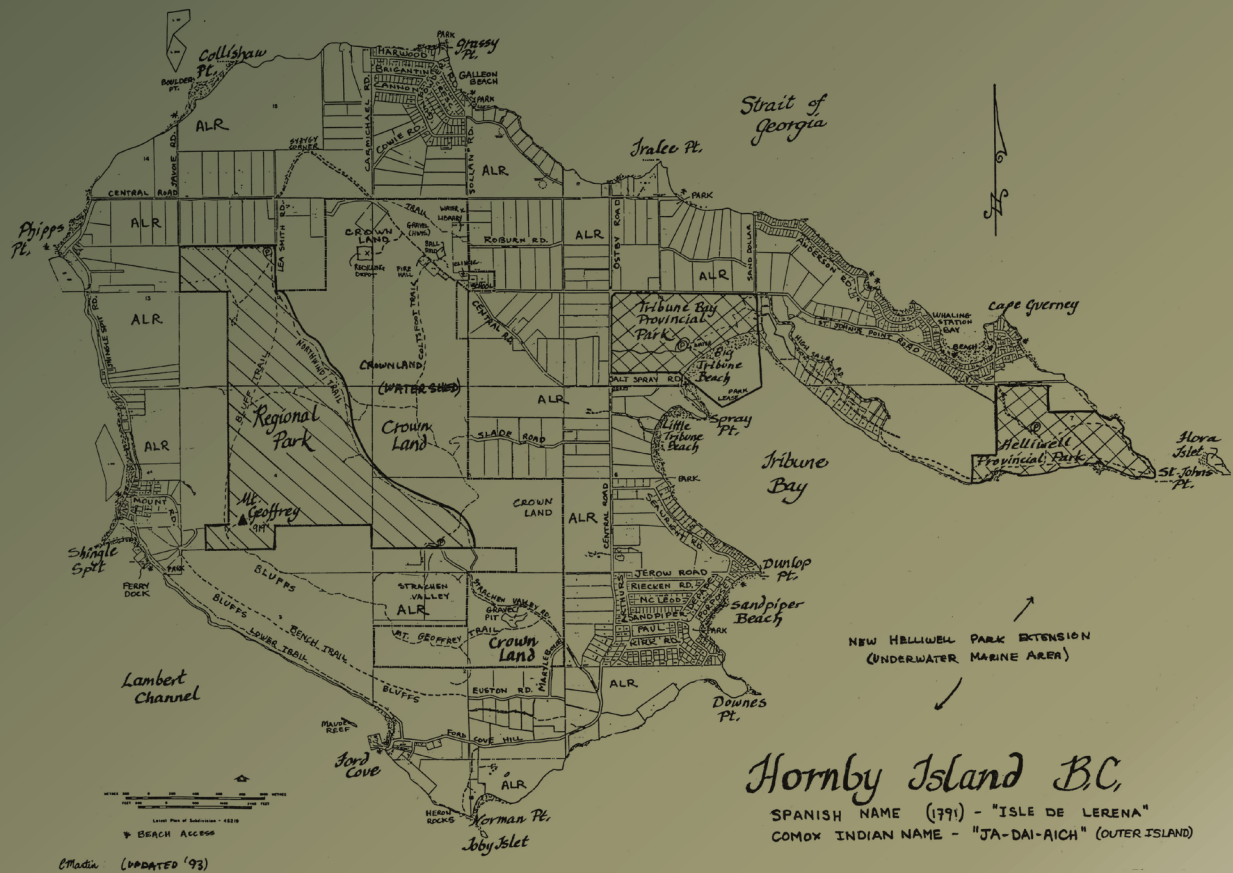


Final Report

Hornby Island

Community Services Study



Prepared for:

CH2M HILL and our associates, consider(s) the data and information contained in this report to be proprietary. This report and any information contained herein shall not be disclosed outside Comox Strathcona Regional District and shall not be duplicated, used or disclosed in whole or in part for any purpose other than to evaluate this report.

