

Area A Water Master Plan

Executive Summary

Increasing demands, changing standards, heightened public expectations and concern for the environment culminated in a unanimous support to develop a master plan for drinking water supply for the Electoral Area A of the Sunshine Coast Regional District. Moreover, the Environmental Appeal Board ruling on the Hotel Lake license transfers Public Hearing in 2005 requires the SCRD to conduct a water master plan to support the transfers. Ministry of Environment hence adopted a position that current and future applications for water extraction from any of the lakes must be supported by a Water Master Plan.

A Core Group representing major stakeholders was appointed by the Area A Director as a study group to provide well rounded input to the development of the plan and Acroloxus Consultancy was retained to facilitate the process. The main purpose of the report is to provide a framework outlining tasks and related schedules to address the various needs for both community and individual systems as projected by the Core Group.

This report addresses the water needs for residents of the entire Electoral Area A (Appendix B, Map 1). The Electoral Area A Official Community Plan boundary, with the addition of Nelson and Hardy islands, was selected as the focus area for this initiative as the majority of known water systems are located in this area (Appendix B, Map 2). The area is exceptionally rich in fresh water resources but it is also extremely fragile in (some) fish habitat and biodiversity. The study identifies 11 lakes that may function as community supply sources (section 1.1).

At the present time at least eight community water supply systems and a large number of individual private systems and small systems meeting the definition of a water supply

system as per the Drinking Water Protection Act are identified in the focus area. Purveyors include the SCRD, SPHWD, Clear Water Utilities and a number of voluntary community groups. While respective strengths and weaknesses may vary, common emerging issues include:

- Projected growth and corresponding need for increased water supply
- Health related water quality, such as arsenic concentrations in well water, and corresponding funding requirements
- Infrastructure improvements requirements
- Management capacity and corresponding liability
- Availability and policy limitations of grant funding
- Drinking water source protection

The study adopts the following goals and objectives as guidelines for the master plan:

- Provide high quality drinking water, complete with multi-barrier protection, for residents of Area A in accordance with community requirements.
- Design and implement systems that are supported by scientific studies.
- Develop a phased implementation plan that is practicable, cost effective, and environmentally sustainable.
- Pursue, with diligence, Federal and Provincial funding sources, and promote partnerships with universities to maximize funding and learning opportunities.
- Implement water conservation programs to maximize life and functionality of infrastructure.
- Create a forum for ongoing public outreach and consultation.
- Satisfy the requirements of the Environmental Appeal Board.
- Protect drinking water source areas.
- Promote green infrastructure development and implementation of related Best Management Practices.

In developing the master plan the report takes into consideration the following factors:

- Boundaries as defined by watersheds, jurisdictions and OCP's
- Future development and water needs
- System improvements – including potential integration and collaboration
- Water demand management
- Source protection
- Funding alternatives

Based on these considerations service envelopes are identified as system identities to facilitate the organization of tasks. Some assumptions are made, on a without prejudice basis, with respect to amalgamation and sharing infrastructure to maximize economies of scale. Such amalgamations are predicated on written requests being received by the SCRD. Subsequent approval in principle will trigger various technical and feasibility studies to support any final decisions that may be rendered by the SCRD Board. The matrix provided in Appendix C summarizes the long and short-term tasks proposed to achieve the goals identified by the Core Group. Standard tasks typically include:

- Preliminary feasibility to identify costs and key issues
- Hydrological and biological studies as required
- Assessment of integration opportunities
- Final feasibility study
- Implementation of plans and programs

Common to all initiatives is a concerted effort to pursue grant funding from federal government, provincial government, and institutional sources. While many of the short-term tasks have either been initiated already or their initiation is imminent, it has been identified that the long-term program will entail comprehensive studies on the various watersheds to determine the optimal long term water supply capacity of an integrated watershed with minimum acceptable impact on the environment. All of the lakes in the

entire Area A will be assessed as an integrated system to support the needs of the communities. Inasmuch as this assessment is a major undertaking for the Area, the important decision in the immediate future is to determine the source of funding for this work. This determination will enable the SCR D to proceed with the development of funding scenarios and the terms of reference for the Sakinaw Basin management study (Appendix C, task S20) in 2007, and perhaps other studies in the future.

In conclusion, the Area A Water Master Plan is the outcome of the collaboration of a group of astute individuals representing significant stakeholder interests in water management within Area A. It provides a work plan to achieve the goals developed collectively by the group. The report also assumes stringent water conservation programs, regular public consultation and a concerted effort to pursue grant funding as matters of regular practice. As economic climate and social environment may change from time to time, the work schedule and nature of specific tasks will be adapted correspondingly. The Area A Water Master Plan should therefore be used as a working document for SCR D staff and be updated on a regular basis.

INTRODUCTION

In recent years, growth and development within Area A on the Sunshine Coast has been increasing at an unprecedented rate¹. With every new development comes increasing pressures on infrastructure and the fundamental necessity of providing a sustainable potable water supply to meet the new demand. Careful long-term planning is required to ensure that future supply fulfils these growing demands and that the quality of drinking water meets acceptable standards. Water consumption must also be measured against the effect that drawing water might be having on the sources of supply and the intricate balance of natural ecosystems.

Drinking water quality is the primary responsibility of the water purveyor. With the new Provincial and Federal legislation demanding progressively advanced treatment standards, water purveyors are expected to install increasingly sophisticated systems to safeguard the health of consumers and protect themselves against potential liabilities. Moreover, the effects of water extraction on the natural functions of intricate freshwater ecosystems are extremely important to local communities. Concerns over water extraction from Hotel Lake led to a special hearing of the Provincial Environmental Appeal Board (EAB) in 2005 (Appendix F). Deliberations by the EAB resulted in a call for a Water Master Plan before any additional long-term extraction would be approved. The appeal to the EAB in 2004 on the transfer of Hotel Lake licenses also exemplifies the public's desire to protect the environment. Safeguarding the environment frequently entails protecting the source of natural resources from damage and contamination. Careful planning and comprehensive scientific analysis are therefore a necessary prerequisite to sustainable development.

¹ Electoral Area A is the fastest growing Electoral Area on the Coast. In 2005, 17 of the 42 subdivision applications were in Area A and 163 of the 300 parcels created were in Area A. Area A currently has the second highest assessment on the lower Sunshine Coast (second only to District of Sechelt).

The importance of planning and scientific analysis was a dominant theme of the Sunshine Coast Water Summit held March 22-23, 2006. The event, sponsored in part by the SCRD, brought together scientists, water management professionals and over 80 local stakeholders to discuss water issues and identify actions required to develop a draft Water Management Framework for the entire Lower Sunshine Coast. The subsequent report entitled “A Framework for Creating a Sunshine Coast Water Master Plan” (Appendix N) provides a summary of proceedings from the Water Summit and represents a source of public input on water development planning.

As a local government, the Sunshine Coast Regional District (SCRD) has the interest of the entire Area A at heart. A planning framework has to be developed to address the needs of all of its tax-payers, including both public and private systems. This document is the outcome of an inclusive planning process involving various stakeholders. It is hoped that this document may serve as a template for future development of a Water Master Plan for the Lower Sunshine Coast.

1. BACKGROUND

1.1 Demographics, Hydrology and the Geographic Setting of Area A

Area A is located on the Lower Sunshine Coast (see Map 1 in Appendix B) and is bounded by the Jervis Inlet to the North, the Malaspina Strait to the West, the Caren Range and Sechelt Inlet to the East and Secret Cove to the South. Map 2 in Appendix B identifies the focus area for the Water Master Plan. The area is exceptionally rich in fresh water resources, has many parks and considerable shoreline; and is a popular tourist destination for much of the year. The area has a complex surface and groundwater hydrology with numerous lakes connected by an arterial network of streams, creeks, aquifers and spring water sources. Moreover, Ruby Lake and Sakinaw Lake are two large lakes in the area that support significant federally- and provincially-listed fish populations.

LAKE MORPHOMETRIC DATA*						
Lake	Area (ha)	Volume (x 10 ⁵ m ³)	Maximum Depth (m)	Mean Depth (m)	Watershed Area (ha)	Lake Retention Time (yr)
Garden Bay	62	110	52	18	315	3.9
Hotel	26	17	11	7	112	1.4 ?
Katherine	6	5	-	8	97	0.6
McNeill	18	7 (est)	12 (est)	4	3092	0.02 (8 days)
Mixal	44	45	25	10	256	2.0
North	40	21 (est)	16	5	338	0.7
Paq	12	3	4	2.5	135	0.2
Ruby	456	2500	112	55	2144	13
Sakinaw	686	3500	140	51	4190	9.3
Waugh	76	50	31	7	738	0.8
Klein**						

Mean depth (m) = lake volume / surface area of lake

Lake Retention Time (yr) = lake volume (m³) / total water inflow (m³/yr)

Total water inflow (m³/yr) = watershed area (m²) x runoff coefficient (estimate 0.93 m³/m²/yr)

* Extracted from 1992 report prepared by Westland Resource Group, Victoria, B.C. for SCRD

** Data not available

The population of Area A (about 2,400 according to the 2001 census²) is dispersed throughout the area, with concentrations in the communities of Madeira Park, Garden Bay, Kleindale, Irvine's Landing and Egmont. There are also numerous pockets of population in the rural regions of Area A. The overall population is easily doubled when seasonal dwellers return to their vacation properties, without even considering tourists.

