYSTEM EVALUATION AND IMPROVEMENTS

The following section assesses the existing water system against the design criteria described in the previous sections and identifies what is required to meet the desired design criteria if any shortfalls are present.

4.1 General

The existing water system is approximately 45 years old and the water quality monitoring for the Sticks Allison water system indicates that the system continues to produce safe drinking water. Table 4.6.1 summarizes the remaining useful life for each major asset.

It is suggested that the Sticks Allison water system maintain a small equipment replacement fund to be available to replace existing equipment, such as pumps, instruments and appurtenances as they age without having to utilize the capital reserve fund.

4.2 Water Source

In general, the water source is more than adequately sized to meet the current domestic water demands based on recent metering of weekly, monthly and annual consumption and production rates. The present maximum production based on 18 hours of production per day yields 65 m³ (17,000 gallons) per day. The current actual MDD is approximately 39m³ (10,000 gallons) per day as noted in Section 3.3.

Due to the observed decreasing trend in the Sticks Allison well water level and aquifer, it is proposed to conduct a high-level ground water study of the existing aquifer and identify any groundwater protection issues. A more detailed study may be required pending the information gathered.

4.3 Disinfection and Treatment

The existing disinfection system supplying the Sticks Allison water system utilizes chlorine and UV disinfection. The chlorine system is about 10 years old and the UV system was replaced in 2013. Both systems are in good condition and no upgrades are required at this time.

Related to disinfection process, the CRD's safety advisor has undertaken a review of the facility in consultation with the Worksafe BC officer and determined that additional eyewash safety equipment and drench hose is required for the safety of the workers.

4.4 Storage

The existing storage tank capacity is 118.0 m³. The bolted steel tank is about 20 years old and considered to be in good condition. It has more than sufficient volume for current users and the ultimate development of the Sticks Allison water service area. An additional 86 m³ (total 204 m³) of volume would be required to provide enough storage for a minimum level-of-rural fire protection.

4.5 Distribution System

The existing distribution system currently meets domestic balancing and emergency storage needs. The water system is not designed to provide fire protection. The majority of the asbestos cement mains are and reported to have been constructed in 1968, making them over 45 years old.

The replacement of the AC mains should be budgeted in the next 10 to 20 years. Many jurisdictions have implemented replacement programs to eliminate existing AC watermains. In addition to the mains being over 45 years old, if water production losses increase it could generally be an indication that the mains should be replaced due to the deterioration of the pipe. It is proposed to undertake a water audit study to determine if there are any appreciable leaks in the system and further determine the condition of the asbestos cement pipe material.

The system contains two dead-end mains that cannot be interconnected with the rest of the system. Flushing these mains during the summer months may be required to ensure chlorine residual and to maintain water quality. The valves need to be located, exercised regularly and replaced if they do not work properly, if they are critical to the operation of the distribution system.

If the Sticks Allison water system desires fire protection to meet the Fire Underwriters minimum rural standard of 33 l/s all of the water mains would need to be upsized to a minimum of 150 mm diameter.

4.5 Water Quality Monitoring

While the existing water sampling plan meets all regulatory requirements and generally addresses the system inherent risks to water quality, the CRD Water Quality Division has proposed a slight increase to the water testing budget in 2016 to achieve the following:

- Increase metals sampling from annually to semi-annually at two stations,
- Add pH sampling semi-annually at two stations (raw/treated) and
- Add turbidity sampling semi-annually at the raw water.

These proposed changes would fill the deficiencies in the current water sampling plan and provide a better representation of the water quality overall for a modest increase of \$115 over the 2015 total water testing budget of \$1,840.

4.6 Prioritization Summary and Recommended Improvements

The following summarizes the recommended strategy for additional improvements to the Sticks Allison Water system that should be considered for implementation in order to ensure that the capacity of the water system to deliver water is maintained,

compliant with regulatory standards and financially sustainable. Table 4.6.1 summarizes the remaining useful life for each major asset.