Executive Summary

The Comox-Strathcona Regional District (CSRD) retained CH2M HILL to provide technical information related to upgrades and/or changes to the provision of services on Hornby Island. The service enhancements under consideration included:

- Upgrades to the Waste Management Centre (Recycle Depot) with operational enhancements to address operational needs and third party safety assessments.
- On-island septage treatment and disposal opportunities.
- Provision of a community water supply to service individual and/or bulk water sales in a manner that could resolve concerns related to groundwater extraction.
- Infrastructure improvements related to the Fire Hall.

Assessment of CSRD Properties

The CSRD requested an evaluation of the status of properties owned by the CSRD: four properties on Anderson Road and one property on St. John's Point Road. The assessment was to determine the suitability of these properties as sites for new infrastructure and the viability of selling surplus properties unsuitable for new infrastructure. The proceeds of the sales would go to funding the improvements considered in this assessment. Findings from the evaluation indicate the following:

- Various community representatives and property owners have spoken of land use commitments made to them in the early 1970s by the development company that initially prepared the subdivision of the northern portion of the island and by officers of the CSRD.
- Several property owners near to the Anderson Road properties believe that the CSRD has a obligation to maintain these properties in their natural state, and that they have a right to access, in perpetuity, water obtained from wells on these properties.
- Some property owners near to the St. John's Point Road property have spoken of land use commitments by the CSRD and impacts to their properties in the event of changes to the CSRD property.
- None of the CSRD properties would be suitable as locations for new infrastructure or municipal services.
- CSRD has indicated that, in light of the community response, it will not proceed with the sale of these properties. This being the case, the CSRD should designate these properties for use as undeveloped parklands, and complete internal transfers of the properties to the Regional Parks group, which is best able to manage and maintain these properties.

Hornby Island Fire Hall

An assessment to determine the best option for infrastructure improvements to the Fire Hall was performed by reviewing previous work performed by other consultants, reviewing planning history and by soliciting public feedback. Findings indicate the following:

- The CSRD needs to either upgrade or replace the existing Fire Hall.
- Out of the four options reviewed, replacing the Fire Hall on a nearby site (Option 3) is likely the preferred option. This option also garnered the most support from members of the Hornby Island Fire Department.
- The most suitable site for a new Fire Hall is Crown Land presently used as a source of gravel by the Ministry of Transportation and Highways (BC MoTH).
- The new Fire Hall facility should include the building, driveways, aprons, water storage tanks, a gravel training area and a dedicated septic tank and disposal field system.

Community Water Supply

An assessment of the hydrogeologic, technical and economic issues for the CSRD to provide a central well was conducted. Findings from the assessment include the following:

- The CSRD has no obligation to provide water to the public on Hornby Island as the island has not been designated as a service area.
- It would be feasible to locate a community well on the Island. The hydrogeological study concluded that a well producing 0.3 L/s (4 gpm) could be located in the Mount Geoffrey escarpment without impacting the production rates of existing private wells in the area.
- The areas around the existing Fire Hall and the southeast end of the BC MoTH gravel pit would be suitable locations for a community well. Any proposed community well should be located at least 60 m from the nearest existing well.
- A community well and water supply depot would, in effect, be a municipal water distribution system, and the CSRD would be liable for insuring that the water was safe to drink.
- Feedback from the community indicates that further public consultation and discussions are required to reach consensus on the need for a community well.

Waste Management Centre

The CSRD requested CH2M HILL to identify options related to the provision of on-site water supply and sanitation services. Based on a review of existing and future site infrastructure and operations and of public feedback, findings include:

- The CSRD needs to improve the water supply and sanitary services for the staff and the public at the Waste Management Centre.
- Installing a groundwater well would be the lowest risk and most cost effective solution.

-
- Installing a rainwater harvesting system could provide an adequate water supply at slightly higher costs. Rainwater harvesting would meet an objective of the Hornby Island Official Community Plan.
 - A potable water supply for the public may not be needed nor wanted.
 - An on-site ground disposal system, consisting of a septic tank and tile field, is appropriate for the Waste Management Centre.
 - Public feedback has indicated a strong desire for more dialogue about options for upgrades.