While steady growth is forecast over the next ten years for the entire Sunshine Coast, it is anticipated to accelerate most in Area A. Within Area A, however, rates of growth vary widely from high-growth residential areas in South Pender Harbour and Garden Bay to low-growth rural areas. Potential growth areas requiring community water systems are shown in Map 4 of Appendix B.

The water master plan for Area A should therefore address both long-term and short-term supply of good quality drinking water for all residents in the area while maintaining the integrity of natural eco-systems. The Plan must also identify timing of future planning and implementation to match spending with actual needs.

1.2 Legislative framework

Water purveyors share responsibility for the protection of drinking water with the Ministry of Environment, Provincial Health and Local Authorities. Several legal instruments govern drinking water protection, including but not necessarily limited to the following:

- The Provincial Groundwater Protection Regulation 2004
- The Drinking Water Protection Regulation 2003 (effective December 2005)
- The Drinking Water Protection Act 2001 (came into force May 2003)
- The Provincial Fish Protection Act 1997
- The Water Protection Act 1996

² http://www.scrd.bc.ca/the_board.html

- The Health Act 1996
- The Fisheries Act 1996
- Navigable Waters Act
- (Various) Municipal and Zoning by-laws

In Area A, the primary responsibility for monitoring drinking water rests with the Drinking Water Officers appointed by the Vancouver Coastal Health Authority under the provisions of the Drinking Water Protection Act.

1.3 Need for new infrastructure

As communities evolve and demographics change, the manner in which drinking water is provided must also change, and a plan to facilitate the orderly implementation of change is absolutely essential. The compelling reasons that are driving the need for change are as follows:

1.3.1 Increased Public Expectations in Water Quality and Environmental Protection

With an increasingly health-conscious society, clean air and fresh water are seen as essential elements of a healthy environment and healthy living. Corresponding expectations of the water purveyors and local governments to provide better services are also perceived to be increasing at the same pace. To meet such expectations purveyors must have trained individuals to manage and operate the systems.

Recent incidents of water contamination in other provinces further intensified the demand for higher standards and concern of potential liability. The management paradigm must change from "...volunteers and bare minimum..." to "...professionals and multi-barrier protection..."

1.3.2 Requirements of New Legislation

The goal of the Provincial Government with respect to water quality has been clearly defined by way of new legislations. The Drinking Water Protection Act (2001) established definitive responsibility and decision-making within government for safe drinking water in B.C. The amended Drinking Water Protection Act (2003) came into force on May 16, 2003, replacing the Safe Drinking Water Regulation under the Health Act. These new measures govern drinking water from “source to tap” and are designed to better protect the health and safety of British Columbians. Under this legislation, the Ministry of Health Services will provide leadership and assume ultimate responsibility for providing safe drinking water for British Columbians. In addition, the Provincial Health Officer will ensure the accountability of government and those delivering drinking water. The legislation will:

- Make public health the priority and guiding principle for decisions related to drinking water.
- Establish the Ministry of Health Services as BC’s lead agency for drinking water.
- Strengthen the role of the Provincial Health Officer in monitoring and reporting regularly on drinking water and public health protection.
- Establish new drinking water officers across the province, with authority to investigate complaints, require testing and assessment, perform inspections, co-ordinate source protection, and take other steps to ensure water safety.
- Provide for a source-to-tap assessment of all drinking water systems in BC, starting with systems that may pose the highest risk to users.

According to the new legislation, regional Drinking Water Officers will work together with water purveyors to assess the needs of individual waterworks and implement the most effective approach to safeguard water quality and public health in BC

communities. By bringing into force the Drinking Water Protection Act and new regulations, the government is establishing an entirely new regulatory framework in BC.

The Guidelines for Canadian Drinking Water Quality (2003 Revision) are not a legal requirement but have been followed in Victoria as if they are compulsory to ensure the best standards are adhered to. Schedule A of the Drinking Water Protection Regulation also establishes water quality requirements for providing potable water.

1.3.3 Role of the Federal Government

The Federal Government has also demonstrated its health and environmental objectives by allocating significant amount of grant funding to “green” initiatives aimed at improving quality of life in rural communities. Major funding programs are being implemented through the Federation of Canadian Municipalities under the Green Municipal Fund and in partnership with the Provincial and Local Governments under the Rural Municipal Infrastructure Program. These programs will enable communities such as Area A in the Regional District to fulfill their need for good drinking water.

1.3.4 Growth and Development

Area A has evolved from a small rural cottage country to a modern rural community with considerable new and large homes. Next to the District of Sechelt, Area A has the second largest tax roll assessment in the Regional District. Infrastructure for the area, however, has not kept pace with this evolution.

The Egmont/Pender Harbour Official Community Plan (2004)³ reflects community values and draws on existing technical analysis to guide future development in Area

³ Available at <http://www.scrd.bc.ca/documents/432%20Area%20A%20OCP%20MASTER%20-20SEPT04.pdf>

A. The OCP should be supported by a Water (among other services) Master Plan thus enabling developers and service providers to anticipate and meet the needs of existing and future communities.

If the current growth rate were to continue, water requirements in Area A are projected to increase by some 5 million gallons per year. The South Pender Harbour Water District (SPHWD) currently supplies nearly 1000 customers from McNeil Lake and may have capacity for up to 2000 connections. The Garden Bay Waterworks District (GBWWD) is approaching its limit with only 25% to 30% remaining in its license from Garden Bay lake. The SCRD has already reached its current license limit (not counting the licenses transferred from GBWWD) in water extraction from Hotel Lake to supply its 100+ customers. More importantly, all water purveyors must also address water quality and infrastructure issues.

1.3.5 Environmental Appeal Board Ruling (9 August 2005)

As a result of transferring two Hotel Lake water licenses from Garden Bay Waterworks District to the SCRD in 2004, an appeal under the Water Act was filed with the Environmental Appeal Board (EAB). The EAB conducted a public hearing in January 2005. On 9 August 2005, the EAB handed down its ruling addressing the following issues:

1. From the subject licenses, the SCRD will be allowed to extract from Hotel Lake reasonable current and immediately foreseeable water needs of the Regional District. MOE (Regional Water Manager) will limit the amount of water to be withdrawn from Hotel Lake under the two licenses transferred to SCRD from the Garden Bay Waterworks District (GBWWD) by amending them as found necessary;

2. SCRD will complete the Hotel Lake water balance study within the next twelve months (meaning by the end of September 2006), recommending, among other things, a minimum water level for Hotel Lake as required by Clause (e) of the transferred water licenses;
3. SCRD will complete a master water plan.
4. SCRD will prepare and submit regular progress reports to MOE (Regional Water Manager) on the above tasks, to be completed at intervals to be determined by the Regional Water Manager; and
5. SCRD will make available to the public the master water allocation plan, the Hotel Lake water balance study, and other related studies and progress reports within time limits set out by the Regional Water Manager.

A public meeting was held on 19 October 2005 to discuss water supply issues and the requirements of the EAB (Appendix D). Unanimous support was given at the meeting to proceed with the Master Plan. At the meeting, the notion of forming a smaller steering committee to guide the development of the plan was also strongly supported. Members representing the major stakeholders in Area A were appointed by the SCRD to the committee.

MoE subsequently established that any future application from a water purveyor (SCRD, GBWWD, and SPWD inclusive) for additional water from any of the water bodies in the area must be consistent with the resource planning as outlined in the master plan.

2. Current (2005) Community Water Supply Systems (Appendix B, Maps 5 and 6)

As communities grow and water systems evolve, purveyors are faced with a variety of challenges. Common issues include:

- All surface water supplies in Area A lack multi-barrier protection. None of the systems meet the recommended treatment objectives of 4 log (99.99%) removal or inactivation of viruses, 3 log (99.9%) removal or inactivation of giardia and cryptosporidium and less than 1 NTU turbidity.
- Source water protection and system security are typically inadequate.
- All purveyors lack funding for major capital works.

