COMPREHENSIVE REGIONAL WATER PLAN

1.0 EXECUTIVE SUMMARY

This Comprehensive Regional Water Plan (CRWP) provides the Sunshine Coast Regional District (SCRD) with a review of the Regional Water Service Area (RWSA) and provides direction for the SCRD to meet the sustainability goals as identified in the *2011 We Envision Plan* and the *Corporate Strategic Plan*. The CRWP provides guidance for water conservation and system expansion / improvement measures to accommodate growth projections identified in the various Official Community Plans to the year 2036. The RWSA includes the Chapman water system (10,000 connections and bulk water supply to Gibsons) and the smaller Langdale, Soames Point, Granthams Landing, Eastbourne, Cove Cay and Egmont water systems (representing 648 connections combined). The Plan excludes the North and South Pender Harbour Water Service Areas, which are addressed in the Area A Water Master Plan and are currently the subject of separate 10 Year Master Plan development processes. There are certain areas in the SCRD that are populated but not currently serviced by community water systems. A policy is in development to address water needs in these areas.

The CRWP provides a detailed analysis of the Chapman water system which is the largest water system and supplies over 90% of the Coast's residents and businesses within the RWSA. The Langdale, Soames Point, Granthams Landing, Eastbourne, Cove Cay and Egmont Cove systems are also analyzed and included as a separate Small water systems section in this report.

Analysis of the Chapman and the small water systems result in recommended actions, such as intensive demand management, additional source supply capacities, additional treatment capacities, reservoir upgrades and distribution system upgrades, which are summarized in a

Strategic Plan for the Chapman and Small water systems. Capital and operations costs for these recommendations are evaluated and prioritized in a preliminary 10-year capital plan.

Demand management programs to effect water conservation have been in place since 2001. SCRD policy is to reduce water demand by 33% from 2010 levels by 2020. Existing demand management (EDM) programs include education, toilet rebate, fixture replacement, 4-stage sprinkling restrictions and enforcement measures. Since 2003 the programs have been successful in reducing average day demand by 12% (674 to 592 L/c/d) and maximum day demand by 23% (1,482 to 1,137 L/c/d) in the Chapman service area. Compared with geographically similar communities, however, the existing water demands remain high.

An intensive demand management (IDM) program should reduce demands to a target of 480 L/c/d for average day and 940 L/c/d for maximum day demand (similar to other communities). The proposed IDM program includes universal metering at an estimated life cycle cost of $8 million. Further measures may include mandatory Stage 2 and/or Stage 3 sprinkling restrictions until metering is implemented, a conservation based rate structure, leak detection and additional education/outreach programs. While the initial cost is high, lower demands will not only reduce long-term infrastructure upgrade requirements but will also allow deferment of infrastructure upgrades in the short term.

In order to better evaluate the merits of an intensive demand management program, all water system infrastructure upgrade and expansion requirements for year 2036 water demands have been analyzed and costed under conditions of both existing demand management (EDM) and intensive demand management (IDM).

Chapman Water System Strategic Plan

The projected 2036 water demands (high population growth rate of 2%) under these two demand management options for the Chapman water system are as follows:

TABLE 1-1
CHAPMAN WATER SYSTEM
PROJECTED 2036 DEMANDS

Water Demand	EDM	IDM
Average Day (ML/d)	21.3	17.0
Maximum Day (ML/d)	44.4	33.3

The Chapman Creek source relies on a combination of natural creek flow supplemented with release of water from storage in lakes (Chapman and Edwards). SCRD policy on source water supply (for surface water sources) is to maintain sufficient storage to meet water demands under a 1:25 year drought return period scenario, which is consistent with Provincial guidelines (Ministry of Environment Dealing with Drought handbook 2009). The analysis determined that the 2011 water demand could be met in a 1:21 year drought, which is already less than the 1:25 year goal, and reduces to a 1:11 year drought by 2036 under the EDM condition. With intensive demand management, the 2036 condition improves to a 1:15 year drought, but still unable to meet the 1:25 year criteria. Additional source capacities of 0.43 Mm^3 (under IDM) and 0.76 Mm^3 (under EDM) are needed to meet the 1:25 year drought condition under the 2036 water demand.

The Chapman Creek water treatment plant is presently operating close to its design capacity of 25 ML/d. Under the existing demand management scenario, plant expansion is an immediate priority with Stage 2 and 3 sprinkling restrictions to be implemented until expansion is completed. Under the IDM scenario, universal metering and Stage 2 and 3 sprinkling restrictions are anticipated to allow deferment of the timing for expansion until about the year 2020.