Septage Management

The CSRD requested CH2M HILL to evaluate “on-island” alternatives to the current practice of transferring liquid septage to the Comox Valley Water Pollution Control Centre (CVWPCC).

- Four “on-island” septage management options were identified that could be applied to Hornby Island. However, the volume of septage is low, and the economics therefore do not favour on-island septage management and disposal.
- Transferring liquid septage by truck to the CVWPCC still appears to be best option.

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1. Introduction

The CSRD provides a range of governmental services on Hornby Island. Some members of the community have asked the CSRD to consider providing additional services. Additionally, the CSRD is considering enhancements to some of its existing services.

This report contains a summary of the technical issues and costs related to the provision of the following municipal services:

- Relocation of the Fire Hall and the provision of water and sanitary services.
- Improvement of water supply and sanitary services at the Waste Management Centre.
- Provision of a community water well.
- Provision of an “On-Island” solution to septage management and disposal.

1.1 General

The CSRD provides a wide range of municipal services to nine electoral areas and eight municipalities on Vancouver Island and a portion of the coastal area of British Columbia. The community of Hornby Island (shown in Exhibit 1-1) lies within Electoral Area K of the Regional District and receives a variety of services from the CSRD. The Hornby Island community consists of a diverse mixture of permanent residents and “off-island” recreational property owners. Hornby Island’s sand beaches and parks attract a large population of vacationers who spend short periods of time on the island and appear to have a significant impact on the infrastructure and resources available on the island. The main tourist season occurs in July and August although the fringe seasons also attract people who have impacts on water use, wastewater generation and disposal, and solid waste (garbage) generation, handling and disposal.

The community has established the Hornby Island Residents and Ratepayers Association (HIRRA). This non-profit society operates and manages a group of services including the Waste Management Centre (WMC), the Fire Hall (including protective and first responder services), the Community Hall and various comfort stations on the Island through contracts with the CSRD.

In July 2007 the CSRD retained CH2M HILL (with subconsultants Landworks Consultants Inc. (Landworks) and Elanco Enterprises Ltd. (Elanco) for land-use planning and hydrogeology services, respectively). The assignment was to assist in the development of a community servicing strategy to help the CSRD improve existing services and, where appropriate, to implement additional services for the community. The following issues need to be addressed:

- Whether the existing Fire Hall should be upgraded, or whether a new Fire Hall facility better would be of greater benefit to the community.
- Whether there is sufficient need for a community water supply (i.e. a well and related storage and treatment facility) and an appropriate site for such a facility.

- Whether the CSRD ought to provide a public potable water supply, and how the CSRD would manage the issues inherent with such a facility.
- Whether there are options for the provision of a water supply and sanitation facilities at the Waste Management Centre.
- Whether there are options for providing on-island septage treatment and disposal to reduce the volume of septage that gets transported off-island in septage trucks.
- Whether the properties currently owned or leased by the CSRD suit the requirements for the provision of fire protection, water supply, solid waste management, and/or septage treatment and disposal.
- Whether the properties should be sold if deemed to be unsuitable for providing community services and thereby no longer needed.