As reflected in its funding guidelines, the Province encourages the smaller systems to be converted to regional or local government services. Unless such conversions occur, private and Improvement District systems, strata corporations, utilities, and community user group and shared interest group systems are typically not eligible for provincial grant funding. The following table and subsequent summaries describe the existing community water service areas within Area A and related issues:

Reference in Appendix B	Community (Service Area)	Source of Supply	Purveyor	Issues
A, Map 5	Garden Bay	Garden Bay Lake	SCRD North Pender Harbour Water Service Area (formerly Garden Bay Waterworks District)	<ul style="list-style-type: none"> • rapid growth • long-term supply and capital funding • multi-barrier protection • source protection
B, Map 5	Daniel Point/Irvine's Landing	Hotel Lake	SCRD	<ul style="list-style-type: none"> • seasonal water quality • long-term supply and capital funding • multi-barrier protection • source protection
C, Map 5	Madeira Park, South Pender Harbour,	McNeill Lake, Haslam Creek and Harris Lake	South Pender Harbour Waterworks District	<ul style="list-style-type: none"> • seasonal water quality • long-term supply and capital funding • eligibility for grant funding • multi-barrier protection, • source protection

D, Map 5	Cove Cay	Ruby Lake	SCRD	<ul style="list-style-type: none"> • long-term supply and capital funding • multi-barrier protection, • source protection
E, Map 6	Oyster Bay Road south and north	McNeill Lake, Haslam Creek and Harris Lake	South Pender Harbour Waterworks District	<ul style="list-style-type: none"> • perpetual boil water advisory, • substandard infrastructure • multi-barrier protection • source protection
F, Map 6	Dream Valley	Groundwater	Clear Water Utilities	<ul style="list-style-type: none"> • Viability as a business entity • fluctuating arsenic levels
G, Map 6	Egmont	Waugh Lake	Community volunteers	<ul style="list-style-type: none"> • substandard infrastructure • no treatment or disinfection • perpetual boil water advisory • multi-barrier protection • source protection • long-term supply and capital funding
unidentified	Small systems around Sakinaw Lake	Sakinaw Lake	Private Systems	<ul style="list-style-type: none"> • Water quality (arsenic) • source protection
H, Map 6	Jervis Inlet Road	Four Acre Lake	Community volunteers	<ul style="list-style-type: none"> • substandard infrastructure • unlicensed system, no treatment or disinfection • multi-barrier protection, • source protection
I, Map 6	Pender Harbour Secondary School	Groundwater	School District 46	<ul style="list-style-type: none"> • High arsenic levels • no treatment, bottled water supplied
J, Map 6	Middle Point	Groundwater	Private systems	<ul style="list-style-type: none"> • High arsenic levels in private wells • No community system close by
unidentified	Small systems	North Lake, wells etc.	Private systems	<ul style="list-style-type: none"> • surface water source without multi-barrier protection

Garden Bay/Hotel Lake watershed

A. Garden Bay Waterworks District (Garden Bay Lake)

Since May of 2006 the Garden Bay Waterworks District (GBWWD) has been converted to one of SCR D's service areas. The system is to be inter-connected with the SCR D's Irvines Landing (Hotel Lake) water system. The work will commence in the fall of 2006.

The newly formed service area has been named the North Pender Harbour Water Service Area (NPHWSA).

Prior to the integration with the SCR D system, GBWWD operated and maintained a community system in Garden Bay using water drawn from Garden Bay Lake. The watershed contributing to Garden Bay Lake is as shown in Appendix B, Map 3. The system was established in the 1960's and had evolved and expanded as the community grew.

Garden Bay Lake was first established as a water supply source to the St. Mary's Community Hospital (also know as the Old Mission hospital in Pender Harbour) in 1929. The hospital was relocated to Sechelt in 1964. The Garden Bay Waterworks District was incorporated in 1960.

In 1976, GBWWD amalgamated with Scott Bay Waterworks. The Scott Bay Waterworks provided water to Garden Bay properties from a small, gravity fed, wood stave pipe from Hotel Lake. The line was abandoned in 1982 when the network was connected to the Garden Bay system.

At the time of amalgamation (May 2006), GBWWD served approximately 300 residential customers and 14 commercial customers. Potentially, there are another 48 customers that may connect to the system.

During 2005 and 2006, several developers made plans to develop within the service area. As at May 2006, the following developments are in progress:

- Farrington Cove (see Map 4, Appendix B)
 - 54 lots
 - Subdivision approved
 - Services already connected to the system

- Pine Haven/Rockwater (see Map 4, Appendix B)
 - 23 lots
 - Subdivision approved
 - Construction in progress

- Pender Harbour Landing (see Map 4, Appendix B)
 - 40 lots
 - Preliminary layout approved
 - Engineering design in progress

While the Hotel Lake/Irvines Landing and Garden Bay systems are fed by two separate watersheds, the amalgamation provides mutual back-up for peak flow and emergency situations. For the purpose of this report the two systems will be addressed separately. The combined area hydrology will be addressed as Mixal Creek watershed (see Appendix B, Map 3) in a study to be conducted in October 2006.

The water supply from Garden Bay Lake is currently operating at approximately 70% of its licensed capacity. In anticipation of continued water demand from new development, an application was submitted to the ministry of Environment for diversion of another 25 million gallons per year from Garden Bay Lake. The mode of operation and water balance analysis are summarized in the Water Development Plan for Garden Bay Lake (Appendix E).

B. Irvines Landing Water System (Hotel Lake)

This service area encompasses the communities of Daniel Point and Irvine's Landing, identified as the Irvines Landing Water System in Appendix B, Map 5. There are currently 106 customers within the service area, and 146 registered water service connections. Based on the current OCP, this area will support up to 176 future customers (i.e. households), for a total of 322 potential water customers connected to

the system. The final phase of the Daniel Point Subdivision was approved in 2005 and development of 40 lots is in progress (see Map 4 of Appendix B).

To facilitate the anticipated growth in the area, the SCR D made an application in 2003 for an additional 14.0 million gal. per year of extraction from Hotel lake. The application has been held in abeyance pending further studies and a master plan for the area.

In 2004, the GBWWD transferred two water licenses to the SCR D. The licenses allocate approximately 11.3 m gal extraction from Hotel Lake. As a result of the EAB Hearing in 2005 (Appendix F), a water balance analysis entitled Technical Memorandum – Hotel Lake Hydrologic Analysis was completed by Kerr Wood Leidal in August 2006 (Appendix G). Partial transfer was approved to support immediate requirements and such approval is to be re-visited pending completion of a master plan for the watershed (i.e. Hydrologic study of the Mixal Creek watershed).

The combined system, once fully integrated will have two different sources of supply for improved security. The report prepared by Acroloxus in 2005 concludes that the conversion of GBWWD and the integration of the two service areas will also enable the SCR D to operate the system more efficiently (Appendix H).

The area has experienced unprecedented growth in the last 2 – 3 years and it is expected that steady growth will continue in the short and medium terms. While the administrative structure for the newly formed North Pender Harbour Water Service Area is being established, plans are being developed for increased water supply and multi-barrier protection of the water supply.

Emerging issues for Garden Bay, Daniel Point and Irvine's Landing:

- Rapid Growth
- Long-term supply and capital funding
- Current applications for Water licenses and related impact on fish habitat

- Integration of smaller systems (Sakinaw Ridge)
- No multi-barrier protection
- Garden Bay/Hotel Lake physical system integration
- Water conservation and system upgrade
- Source Protection
- No security against intrusion

Opportunities:

- Apply for a license to increase allowable extraction from Garden Bay lake (complete)
- Integrate with Hotel Lake system as back up in the event of an emergency and to improve operating efficiencies (work in progress)
- Pursue a multi-barrier treatment system and grant funding for same
- Apply for a license to extract water from from Sakinaw Lake to service nearby development and provide alternate source upon integration with North Pender Harbour Water Service Area

C. South Pender Harbour Waterworks District

The South Pender Harbour Waterworks District (SPHWD) is the single largest drinking water purveyor in Area A (Appendix B, Map 5). The SPHWD has in excess of 900 customers. Its service area encompasses the Madeira Park and Francis Peninsula areas. Its water supply comes from Haslam Creek and McNeill Lake. Its total consumption in 2004 was 84,505,000 gal. (Bel MK Engineering Ltd.) and it holds two licenses of 73,000,000 gal. each.

The SPHWD has experienced seasonal water quality issues due to the characteristics of raw water drawn from McNeill Lake. Water quality parameters of particular concern include colour, turbidity, total organic carbon, protozoa (*giardia & cryptosporidium*), and disinfection byproducts (trihalomethanes). Colour and turbidity

levels exceed the Guidelines for Canadian Drinking Water Quality (GCDWQ) typically during the months of June to December. Total organic carbon (TOC) measurements exceed the desired maximum levels throughout the year. Treated bacteriological results generally meet the potability standards. Trihalomethanes in the treated drinking water approach the Maximum Acceptable Concentration (GCDWQ) and the Total Trihalomethanes typically exceed the desired maximum during the months of July to October. (Tim Adams, personal communication, January 4, 2007).