The SCRD WaterCAD model was used to analyze the transmission and distribution system within the Chapman service area. The analysis involves the application of maximum day demand (under both EDM and IDM conditions) coincident with fire flow requirements. Throughout the Province, most rural areas utilize a 30 L/s fire flow. Because much of the service area is rural, the system was analyzed under two conditions; 60 L/s fire flow for urban and rural areas and 60 L/s fire flow for urban areas with 30 L/s fire flow in rural areas. The results indicate a 60 L/s fire flow for urban and rural areas required approximately $7.1 million in upgrades while the 60 L/s urban and 30 L/s rural fire flow required only $0.50 million in upgrades. A 30 L/s fire flow requirement in rural areas and a 60 L/s requirement in urban areas are recommended.

Maximum service elevations for each pressure zone within the Chapman service area were also reviewed. The current system is unable to service higher elevation properties in the Roberts Creek, West Sechelt and Halfmoon Bay areas. As the current water system cannot support the current water service area boundaries, it is recommended that development priorities be restricted to the current service area boundaries and that future development plans that may look to expand service to these or other higher elevations be reviewed on a case by case basis.

Following analysis of the Chapman water system, a Strategic Plan was developed with a 25 year planning horizon, summarized as follows:

1) Previous studies were updated to allow comparison of three options for increasing the Chapman Creek source capacity, as summarized in Table 1-2.

TABLE 1-2
CHAPMAN CREEK SOURCE OPTIONS

Option	Life Cycle Cost	
	EDM	IDM
Engineered Lake	$8,000,000	$4,750,000
Floating Pump Station	$1,900,000	$1,200,000
Raise Chapman Lake	$5,500,000	$3,300,000

Construction of the floating pump station (or alternative system), future construction of the engineered lake, continued use of the Chaster Well during drought conditions, use of Gray Creek for emergency supply only and a groundwater investigation program are recommended for increasing the water source capacity.

2) The existing Chapman Creek water treatment plant comprises of two 12.5 ML/d treatment trains. Expansion includes the addition of a third train to increase the capacity to 37.5 ML/d at an estimated cost of $6.4 million. Under the IDM scenario, plant expansion is delayed to about the year 2020 and the service life of the expanded plant will extend beyond 2036. Under the EDM scenario, plant expansion is required immediately and the 37.5 ML/d design capacity will be reached around 2028. The plant would need to be further expanded to 45.0 ML/d at a cost of $10.0 million to provide service to 2036.

3) Transmission mains require upgrade to supply 2036 water demands. Under EDM, the upgrade cost is estimated at $7.55 million, reducing to $2.1 million with IDM.

4) Chapman reservoirs are able supply the existing and future balancing demand for the entire Chapman water system. Additional fire storage volumes are required in Zone 1 during the future 2036 EDM scenario. The cost for reservoir upgrades is $1.5 million for EDM, reducing to $0 if IDM is implemented.

5) To provide 2036 water demand and the required rural and urban fire flows requires upgrading of the distribution system (watermains, booster pump stations, pressure reducing stations, dead end elimination). The cost if EDM is continued is $13.74 million reducing to $12.84 million if IDM is implemented.

6) The financial significance of implementing an intensive demand management program compared with continuing the existing demand management program is illustrated below. Life cycle costs include the operations and maintenance costs to the year 2036.

TABLE 1-3
CHAPMAN WATER SYSTEM STRATEGIC PLAN
SUMMARY OF COSTS – EDM VS IDM

Item	Total Cost	
	EDM	IDM
Demand Management Programs	$120,000	$8,510,000
Source Supply	$10,270,000	$6,320,000
Water Treatment	$10,100,000	$6,500,000
Water Transmission / Reservoirs / Distribution	$22,790,000	$14,940,000
Total Estimated Cost	**$43,280,000**	**$36,270,000**

IDM is estimated to reduce overall costs by approximately $7.01 million and is recommended.

Small Water Systems Strategic Plan

The Langdale, Soames Point, Granthams Landing and Eastbourne water systems are supplied through shallow groundwater wells and the Cove Cay and Egmont Cove water systems are supplied through surface water from naturally occurring lakes in the SCRD. There is insufficient information to assess the drought risk of each of the small water system sources, but analysis was undertaken to compare the source capacity at each water system to supply water for the 2011 and 2036 water demand. It was determined that the source capacities were adequate for all water systems with the exception of the supply in the Eastbourne community. It was identified that a groundwater investigation program would be required to provide additional well supply to the area.

Treatment capacities at each of the small water systems were compared to the maximum day demands anticipated for 2011 and 2036. Treatment facilities are currently providing enough capacity to meet 2011 and 2036 maximum day demand for all the small water systems except for Eastbourne. The Eastbourne water system experiences periods of low flow at the well sources during the summer. To address this, each individual homeowner in the Eastbourne community has a water storage tank to provide water during these low demand periods.

The SCRD WaterCAD model was used to analyze the distribution network in the small water systems. The analysis involves the application of maximum day demand (under both EDM and IDM conditions) coincident with a 30 L/s fire flow requirement for the small water systems.