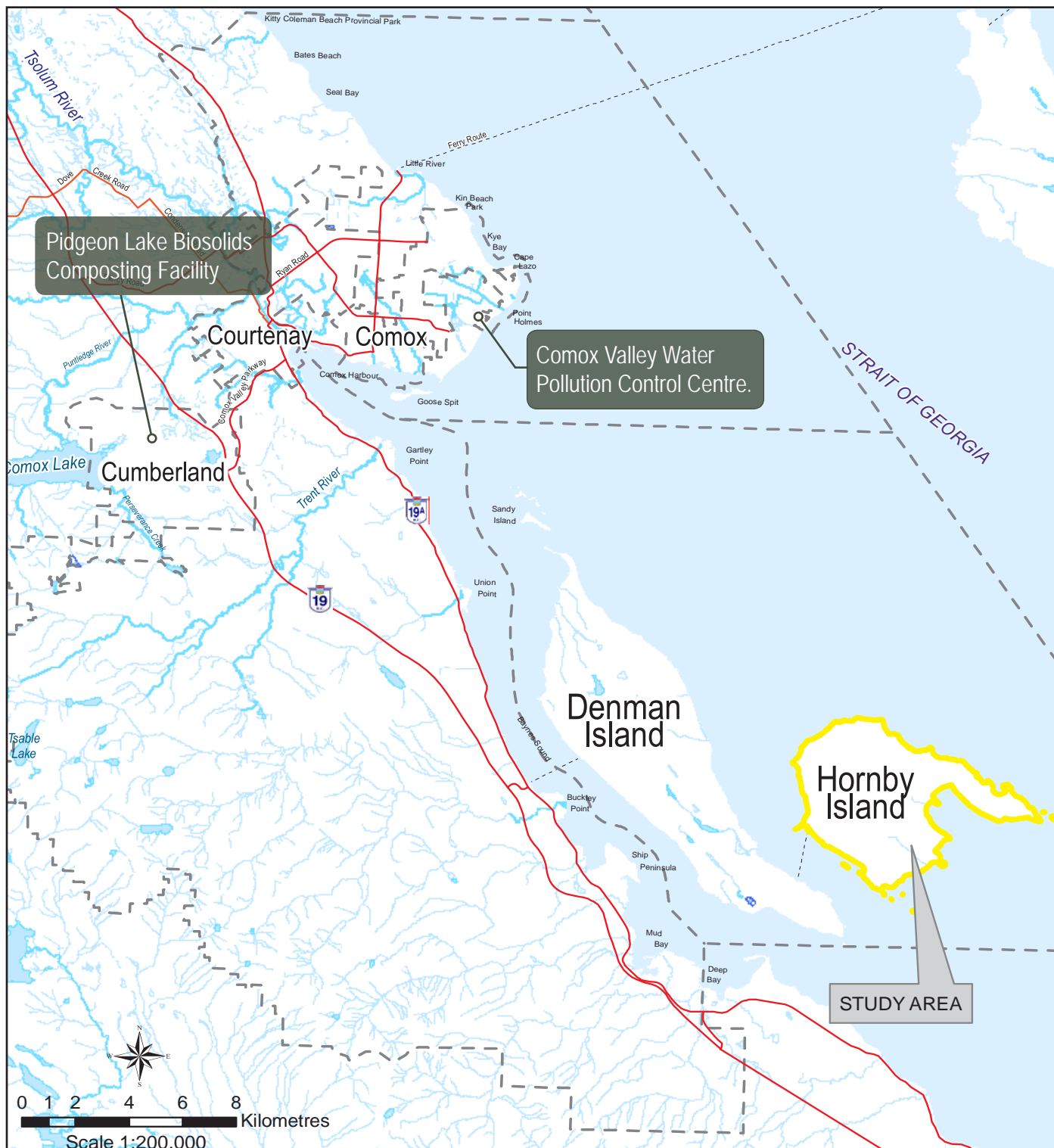


EXHIBIT 1-1
Hornby Island Community Services Study Area

Although the CH2M HILL team involved in this assignment has a professional relationship with the CSRD and includes three Hornby Island property owners, they evaluated and addressed the study's issues from a purely technical/engineering perspective as directed by the CSRD. Some services such as the Fire Hall and Waste Management Centre are mandatory. Other services could be provided in a manner that reflects the needs of the community.

The various segments of the community that would access these mandatory and optional services would ultimately need to cover the cost of the services provided through either a "user pay" scheme or some form of generic taxation in the form of a property tax. This consideration of how to allocate the cost of the services did not form part of CH2M HILL's assignment and will be part of the decision making process within the overall community.