The Drinking Water Officer has encouraged the SPHWD to conduct a comprehensive Source-to-Tap Assessment under the Province's revised Drinking Water Protection Act (2003). The Study is currently in progress and is expected to be completed by the summer of 2007. Among the issues to be addressed by this assessment is that of potential amalgamation with the Sunshine Coast Regional District system as directed by the SPHWD Board.

Emerging issues for the SPHWD include:

- Seasonal water quality problems
- No multi-barrier protection
- Source protection
- Lack of access to government infrastructure funding
- Potential amalgamation with the Sunshine Coast Regional District
- Water conservation and system upgrades
- No security against intrusion

Opportunities:

- Implement Source-to-Tap Assessment results and recommendations
- Support of additional growth through existing water licenses
- Consider amalgamation with the Sunshine Coast Regional District and integration with the North Pender Harbour Water Service Area system
- Pursue a new water treatment plant and grant funding for same

D. Cove Cay

The Cove Cay Water System (Appendix B, Map 5), formerly the Cove Cay Water Works (installed in 1978), was acquired by the Sunshine Coast Regional District in 1996. The system serves 88 lots in the Cove Cay Subdivision and holds a single water license allowing the withdrawal of 48,000 gallons per day from Ruby Lake (see Appendix B, Map 3).

The waterworks currently consists of a pump station located on the shore of Ruby Lake that pumps to a reservoir in the Cove Cay Subdivision via a 150 mm D.I. water main. Major upgrading to the pump station and installation of a new 82,000 gallon steel reservoir were completed in 1997. Water treatment consists of chlorination.

Inspection reports filed by the Drinking Water Officer indicate the Cove Cay system has relatively good water quality and poses a low health hazard. However, like other systems in Area A, no multi-barrier protection currently exists on this system and it does not meet the Vancouver Coastal Health Authority's standard of 4, 3, 1 (4 log removal or inactivation of viruses, 3 log removal or inactivation of giardia and cryptosporidium, turbidity less than or equal to 1 NTU).

E. Oyster Bay North and South

Two community drinking water systems located on the north and southwest shores of Oyster Bay, are known problem areas with respect to drinking water quality (Appendix B, Map 6). The 16 properties (14 existing households) along Oyster Bay and Daniel Road north of Oyster Bay, and the 13 properties on the southwest side of Oyster Bay, are presently serviced by privately installed sub-standard plastic waterlines with water supplied by way of a connection to the end of the South Pender Harbour Waterworks District line. The added on part of the system is subject to an ongoing boil water

advisory and does not provide fire protection service (hydrants). A 200 mm ductile iron water main extension to service these community systems with water from the North Pender Harbour Water Service Area is planned to address water quality issues.

Emerging Issues for the Oyster Bay Road residents:

- On-going boil water advisory
- Un-reliable water supply agreement
- Substandard infrastructure
- Growth
- No fire flows

Opportunities:

- Secure water supply from the SCRD (extension of GBWWD system)
- Apply for Federal and Provincial funding to assist with extension
- Secure Fire Flows

F. Dream Valley Cottage Country (Appendix I)

Dream Valley Cottage Country is a 20-strata lot subdivision located 1.4 kilometres north-east of Hotel Lake (Appendix B, Map 6). This subdivision was developed in 1997 with a community water system and sewer system installed. Water is supplied from groundwater wells. Elevated arsenic levels in well water have been addressed through the provision of improved treatment. However, fluctuating arsenic levels is an on-going issue. Presently there are 15 water users on this system with 5 parcels undeveloped. The water system is presently operated by Clearwater Utilities, a private company owned by the developer of this strata subdivision. Due to high insurance cost and lack of economies of scale, Clearwater Utilities believe that the SCRD may be able to operated and manage the system more cost effectively. Consequently, the firm requested the SCRD undertake an assessment of their water system with the intention of taking over this system. This request is attached in Appendix I.

Emerging Issues for the Dream Valley Cottage Country:

- Rising insurance and operational costs
- Disposal of water treatment backwash water
- Fluctuating arsenic levels make treatment difficult
- Source protection
- Growth
- No security against intrusion

Opportunities:

- Dispose of backwash water in sewer system
- Turnover system to the SCRD
- Connect future development to the system

G. Egmont Cove

The community water system for the Egmont Cove is owned and operated by the Egmont Cove Properties Owners Association, a non-profit association, serving approximately 29 residences in the Egmont Road Area (Appendix B, Map 6). The community obtains its water from Waugh Lake and water is distributed without any treatment. Residents possess separate individual licenses.

The community has operated this water system for over 40 years and has been under a boil water advisory for the last eight years. The local health authority has requested that the system be improved to provide treatment / disinfection.

The water distribution system is composed of substandard water mains inadequate for fire protection. Many of the mains and valves are exposed above grade.

The community board is assuming substantial risk associated with health hazards posed by operating a water system with no treatment. Abandoning the water system is not an option that the community would consider.

In 2005, the community requested that the SCRCD take over the system (Appendix J). Staff conducted a feasibility analysis (Appendix K) and provided a number of recommendations to the community. To date, no decisions have been made with respect to turning the system over to the SCRCD or to improve the system independently.

Emerging Issues for Egmont Cove Community:

- Lack of water treatment and on-going boil water advisory
- Inferior substandard infrastructure
- Surface water source without multi-barrier protection
- Growth
- Source protection
- No fire flows
- No security against intrusion

Opportunities:

- Take-over by the SCRCD
- Develop new treatment facility, upgrade infrastructure and pursue grant funding for same

H. Jervis Inlet Road

Approximately one third of the 30 properties along Jervis Inlet Road and Earl's Cove Road are serviced by a 1.5 inch plastic line supplied by Four Acre Lake approximately 2.4 km south of Jervis Inlet Road (Appendix B, Map 6). The water system is presently at capacity and no additional connections are being allowed by the community.

This water system is unlicensed and unregulated. The distribution line is above grade for most of its length, receives damage from freezing and wildlife, and is considered unreliable. The water system presently lacks any treatment or disinfection, and does not support fire protection.

Residents of Jervis Inlet Road and Earl's Cove Road approached the Sunshine Coast Regional District in 1997 about the possibility of extending the Cove Cay Water System to service the properties in question. Following a preliminary feasibility assessment, the SCR D made a successful application for grant funding to further investigate the feasibility of extending water services from Cove Cay and prepare design drawings. This work was commenced in the fall of 2006 and is scheduled to be completed by the end of the year. An additional water license from Ruby Lake may be required to accommodate the proposed system expansion.

Emerging Issues for Jervis Inlet Road community:

- Lack of water treatment
- Substandard and failing infrastructure with limited capacity
- No fire flows
- System is unregulated
- Boil water advisory
- Water license issues
- Surface water source without multi-barrier protection
- Growth
- Source protection
- No security against intrusion

Opportunities:

- Connect to the Cove Cay system and pursue grand funding for same
- Apply for financial assistance from the Province (Planning Grant)
- Take-over by the SCR D

I. Pender Harbour Secondary School

Pender Harbour Secondary School (Appendix B, Map 6) receives groundwater supplied by an arsenic-contaminated well. The current system lacks treatment, and bottled water is provided for drinking. The Sunshine Coast Regional District is considering options for addressing arsenic contamination in the school's water supply.

Emerging Issues for the Pender Harbour Secondary School:

- High arsenic content in water supply
- Source protection

Opportunities:

- Install arsenic removal system or develop alternative water supply and pursue grant funding for same
- Redevelop old water supply from Anderson Creek

J. Middle Point

The Middle Point area has a population of approximately 200 (Appendix B, Map 6). The water servicing for this area consists of primarily private wells and more rarely surface sources. The area typically has either shallow soils covering bedrock or exposed bedrock so many water sources are from wells drilled into the bedrock. Many residents have treatment systems installed. There is, however, the potential for a reduction in the water quality due to naturally variable arsenic levels, treatment maintenance and limitations in the amount of arsenic that treatment units can remove. There are no adequate fire flows to supplement fire protection in this area.

Coast Garibaldi Health, in cooperation with the Ministry of Health and the Ministry of the Environment, conducted testing to assess the extent of arsenic contamination in Area A.

The testing was conducted in 1994 and the report “Well Water Survey for Arsenic in the Powell River and Sunshine Coast Communities of British Columbia”, was completed in April, 1995.