Following analysis of the small water systems, a Strategic Plan was developed with a 25 year planning horizon, summarized as follows:

1) A groundwater investigation to find additional suitable supply wells is recommended to improve the water supply to the Eastbourne community. Additionally, outstanding Source to Tap Assessments and Well Protection Plans should be completed for the small water systems.

2) Automation of the chlorination supply at the Soames Point well should be carried out by the SCRD. Further, the treatment capacity expansion for the Eastbourne community may be required upon commissioning of any additional groundwater wells that may be found and put into service.

3) There are fire storage deficiencies in the Langdale, Soames Point and Granthams Landing water systems under 2036 water demands. However, because of the interconnectivity of the zones and especially the Fisher PRV, water from the Chapman water system can be supplied to the small water systems during the fire flow condition. A budget of $10,000 per year is recommended for SCRD staff to confirm operation of the valves which will open to provide Chapman water under these emergency conditions. The 25-year life cycle cost of providing this service is $175,000.

4) To provide 2036 water demand and the required fire flows requires upgrading of the distribution system (watermains, booster pump stations, pressure reducing stations, dead end elimination). The cost is $1,855,000 under both EDM and IDM.

5) The financial significance of implementing an intensive demand management program compared with continuing the existing demand management program is illustrated below.

TABLE 1-4
SMALL WATER SYSTEMS STRATEGIC PLAN
SUMMARY OF COSTS – EDM VS IDM

Item	Total Cost	
	EDM	IDM
Demand Management Programs*	$0	$0
Source Supply	$200,000	$200,000
Water Treatment	$60,000	$60,000
Water Transmission / Reservoirs / Distribution	$2,030,000	$2,030,000
Total Estimated Cost	**$2,290,000**	**$2,290,000**

* Demand management costs are included in the Chapman Water System Strategic Plan

IDM is estimated have the same overall cost as the EDM condition for the small water systems. The cost savings are mostly realized in the work saved in the Chapman water system.

Preliminary 10-Year Capital Plan

The CRWP concludes with recommendations for priority work for the intensive and existing demand management scenarios presented as a preliminary 10-year capital plan. The intensive demand management scenario is recommended for the SCRD due to reduced costs as well as a timeframe where certain immediate upgrades to the system are delayed so that costs are spread out and more manageable for the SCRD.

Note that the detailed business / financial plan and rate structure design will be part of a separate document. The plan totals $30.5 million, as summarized in Table 1-5.

TABLE 1-5
PRELIMINARY 10-YEAR CAPITAL PLAN RECOMMENDATIONS

Recommendation	Construction Target	10 Year Capital Cost
Demand Management		
Implementation of Stage 2 and Stage 3 water sprinkling restrictions with enforcement	2014-2015	$ 120,000
Install Universal Metering	2014-2015	$ 5,280,000
Metering - Reading, Data Entry, Billing and O&M costs	2014-2023	$ 1,470,000
Assess Futher Demand Management Strategies	2014	$ 40,000
Additional Intensive Demand Mangement Programs	2019	$ 250,000
Water Source		
Obtain permits for floating pump station or alternative system	2014	$ 20,000
Construction of floating pump station or alternative system	2015	$ 660,000
Upkeep of floating pump station or alternative system	2016-2023	$ 320,000
Groundwater test drilling program	2016-2017	$ 300,000
Obtain property rights for construction of man-made lake	2021	$ 50,000
Small Systems: Groundwater Investigation to find suitable additional wells for Eastbourne	2019	$ 100,000
Small Systems: Complete Source to Tap Assessments and Well Protection Plans	2014	$ 100,000
Water Quality		
Initiate Pre-Design Study for Chapman Water Treatment Plant Expansion	2019	$ 100,000
Construction of Chapman Water Treatment Plant Expansion to 37.5 ML/d	2020-2021	$ 6,400,000
Small Systems: Automation of chlorination at the Soames Point Well	2018	$ 30,000
Small Systems: Pre-Design for Treatment Expansion at the Eastbourne Wells	2020	$ 30,000
System Infrastructure		
Chapman Transmission Main Upgrades (see Table 8-3)	2016	$ 2,100,000
Chapman Fire Protection Upgrades (see Table 8-5)	2017-2021	$ 11,000,000
Eliminate dead ends in the Chapman distribution system	2018-2023	$ 900,000
Small Systems: Annual check for interconnectivity	2014-2023	$ 100,000
Small Systems: Fire Protection Upgrades (see Table 9-2)	2016	$ 880,000
Small Systems: Eliminate dead ends	2017-2022	$ 300,000
	TOTAL	**$ 30,550,000**

Overall, the RWSA is well managed. The SCRD management team should be supported in their ongoing work to better the water supply service to the communities it serves.