In order to meet the requirements of the assignment, CH2M HILL completed the following activities:

- Met with Regional District staff on the Island to visit key sites and discuss issues related to the assignment.
- Met with the Director for Electoral Area K (Ms. Carol Quinn) to obtain an understanding of the issues from a resident's perspective.
- Met with the Fire Chief (Mr. Gifford LaRose, P.Eng.) to gain an understanding of the issues related to the provision of fire protection services on the Island.
- Met with members of the Hornby Island Water Stewardship Project regarding their concerns related to the use of water on the Island.
- Reviewed existing reports and contacted other government agencies as appropriate to obtain information related to the issues under consideration.
- Reviewed current legislation, official community plans, and other regulatory information to identify issues that the CSRD would need to address should they proceed with the provision of the services under consideration.
- Researched information for similar communities that provide municipal services in a manner that could be implemented on Hornby Island. This activity was completed through literature and Internet searches and through the use of the CH2M HILL's technical experts to gain insight into possible solutions.
- Developed life cycle cost estimates to assess the potential impact of specific services on property owners.
- Attended a public meeting on the Island to present the scope of work and hear the perspective from members of the Island's "full time" community.
- Reviewed and incorporated (as appropriate) feedback on the draft report from the public and CSRD staff.

1.2 Basis for Evaluation

The CSRD has a mandate to provide municipal services on the Island. The Islands' Trust provides a regulatory framework that regulates development and land-use issues on all the Gulf Islands through an Act of provincial government regulation. The requirements of the Islands' Trust and the values instilled in the Hornby Island Official Community Plan (OCP) were taken into consideration when evaluating the services that form the basis of this assignment.

Hornby Island has a land area of approximately 3,000 hectares (ha's) with delineated property areas primarily segregated into crown land, parks, and residential properties with a small percentage of the properties reserved for commercial, light industrial, and government services. Exhibit 1-2 contains a breakdown of the various land uses. The Hornby Island OCP clearly states that the community does not want to entertain proposals that involve the increase in overall population density on the Island. Accordingly, CH2M HILL used the current land-use information as the basis for its evaluation of potential services that the CSRD could provide.

EXHIBIT 1-2

Population and Property Data¹

Parameter	Value
Resident population (2006)	1,074
Properties Zoned Residential (2007)	1,130
Current Improved Residential Properties (2007)	840
Properties Zoned Commercial (2007)	8

At more than 50,000 visitors a year, tourism plays an integral and valued role in the economy of the Island. The number of visitors has increased dramatically over the last decade resulting in significant economic opportunities but also creating pressures on the community, the environment, and existing municipal infrastructure on the Island. These visitors include day visitors, short term visitors who either rent vacation properties or camp, and non-resident property owners who either rent their properties during the summer and fringe seasons or use the properties exclusively for themselves at various times throughout the year.

The infrastructure needs of this variety of visitors ranges from relatively low for day-trippers, low to moderate for visitors with on-site infrastructure at their accommodation (i.e., rain water storage, wells, composters) combined with an ingrained approach to reducing use of resources, to moderate to high for visitors whose accommodation does not include these features and/or whose concerns for the environment are not necessarily aligned with the Community vision.

¹ From Statistics Canada 2006 Census and Aquaprotech Management Inc. Report, "CSRD Islands Septage Management (Cortes, Quadra, Denman, Hornby) – Preliminary Investigation Report, 2007"

The community's official community plan (OCP) includes a vision that seeks to encourage the development of small-scale visitor accommodation that is adequately serviced while preventing undue cost to the local taxpayers. To service the needs of the tourism industry and the needs of the community (with emphasis on solid waste management and water use), it is likely that a range of options will need to be made available so that people will have a choice in the manner in which they procure/use the infrastructure.

The CSRD retained CH2M HILL to provide a technical assessment of various infrastructure options available to the community, to determine the viability of the options, to determine concept level costs for viable options, and where appropriate to provide ideas on how/where infrastructure changes could be implemented. The Community in consultation with the CSRD will ultimately make decisions on the manner and scope of the services that the CSRD will provide in the future.