The Middle Point area had 41 wells tested and 21 wells respectively had arsenic content values that exceeded 0.025 mg/L, the maximum value considered safe at that time for drinking and cooking in the CDWQG. Subsequently, the Maximum Acceptable Concentration (MAC) for arsenic in drinking water was reduced to 10 parts per billion or 0.01 mg/L, thereby implicating additional wells with test results in the range of 0.01-0.025 mg/L. It was pointed out in this report that two of the highest arsenic values in the study were found in wells located in the Middle Point area. It appears the deeper wells drilled into bedrock are particularly susceptible to arsenic contamination. All elevated arsenic levels occurred in wells adjacent to the coastline.

Emerging Issues:

- High arsenic content in water supply
- No fire flow storage from water purveyor
- Source protection
- Growth

Opportunities:

- Connect to a community system and pursue grant funding for same

2.1 Small Private Systems

Private and small community water systems in Area A often encounter different challenges. The following table provides an inventory of all known systems that fall under the definition of a water supply system as per the Drinking Water Protection Act

not already addressed in this section. Note that individual descriptions are not provided. The information, however, is provided for reference and future planning consideration.

Inventory of Additional Water Supply Systems*	
Tom & Sherry's Restaurant	Malibu Club Office
West Coast Wilderness Lodge	Green Rosette (Bakery on Skookumchuck Trail)
West Resort	Strongbow Campground
Roadside Grill	Dan Bosch Park
Petrocan	Ruby Lake Resort and Campground
Pender Harbour Golf Club	Katherine Lake Park
"Harperville"	Mount Daniel Resort
Elliot Road	Lakeside Motel
Egmont Fish Plant	Bill Lytwyn Rental Duplexes (beside Mount Daniel Resort)
Egmont Marina and Resort (Backeddy Pub)	

*Supplied by Vancouver Coastal Health.

Private and small water systems with groundwater supplies present specific management challenges. In the Sunshine Coast area, there are several community areas where over 20% of the wells sampled had arsenic values of 0.025 ppm – Halfmoon Bay, Secret Cove, Middle Point, Madeira Park and Kleindale. (Vicki Carmichael, Len Clarkson, 1994) The highest arsenic concentrations detected in the subject study were from wells located in the Middle Point area. Individual home owners typically have limited resources and expertise in seeking treatment. Even if the arsenic concentration is below maximum amount prescribed in the related regulation, it is, nevertheless, a potential health concern to the residents.

Non-cancer effects of arsenic contaminated drinking water can include thickening and discoloration of the skin, stomach pain, nausea, vomiting; diarrhea; numbness in hands and feet; partial paralysis; and blindness. Arsenic has been linked to cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate.⁴

Emerging Issues for private system owners:

- High arsenic content in groundwater supplies

⁴ U.S. Environmental Protection Agency, <http://www.epa.gov/safewater/arsenic/index.html>, Sept. 14, 2006.

- Surface water sources lack multi barrier protection
- No fire flows
- Expensive treatment
- Source protection
- Growth
- No security against intrusion

Opportunities:

- Potential to form of small community systems
- Apply for financial assistance from federal and provincial funding sources

3. Attributes of the Area A Water Master Plan

3.1 Purpose and Format of the Master Plan

The Master Plan is designed to address the scope and schedule of improvements in each identifiable service envelope. For the purpose of this report, a service envelope is defined as a discrete planning area for the provision of water services, and may or may not conform to existing service areas or other jurisdictional boundaries. These envelopes and system improvements will evolve as growth, integrations and amalgamations occur.

There are two key dimensions that drive the improvement requirements and related implementation schedule. One is the service envelope and the other is the time when the infrastructure is projected to be required. The service envelope is a factor of autonomy and purveyor for the respective areas. While supply sources may remain the same for these areas, service envelopes may evolve as systems integrate and organizations amalgamate.

Improvements, however, are a function of system (quality and quantity) requirements and environmental constraints. Improvements are designed to evolve over time to respond to the changing local economy, community expectations and emerging environmental, economical and social issues. The Master Plan addresses the need for community water systems as driven by the OCP. While the systems and the communities may evolve incrementally, the plan reflects the timing as envisaged by the stakeholders. Notwithstanding the independent initiatives of the private system purveyors and water improvement districts, this plan also contemplates a long term model that reflects the integration of systems to optimize economic, social and environmental benefits. This assumption is made to illustrate opportunities to optimize on a without prejudice basis and is not to be construed as any form of commitment.

The Master Plan, therefore, has to be updated correspondingly from time to time. Moreover, standard practice embodied in this master plan calls for an inclusive and consultative planning process, followed by diligent pursuit of external funding and comprehensive study of the freshwater and ecological systems potentially affected by water extractions by the communities. When systems are installed and fully functional, the standard operating program will include water audits, water conservation, metering, watershed protection and development of an emergency response plan. Being a relatively small and remote area, comprehensive scientific data is not available for most of the watersheds in Area A. Ongoing monitoring and data collection will also be pursued as widely as practicable.

3.2 Methods and Approaches

As recommended by the residents at the public meeting on 19 October, 2005 (Appendix D), the SCRD adopted a collaborative, inclusive and inter-active process engaging all major stakeholders, using a strategic planning approach. Input has been provided by a steering committee comprised of representatives of Provincial Health Agencies, DFO, Sechelt Indian Band, environmental groups (NGO's), Water Improvement Districts (SPHWD), the local planning community (Advisory Planning Commission) and the SCRD (Appendix A). Two workshops with the steering committee were held to compile input from various sectors. The master plan thus reflects community expectations, regulatory requirements, stakeholder input, as well as the requirements (and terms of reference) for future scientific studies as necessary.

The SCRD also supports the Provincial objectives as reflected in its regulations and policies. As a current practice, the SCRD responds to requests for takeover from private and small systems, which trigger a feasibility analysis and subsequent action as warranted. The SCRD's mechanism for responding to requests for takeover is as follows:

1. SCRD receives a request for takeover of the water system from private or small water system(s).
2. SCRD staffs conduct preliminary review of options and feasibility analysis and present to SCRD Board and system users for review.
3. System users review preliminary analysis and advise SCRD if/how they wish to proceed (e.g. self finance and implement immediately, request application for grant funding to offset development costs, etc.).
4. If immediate implementation desires, SCRD proceeds to engineering design, permit applications, and water license applications if necessary.
5. If grant funding requested, SCRD makes application to the Province's Planning Grants program to support detailed feasibility study, engineering and design work. Once completed detailed design work will be used to support applications to capital grant programs if available.
6. For Improvement Districts, a vote is held amongst members to determine support for takeover. If supported, a report is taken to the SCRD Board and forwarded to the Ministry of Community Services to trigger an Order In Council for dissolution of the Improvement District.
7. Applicable Bylaw(s) are amended to include new users in existing service area or to create new service area (as necessary).
8. Once SCRD ownership and financing are secured, construction is scheduled and completed.
9. System users are now SCRD customers, pay user fees to SCRD and are subject to SCRD regulations.
10. SCRD includes new users in program delivery (e.g. Water Conservation Program, Source Protection Programs, Emergency Response Planning, etc.)

Irrespective of the proposed timeframe herein, “trigger” events, such as petitions from the communities, may warrant a change to the implementation schedule (Appendix C).

3.3 Goals and Objectives

In developing the plan to provide potable water to the communities, careful consideration must be given to protecting the sources of supply, maintaining the functional integrity of freshwater ecosystems and to ensuring enough water is available to protect fish habitat. The over-arching goals and objectives of the Master Plan are as follows:

- Provide high quality drinking water, complete with multi-barrier protection, for residents of Area A in accordance with legislative and community requirements.
- Design and implement systems that are supported by scientific studies.
- Develop a phased implementation plan that is practicable, cost effective, and environmentally sustainable.
- Pursue, with diligence, Federal and Provincial funding sources, and promote partnerships with universities to maximize funding and learning opportunities.
- Implement water conservation programs to maximize life and functionality of infrastructure.
- Create a forum for ongoing public outreach and consultation.
- Satisfy the requirements of the Environmental Appeal Board.
- Protect drinking water source areas.
- Promote green infrastructure development and implementation of related Best Management Practices.