Operating

Maintenance Reserve Account – The existing equipment, such as pumps, instruments and appurtenances are aging and there is often a need to repair or replace small equipment that is in service without having to utilize the capital reserve fund. It is proposed that the water service maintain a maintenance reserve account balance in the order for \$5,000 for such minor type expenditure.

Water Quality

Water Quality Sampling – It is proposed to increase water quality sampling allocation in the operating budget by \$115 per annum, to total \$1,840 in the operating budget annually. The water sample plan is proposed to be enhanced to provide a better representation of the water quality and expectations by the Island Health Authority.

Capital

The following is a summary of proposed capital expenditures in the next two years:

- 1) Safety Equipment \$2,000 (2016) – the CRD's safety advisor has undertaken a review of the treatment facility in consultation with the WorkSafe BC officer and determined that additional eyewash safety equipment and drench hose is required.
- 2) Ground water study \$5,000 (2016) – Due to the observed decrease in the Sticks Allison well water level, it is proposed to conduct a high-level ground water study of the existing aquifer. A more detailed study may be required pending the information gathered during the high-level study.
- 3) Water Audit Study \$5,000 (2017) – It is proposed to conduct a water audit of the system to determine if there are any appreciable leaks in the system and further determine the condition of the asbestos cement pipe.

<u>Item</u>	<u>Capital Cost (year)</u>
1. Safety Equipment	\$2,000 (2016)
2. Ground Water Study	\$5,000 (2016)
3. <u>Water Audit Study</u>	<u>\$5,000 (2017)</u>
TOTAL	\$12,000

The capital costs are based on estimated costs in 2015 dollars, and includes supply and installation of materials and equipment, engineering, contingency, and indirect costs.

Capital Reserve Account

The replacement cost of the overall Sticks Allison Water System including well, water treatment plant, booster station, storage tank, distribution pipes and appurtenances is estimated to be in the order of 1.8 million dollars.

Summary of estimated replacement costs:

Well Infrastructure	\$200,000
Water Treatment Plant/Booster Station	\$400,000
Storage Tank	\$500,000
<u>Distribution System and Appurtenances</u>	<u>\$700,000</u>
Total	\$1,800,000

The Sticks Allison Water Committee should consider maintaining a capital reserve fund balance using a percentage of the total asset replacement value. Considering that the estimated total replacement value of the water system is in the order of \$1,800,000 and its fair condition, a reserve amount in the order of 2 to 5% of the replacement value or \$36,000 to \$90,000 would be reasonable at this time.

However, the CRD Finance Department will review reserve fund balances and types to determine the best strategy in order to sustain the service area. Any major future capital improvements may utilize the reserve amount solely or in combination with an increase in parcel tax and/or supplementary funding opportunities/grants.

Table 4.6.1 – Prioritization Summary

Asset	Remaining Useful Life (Years)	Importance	Redundancy	Priority (1 is high)
Well	unknown	Needed for service		1
Well pump and motor	5	Needed for service		1
Pump house	15	Needed for service		1
Electrical components	15	Needed for control		1
Chlorinator	5	Mandatory		1
UV	5	Mandatory		1
Storage tank	30-50	Need for demand		3
Distribution System				
Hydrants (4)	20	Needed for public safety	Other hydrants	5
Standpipes (3)	20	Needed for maintenance		5
Valves (10)	20	Needed for isolation		4
Water Meters (34)	25	Needed for operating information		5
Watermains				
100 mm (AC)	20	Needed for delivery	No redundancy	2

SUMMARY OF WATER SERVICE COMMITTEE BYLAWS

1. Sticks Allison Water Local Service Establishment Bylaw No.1, 1997, 2556
2. Southern Gulf Island and Juan de Fuca Electoral Areas Utilities and Street Lighting Fees and Charges Bylaw No. 1, 3987
3. Water Regulations Bylaw No.1, 1792

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SUMMARY OF BACKGROUND INFORMATION

1. Take Over Study of Sticks Allison Water Utility – CRD, April 1996

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