1.3 Terms and Definitions

Exhibit 1-3 is a summary of the terms used in this report.

EXHIBIT 1-3
Summary of Technical Terms

Term	Acronym	Description
Comox-Strathcona Regional District	CSRD	Municipal governmental agency responsible for municipal infrastructure services on Hornby Island.
Comox Valley Water Pollution Control Centre	CVWPCC	Regional wastewater treatment facility located in Comox.
Islands Trust		Provincially legislated organization that administers and controls development on the Gulf Islands under a Legislative mandate to protect the Gulf Island environments and cultural ideals.
Land and Water BC	LWBC	Provincial Agency with whom the current Fire Hall property agreement exists.
Ministry of Transportation and Highways	MoTH	
Official Community Plan	OCP	Formal document that prescribes the direction for growth and development on the Island.

1.4 Information Provided by the CSRD

During the project initiation phase the CSRD provided the following documents and information for review:

- GIS Data and Orthophotos of Hornby Island
- Copy of Report – Aquaprotech Management Inc, “Comox Strathcona Regional District Islands Septage Management (Cortes, Quadra, Denman, Hornby) Preliminary Investigation Report”, April 2007
- Copy of Report – Hornby Island Solid Waste Transfer (SWT) Facility – Report on Facility Safety, 2006
- Copy of Municipal Insurance Association’s Liability Risk Assessment for the Waste Management Centre, 2006
- Draft copy of a Needs Assessment Report for the Waste Management Centre
- Verbal information regarding facility operating procedures.

1.5 Summary of Draft Report Feedback

Following the presentation of the draft report, the CSRD requested comments from the community and from staff members. The CSRD received 48 submittals from a broad spectrum of the community – both permanent residents and non-resident property owners. Some residents provided multiple submissions.

The key issues are addressed in more detail as they apply to the individual sections of the report, but generally consist of the following items:

- The community wants more dialogue and input into any decisions related the infrastructure or services on Hornby Island.
- Local residents of the Anderson Road area obtain water from the wells located on the CSRD properties and believe that they have a right to this water, and that the CSRD has the obligation to maintain the wells and the properties as “ground water recharge zones” in perpetuity. There appear to be compelling arguments for this position. The community, particularly those directly affected, will strongly oppose any proposals which would change the use of these properties.
- The community considers the Free Store as an integral and culturally important aspect of the Waste Management Centre.
- The community does not support upgrading the public washroom facilities at the Waste Management Centre.
- Providing a public potable water supply depot would be supported by only some members of the community.
- The community generally supports maintaining the *status quo* for septage management.

2. Hornby Island Fire Hall

This section summarizes previous work performed by others and presents CH2M HILL's opinion on the most appropriate option for redevelopment of the existing Fire Hall on the island.

2.1 Summary of Public Feedback

Respondents were generally in favour of the need for a new Fire Hall, but had questions about costs, footprint, and details of the facility that have not been developed at this time.

2.2 Existing Facility

The existing Hornby Island Fire Hall is located on Crown Land on the south side of Central Road between the BC MoTH works yard and the Waste Management Centre. The building has a total area of 360 m² (3,884 ft²) and has four truck bays, an office, a radio room, a meeting room, and kitchen and shower facilities. It was constructed in four phases between 1968 and 1997 and has an unreinforced masonry, ground level structure with a wood-frame second floor.

2.3 Water Supply and Sanitation

The Fire Hall has neither a dedicated water supply nor a wastewater disposal system. Water is supplied to the Fire Hall for both domestic and fire fighting purposes from a well located on the BC MoTH works yard property. It is believed that the private contractor, Emcon Services Inc. (Emcon), has no obligation to provide water to the Fire Hall.

Wastewater from the Fire Hall is piped under Central Road to an on-site septic tank/disposal field on the Joe King Park property. It is also believed that the ballpark operator, the Hornby Island Athletic Association (HIAA), has no obligation to provide wastewater treatment/disposal services to the Fire Hall.