3.4 Significant Considerations

The significant issues to be addressed in each of the planning modules will include, but are not necessarily limited to the following:

3.4.1 Establishing Boundaries

- Physical boundaries need to be established within Area A that delineate the basins of drinking watersheds with community water supply systems and to identify sources of water that feed them. (Appendix B, Map 3)
- Jurisdictional boundaries also have to be established that show existing governance and spheres of influence of different organizations. (Appendix B, Map 5)
- Land use designations and subdivision districts that require community water supply, as reflected in the OCP (Appendix B, Map 4)

3.4.2 Future Development and Water Needs

- The OCP will be used as a guide for the future development of water systems in Area A.
- Growth statistics from existing reports will be considered to establish future infrastructure requirements.
- While various boundaries are instrumental in delineating short-term service areas, system limitations and priorities, long-term servicing scenarios may integrate the area and dissolve some of the boundaries.
- An assumption is made that water conservation measures will be implemented to reduce per capita consumption and hence the future system capacity requirements.
- An assumption is made that drinking water source protection measures will be implemented to reduce the impacts of existing and future development on drinking water source areas.

3.4.3 Considerations for system improvements

In the development of system improvements, primary considerations should include:

- Potential interconnection and collaboration between water purveyors in different watersheds to allow for greater efficiency and flexibility in water management.
- Hydrological studies to investigate existing and new sources. As required by the Ministry of Environment, a water balance study (or a Water Development Plan) must be conducted to identify impacts and implications of each initiative. Furthermore, a minimum acceptable lake level of each contributing lake should be identified, beyond which extractions should be curtailed.
- Mitigative measures may be considered to facilitate the storage of winter runoff for summer supply. The environmental effects of flooding must be explored as and when future dam projects are proposed. Moreover, designs must take into consideration the protection and preservation of fish habitat, instream flows and downstream water licensee requirements.
- Ongoing compilation of appropriate data, such as rainfall, temperature and lake outlet levels, should be conducted as part of the operating program. This data will provide for future refinement of water balance estimations as affected by evaporation, infiltration and exfiltration.
- Use of existing data on fish populations and effects of water levels and flows on fish populations. DFO and MOE Habitat Biologists will need to be consulted to assess and recommend minimum instream flows based on the species-specific composition of the lakes and/or streams impacted by proposed water licenses.
- Potential sources of environmental contamination, such as heavy sedimentation from roads, will be examined and prevented wherever possible.
- Applications for future water licenses must include an assessment of ecological impacts and the potential impact on other end-user licensees. Any mitigative plans must be approved by appropriate agencies.
- Exploration of groundwater sources (including treatment of arsenic contamination in well water if necessary) as alternate supplies.

- Provision of conceptual designs and order of magnitude cost estimates for future projects are to be provided to facilitate system planning (based on the aforementioned consideration).
- Examination of existing water licenses to identify dormant licenses that are not in use and should be revoked for lack of use as permitted under the Water Act
- Development of an inventory of existing dams, their location and storage potential.

3.4.4 Water Demand Management

- Water conservation and demand management will be pursued as a management strategy in order to maximize existing and future water supply capacity and the functionality of existing and future water treatment and distribution infrastructure.
- All parcels connected to the SPHWD system are subject to sprinkling restrictions specified by the District. For more information visit the SPHWD website at www.sphwd.ca.
- All parcels connected to a SCR D water system are subject to the SCR D's Water Conservation Program that includes water conservation rules and regulations (e.g. Drought Management Plan, sprinkling regulations) and will benefit from water conservation programs, including public education initiatives and informational programs, fixture replacement programs and incentives and awards programs. For more information visit the SCR D water page at www.scrd.bc.ca/infrastructure_water.html.

3.4.5 Source Protection

- Water purveyors will work closely with the Drinking Water Officer to develop and implement drinking water source protection programs with the goal of minimizing risks associated with contamination of drinking water source areas.

- Source protection measures may vary amongst water systems and will be developed on a system-specific basis. Examples of potential measures include signage, vehicle barriers adjacent to water bodies, contaminant monitoring programs, government incentives for protection of riparian areas, and new legislative requirements for new developments.
- SPHWD is in the process of completing a comprehensive Drinking Water Source to Tap Assessment. The study will likely be completed by the summer of 2007 and used to develop source-to-tap protection measures for the District. These measures may serve as an example for other water systems in the area.

3.5 Funding Alternatives

In addition to the issues outlines above, each section of the Master Plan shall address funding alternatives. Without limiting the generality of the foregoing, the following alternative should be diligently explored.

- Federal/Provincial Infrastructure Grant Program Funding (research grants)
- FCM Green Municipal Fund
- Provincial Funding – Planning Grant, New Deal, etc.
- Property Tax
- User Fees
- Connection Fees
- Development Cost Charges
- University funding sources
- Students and volunteers
- Local industry, public private partnerships, etc.

4. Tasks and Timing

Appendix C presents a Gantt chart identifying tasks arranged by service envelopes and year when the tasks are expected to be conducted. This section provides a description of the tasks identified for each service envelope. Individual tasks are labeled (e.g. A1) to allow cross-referencing with the chart in Appendix C.

4.1 Service envelope – North Pender Harbour Water Service Area (Hotel Lake/Garden Bay Lake/Mixal Creek watershed)

This envelope includes the two service areas previously known as Garden Bay Waterworks District (GBWWD) and Hotel Lake/Irvine's Landing service area. This region is identified as a top priority because of high development, supply limitations and Hotel Lake sensitivity issues as identified at the EAB Hearing.

The GBWWD approached the SCRD in 2004 to discuss converting the improvement district to one of the services provided by the Regional District. The parties conducted a comprehensive feasibility analysis (Appendix H), including a business plan for the amalgamated organization.

The process was concluded when the GBWWD received majority support from its members via a mail in vote for the proposed amalgamation. Final approval of the order in council was received in May 2006. Details of the process are in the final report prepared by Acroloxus and are available at the SCRD Offices. The SCRD Board supported the formation of the North Pender Harbour Water Advisory Committee to liaise with the community.

Ongoing and future tasks identified in Appendix C include:

- **Application for 14 m gal from Hotel Lake (A3)**

Prompted by the proposed Daniel Point development, application was made in 2003 by SCRD to extract 14 m gal annually from Hotel Lake. The application met with considerable public opposition and the Ministry decided to hold the application in abeyance pending completion of further studies to support the application. Decision on this application will be made in conjunction with other applications for this service envelope described hereinafter.

- **Hotel Lake Hydrologic Study (S1)**

A water balance study of the Hotel Lake system is to be completed by September 2006. Outcome of this study will enable the Ministry of Environment to proceed with further consideration of the Hotel Lake Application.

- **Application for 25 m gal annual extraction from Garden Bay lake (A4)**

Due to the expected growth in the area, the SCRD and GBWWD made applications to the MoE in 2006 for an additional 10 and 15 m gal annual extraction respectively from Garden Bay lake. Review of the applications is pending submission and review of the Mixal Creek water hydrologic study.

- **Transfer of water licenses from GBWWD to SCRD (A4)**

In 2004 GBWWD transferred two existing (Hotel Lake) licenses to the SCRD. Such transfer resulted in an appeal to the Environmental Appeal Board (EAB) under the Water Act. The EAB conducted a public hearing in January 2005 and rendered its decision in August 2005. (Appendix F) One of the decisions deals with the need to conduct a Master Plan study. While the Water Master Plan for the entire Area A is underway, the Ministry of Environment is prepared to accept the Mixal Creek Study as a master plan to provide greater perspective for these licenses.

- **Mixal Creek Hydrologic Study (S2)**

The Mixal Creek watershed encompasses both the Garden Bay Lake and the Hotel Lake watersheds (Appendix B, Map 3). Outcome of this study will enable the

Ministry of Environment to proceed with further consideration of the Hotel Lake Application, Garden Bay Lake applications, and the Hotel Lake transfers from GBWWD. The work has been initiated and is expected to be complete by the end of 2006 or early 2007.

- **Sakinaw Lake Application (A5)**

As prompted by the Sakinaw Ridge development near Sakinaw Lake (see Map 4, Appendix B) SCRD is in the process of making an application to extract 11 m gal from Sakinaw Lake. If successful, this license will negate the need to draw water from a shallow well for the development. The intent is also to integrate the Sakinaw Ridge system with the Hotel Lake system so as to provide better emergency support and establish a more robust supply system. The study has been commissioned and it is expected that the application will be filed in November or December of 2006.

It is also intended that if this application is approved the two licenses transferred from GBWWD can be withdrawn, thus reducing any potential impact on Hotel Lake and neutralizing the impact on the Sakinaw watershed.

- **Sakinaw Lake Hydrologic Study (S4)**

The Sakinaw Lake watershed encompasses a large area around Sakinaw Lake (Appendix B, Map 3). The outcome of this study will enable the Ministry of Environment to proceed with further consideration of the Sakinaw Lake Application. The work has been initiated and is expected to be complete by the end of 2006 or early 2007.

- **GBWWD/HL system integration study (S5) and implementation (I2)**

Engineering study of the physical integration of the two networks will be complete in November 2006 and as part of the study a capital program will be developed to integrate the two service areas. Work will commence in 2007 and should be complete by the end of 2007.

- **Conduct Water Audit for GBWWD/HL systems (I1)**

Due to the high per capita winter water use recorded for GBWWD, the SCRD plans to conduct a water audit for the system in order to quantify unaccounted for water and identify potential sources of water loss within the system. Work is scheduled to be conducted in March and April of 2007.

- **Develop Drinking Water Source Protection Program (S7) and implement (I3)**

Drinking water source protection programs will be developed and implemented for all systems operated by the SCRD. A program will be developed for the NPHWSA in the fall of 2007 and implemented in early 2008.

- **GBWWD/HL UV treatment (Q1)**

In 2005, GBWWD made successful application for a grant under the British Columbia Community Water Improvement Program, in the amount of \$33,000, to install a UV system in Garden Bay. Approval was received in 2006 and work is being planned as part of the GBWWD/HL integration work. Work will be done in 2007. Note that this project is part of a phased approach to improving treatment for this system but will not meet the 4,3,1 treatment objective for surface water supplies without further improvement.

- **Grant funding applications (A1, A2, A6)**

SCRD is pursuing a number of grant funding opportunities for the Area A service improvement initiatives. While most of the communities in Area A are included in the applications, majority of the grant funding would be allocated to integration and water quality improvements for the high population concentration areas. Funding programs accessible to SCRD are:

- FCM Water RFP, 2006 (A1)
- Canada-B.C. Municipal Rural Infrastructure Fund (CBCMRIF) (A2)
- Municipal Planning Grant (A6)

The SCRD intends to install a multi-barrier treatment system starting in the next 3 to 5 years, potentially servicing both the North Pender and South Pender water systems. This infrastructure project is estimated at 2.0 million dollars and would start in 2009/2010.

4.2 Service Envelope - South Pender Harbour Waterworks District

- **Source to Tap Study (S9)**

Due to the various water quality issues, the SPHWD initiated a complete Source to Tap study which is comprised of 8 modules as specified in the Province's Draft Comprehensive Drinking Water Source to Tap Assessment Guideline. It is projected that the study will be completed in the spring of 2007. The study will address water quality, supply capability as well as governance issues.

- **Feasibility study of alternative supply options (S10)**

In April of 2006 the SPHWD Board of Trustees authorized a ninth module to be added to the Source to Tap study. The new module will evaluate the merits of remaining independent versus amalgamating with the SCRD. Findings of this evaluation will be presented to the ratepayers of the SPHWD in a neutral and unbiased manner.

- **Feasibility study of new water treatment plant (S11)**

SPHWD is planning to conduct an assessment of the feasibility of installing a new water treatment plant to service its customers. The study is expected to commence in the fall of 2007 and be completed by the end of that year.

- **Grant Funding (A1, A2, A6)**

Being an Improvement District, the SPHWD is not eligible for provincial and federal grants. The SCRD may be able to leverage grant funding for SPHWD. However this

eventuality may trigger the need for amalgamation with the Regional District. Funding programs accessible to SCRD are:

- FCM Water RFP, 2006 (A1)
- Canada-B.C. Municipal Rural Infrastructure Fund (CBCMRIF) (A2)
- Municipal Planning Grant (A6)

4.3 Service Envelope – N&S PHWSA

- **Integration of North and South Pender Harbour (I5)**

To optimize economies of scale, particularly in water treatment, the notion integrating the north and south Pender Harbour water service areas was discussed by the Core Committee and was considered to have merit. While decision on integration is not part of the Master Plan, assumption is being made to illustrate a potential timeframe.

- **Water Treatment Plant (Q2)**

Neither the NPHWSA nor the SPHWD system has multi-barrier protection. A new water treatment plant is planned for 2009/2010. In the event that integration is not acceptable to the communities, separate water treatment plants will likely be considered. It is, however, conceivable that they will occur in the same time frame.

- **Grant Funding Applications (A1, A2, A6)**

Due to provincial and federal funding policies, applications are made for the purpose of constructing a water treatment facility that will meet provincial/federal standards. Notwithstanding the funding qualifications (for local governments only) applications under the SCRD auspices are being made on a without prejudice basis.

4.4 Service Envelope - Egmont Community

- **Request to Take Over**

The Egmont community is served by a small, private system with both water quality and supply problems. Residents access surface water from Waugh Lake) by individual licenses through a common network. The infrastructure is sub-standard and is under an ongoing boil water advisory. In 2005, the Community, as encouraged by the Drinking Water Officer, requested the SCRDR to take over its water system.

- **Preliminary Feasibility Study (S12)**

Subsequent to the request to take-over by the community, SCRDR staff conducted a feasibility study in 2006. Decision has yet to be made by the Community to turn over the water system to the SCRDR.

- **Grant Funding Application (A1, A2, A6)**

Based on the assumption that the take-over will occur, SCRDR staff made application under both the FCM GMF and the CBCMRIF on a without prejudice basis. Application to the Province's Infrastructure Planning Grants program in the spring of 2007 is anticipated to fund further feasibility and design work planned for fall of 2007.

- **Final Feasibility and Design Work (S13)**

Should the community elect to proceed with the proposed take-over and system upgrades, a final feasibility assessment, including engineering and design work, will be conducted. This work would likely commence in the fall of 2007 and be completed by the end of that year.

- **New treatment facility (Q3) and replacement of distribution system (I7)**

Should the community elect to proceed, installation of a new treatment facility would commence in March of 2008 and be completed by July of that year. Replacement of

distribution mains and installation of storage reservoirs and fire hydrants would follow with work being conducted in 2008 and 2009.

- **Develop Drinking Water Source Protection Program (S7) and implement (I3)**
Drinking water source protection programs will be developed and implemented for all systems operated by the SCRD. A program will be developed for the Egmont water system in late 2009 and implemented in early 2010.

4.5 Service Envelope - Dream Valley Cottage Country

- **Request to Take-Over**
In 2005, Clear Water Utilities, owner of the water system serving Dream Valley Cottage Country, requested the SCRD to take over the system (Appendix I). It is currently supplied by well water that has unacceptable levels of naturally occurring arsenic in the raw water. These levels do not meet the Guidelines for Canadian Drinking Water Quality, inasmuch as the Maximum Acceptable Concentration was recently lowered from 25 ppb to 10 ppb.
- **Preliminary Feasibility Study (S12) and Final Feasibility Study (S15)**
Subsequent to the request by Clear Water Utilities, SCRD conducted a feasibility analysis (Appendix I). Public consultation is to be initiated and final analysis is expected in 2007.
- **Grant Funding Application (A6)**
Application to the Province's Infrastructure Planning Grants program is planned for late 2006 to fund the final feasibility study.
- **Transfer of assets to the SCRD (I9)**
Should the system take-over proceed following results of the final feasibility study, transfer of assets to the SCRD is planned for late 2007.

4.6 Service Envelope – Pender Harbour Secondary School

- **Water quality issue**

This envelope includes the Pender Harbour Golf Course and Pender Harbour Secondary School and attached Aquatic Centre which take water from a well. The system is not meeting fire flow standards and is contaminated with arsenic. The system is currently on a “Do Not Consume Advisory”. Students at the school are currently being supplied with bottled water.

Dialogue between the School Board, the SCRD and the Drinking Water Officer is ongoing. Different options include investigating the Anderson Creek headwater as a potential source, hooking up with the Petro Canada system, or installing a water line along Highway 101 to service the area from the south. A report on the feasibility of supplying the system from the south was produced in the 1970s in response to a major fire at Pender Harbour High School.

- **Grant Funding Application (A1, A2, A6)**

Applications for grant funding from the Federation of Canadian Municipalities’ Water RFP and the CBCMRIF are being made in the fall of 2006 to help fund treatment upgrades for this system. Application to the Province’s Infrastructure Planning Grants program is anticipated to fund further feasibility analysis.

- **Feasibility Study (S17)**

A feasibility study to investigate options for treating arsenic in the groundwater is planned for early 2008, to be completed by the spring of that year.

- **New treatment facility (Q5)**

Depending on results of the feasibility study, installation of treatment facilities will commence in the summer of 2008, to be completed by the end of that year.

- **Develop Drinking Water Source Protection Program (S7) and implement (I3)**

Drinking water source protection programs will be developed and implemented for all systems operated by the SCRD. A program will be developed for the Pender Harbour Secondary School water system in mid 2009 and implemented in late 2009.

4.7 Service Envelope - Middle Point

The Middle Point area includes many small private systems supplied by wells. There are concerns about shallow wells and arsenic levels in wells. An open dialogue is being conducted by the Area A director with the residents on the need and potential funding of a water line from the Chapman system. Future subdivisions are expected to increase water demand in the area, and might off set some of the capital costs.

- **Grant Funding Application (A1, A2, A6)**

Applications for grant funding from the Federation of Canadian Municipalities' Water RFP and the CBCMRIF are being made in the fall of 2006 to help fund extension of water mains from the Chapman system. Application to the Province's Infrastructure Planning Grants program is anticipated to fund further feasibility analysis.

- **Feasibility Study (S18)**

A detailed assessment of the feasibility of extending water services from the Chapman system is planned for early 2009.

- **Water mains extension (I11)**

Depending on results of the feasibility study, extension of water mains from the Chapman system to service properties in the Middle Point area is planned for the fall of 2009.

4.8 Service Envelope – N & S Oyster Bay

- **Request to join the NPHWSA and preliminary feasibility study (S12)**

Both South and North Oyster Bay residents are on continual boil water advisory because the private lines are not to standard, cannot be flushed and are outside of the District boundaries of the water supplier. These residents are currently customers of the South Pender Harbour Waterworks District (SPHWD). However, they are not within the service area boundaries as defined by its letters patent. In 2003, SPHWD requested that they upgrade the connections to 4 inch pipes under ocean water or leave the system by the end of 2007. In 2005, on behalf the residents, SCRD conducted a preliminary feasibility analysis and applied unsuccessfully to the provincial government for funds to join the Garden Bay Waterworks District. The residents have expressed interest in joining the SCRD system. Infrastructure costs related to joining with the SCRD are estimated at \$500,000.

- **Grant Funding Application (A1, A2, A6)**

As part of the application for grant funding under the FCM's Water RFP and the CBCMRIF the SCRD included this service envelope. Such application, however, does not commit any funding arrangement upon receiving a grant nor does it commit the residents to joining the NPHWSA. Future application to the Province's Infrastructure Planning Grants program is anticipated to support further feasibility and design work.

- **Water mains extension (I10)**

Depending on results of the feasibility study, extension of water mains from the NPHWSA to service the communities of North and South Oyster Bay is planned for late 2007/early 2008.

4.9 Service Envelope – Jervis Inlet Road (Cove Cay) Residents

- **Request for Service and preliminary feasibility study (S12)**

Residents along the Jervis Inlet Road requested the SCRD to extend the water system that currently serves the Cove Cay community. The Cove Cay system extracts water from Ruby Lake. A preliminary feasibility assessment was completed in 1997. In 2006, the SCRD received a Planning grant to conduct further feasibility and engineering design for this initiative. This extension will require amending the current water license.

- **Grant Funding Application (A1, A2)**

Consistent with standard practice, SCRD pursues federal and provincial grant funding (FCM , CBCMRIF) on a without prejudice basis.

- **Feasibility Study (S14)**

Subsequent to receiving a Planning grant, the SCRD is conducting further assessment of the feasibility of extending water services from the Cove Cay system. This work is being initiated in the fall of 2006 and will be completed by early 2007.

- **Water mains extension (I8)**

Depending on results of the feasibility study, extension of water mains from the Cove Cay system to service Properties on Jervis Inlet Road and Earl's Cove Road is planned for the fall of 2007.

- **Grant Funding Application (A7)**

Future grant applications are planned to help finance the installation of a UV disinfection system for the Cove Cay system. Applications are planned for the fall of 2008.

- **Cove Cay UV treatment (Q4)**

Installation of a UV disinfection system for the Cove Cay water system is planned for the spring of 2009. Note that this installation is part of a phased approach to improving treatment for this system and will result in multi-barrier (2 barriers) protection but will not meet the 4,3,3,1 treatment objective for surface water supplies without further improvement.

- **Develop Drinking Water Source Protection Program (S7) and implement (I3)**

Drinking water source protection programs will be developed and implemented for all systems operated by the SCRD. A program will be developed for the Cove Cay/Jervis Inlet Road water system in late 2009 and implemented in early 2010.

4.10 Service Envelope – Small Private Systems

- **OCP requirements**

If warranted, the OCP identifies communities (or clusters of residence) for which a community water system is required. Such areas are not identified in the Plan. However, water supply issues will be dealt with accordingly as development occurs.

- **Individual requests**

As a matter of standard practice the SCRD is receptive to requests from individuals for assistance in addressing water supply and quality issues. SCRD will consult with the Drinking Water Officer and solutions such as service extensions will be explored on a user pay basis.

5. Long Term Water Supply Capability – Sakinaw/Ruby Lake Basin (Appendix C, S19, S20 and S21)

The foregoing service envelopes address current and medium term water quality and growth requirements. As growth in the Area A community continues, longer-term water supply must be addressed in the Master Plan. The overall objective is to monitor and study the scientific parameters of all of the lakes in Area A as an integrated system so as to optimize the long-term water supply capacity while minimizing the environmental impact. Wherever practicable and feasible, consideration should also be given to the enhancement of fish habitat by way of engineered structures.

At the present time the SCRD is in discussion with the University of British Columbia with respect to developing a partnership for the purpose of conducting long term monitoring and scientific data collection for the Sakinaw/Ruby Lakes basin (S20). Data would be used as the foundation for a comprehensive integrated watershed management study. Results of the study would support future analyses of impacts of land use decisions on local watersheds (S21). The terms of reference have yet to be developed, and a feasibility study is planned for 2007 to determine how a new function can be implemented to fund this initiative (S19). Irrespective of the outcome of such discussions, watersheds such as Mixal Creek and the Sakinaw/Ruby Lakes basins, should be studied.

At the present time, the majority of the water supply for Area A is from McNeil Lake, Garden Bay Lake, Hotel Lake and Ruby Lake. Total extraction from the existing licenses amounts to approximately 250 – 275 M gal per year. Assuming full integration of the major community systems, this extraction will provide for approximately 2500 dwelling units. It is conceivable that population on community water will eventually exceed this amount. Additional supply for such growth should therefore be planned and managed in accordance with the objectives outlined herein. Furthermore, existing licenses were issued in the past without in-depth analysis of impacts on the lake

system, riparian ecosystems and the natural environment in general. A comprehensive study of the greater watersheds is therefore deemed necessary to complete the investigations of Area A's potential water supply sources and the related impacts on the natural environment. Based on the OCP, the larger watersheds of significant interest are the Mixal and the Sakinaw/Ruby Lakes watersheds.

5.1 Mixal Lake and Ruby Lake/Sakinaw Lake (Appendix B, Map 3)

Mixal Lake is identified as a potential water supply or water storage source. It is interconnected with Hotel Lake and Sakinaw Lake and has no watershed of its own. Park land fronts onto most of the lake. In the long term, a water supply source study of all the interlinking lakes is recommended to better understand the system as a whole.

Ruby Lake and Sakinaw Lakes are two large water bodies that have been suggested as potential future water sources to supply Area A, and potentially part of the Lower Sunshine Coast, in the longer term. The potential of putting a dam on Ruby Lake has been suggested, however, there are concerns related to the need to maintain sufficient water for fish (including the threatened Sakinaw Sockeye) to migrate to and from the ocean.

A small population of residents takes some water from the lakes. Use of motor boats is currently permitted on both Sakinaw and Ruby Lakes because neither is officially identified as a water source. Development of a source protection program for residents, including a septic tanks awareness initiative, could be most important.

Sakinaw Lake is highly stratified with a salt water bottom and fresh water top, creating the potential for noxious matter welling up near shore. A water balance study was done by Mr. Grant McBain from a fisheries perspective. Complementary studies should be conducted to address other related issues.

5.2 Ground Water (S22, S23)

While there are challenges associated with developing new groundwater supplies (e.g. arsenic contamination, high pumping costs), groundwater represents another potential source for long term drinking water supply in Electoral Area A and, as such, warrants further investigation. Towards this end, the SCRCD proposes to develop an up-to-date inventory of groundwater wells in the summer of 2009 (S22) to support an aquifer mapping initiative to be completed by September of 2010 (S23). Aquifer mapping is recommended as an option to investigate the possibility of ground water sources to supply Area A, and would provide information necessary to conduct a feasibility analysis of developing future groundwater supplies. Provincial funding could trigger a more comprehensive ground water study. Further research into funding opportunities and ideas from the Union of BC Municipalities is also suggested.

6. Conclusions

In conclusion, the Area A Water Master Plan is the outcome of the collaboration of a group of astute individuals representing significant stakeholder interests in water management within Area A. It provides a work plan to achieve the goals developed collectively by the group. The report also assumes stringent water conservation programs, regular public consultation and a concerted effort to pursue grant funding as matters of regular practice. As the economic climate and social environment may change from time to time, work schedules and the nature of specific tasks will be adapted correspondingly. The Area A Water Master Plan should therefore be used as a working document for SCRD staff and be updated on a regular basis.