The current arrangements for both water supply and wastewater disposal appear to have been based on a "Gentlemen's Agreement" between the operators of the two neighbouring facilities, or their predecessors.

2.4 Seismic Issues

In 1992 a partial seismic upgrading of Truck Bays 1 and 2 was undertaken. A report prepared by Ron McMurtie & Associates in November 2000, and based on the 1998 Building Code for post-disaster facilities, identified numerous areas of concern regarding the structure, and concluded that the Fire Hall was unlikely to survive a moderate earthquake without severe structural damage. A subsequent report prepared by Ron McMurtie &

Associates in May 2001 estimated the cost and performance of upgrading the building to meet seismic requirements.

The 2005 NBC (National Building Code) and resulting 2006 BCBC (BC Building Code) editions have dramatically increased the seismic design requirements for all structures and place particular emphasis on municipal structures related to emergency response and protection of the environment in a post-disaster situation. Therefore, it is unlikely that the partial seismic upgrade to Truck Bays 1 & 2 carried in 1992 will meet the current Building Code requirements. Similarly, it is also unlikely that the strategy and cost estimate for the seismic upgrade of the whole building developed by Ron McMurtie & Associates in 2000/2001 are still valid.

As part of the next steps for the continued use or retirement of this structure, the CSRD should engage a structural engineer to perform a comprehensive evaluation of the structure and prepare a detailed report on the work needed to upgrade the facility to meet the latest building code requirements for either continued use as a Fire Hall, or another “public” use. The report would include the preparation of more detailed and up-to-date cost estimates.

2.5 Planning History

After the release of the McMurtie reports in 2000/2001 and a series of meetings attended by the Fire Chief and Officers, the Executive of HIRRA, the Fire Committee, the CSRD Director and Staff, the following three courses of action emerged: 1) Do nothing; 2) Repair the existing Fire Hall as per the McMurtie reports; and 3) Build a new Fire Hall. Two separate committees were set up to further investigate Option 3 above: A Building Committee; and a Land Committee.

The Building Committee identified the functional and corresponding size requirements for each of the areas to be included in a new Fire Hall based on typical rural Fire Hall designs used elsewhere in British Columbia. A preliminary capital cost estimate was prepared based on unit rates for the new Courtenay Fire Hall, and compared with the capital cost of new Fire Halls on Quadra Island and in Oyster River.

The Land Committee considered the size of the proposed building, training area and buffer requirements and determined that the new Fire Hall site would need to have an area between 2.0 and 2.5 acres (0.8 to 1.0 hectares). They identified eight potential sites on Crown Land within 500 m of the existing Fire Hall (i.e., in the general vicinity that meets the insurance requirement that the service area be within 8 km of the Fire Hall). Seven of the sites are on Central Road, while the eighth site, on Solans Road, was deemed to be unsuitable because of the limited sight distance at the intersection of Solans Road and Central Road. Two of the seven remaining sites best met the evaluation criteria established by the committee. However, after a meeting between the Committee, Land and Water BC (LWBC) and the CSRD in 2003, it was decided that part of the land currently used as the Highway gravel pit area on Central Road opposite the Waste Management Centre was the most suitable site. In March 2004, the Committee identified an area on the immediate west side of the existing entrance to the BC MoTH gravel pit as the best location for a new Fire Hall. This area provides a minimum slope down from Central Road and a relatively gentle slope in the building area. A site plan for a new Fire Hall was prepared for the site. The

layout included the Fire Hall building, asphalt driveways, concrete aprons, a gravel training area and a possible septic field area.

The Hornby Island Fire Department Fire Hall Planning Report (2004) suggests that the capital construction cost for the new building, including site development and servicing costs, would be capped at \$1 million. The final plan, finishing details and project implementation would be adjusted to meet this budget. The report also re-evaluated the original three options as well as a 4th option – to keep the existing Fire Hall but construct new truck bays in an adjacent separate building. Key issues associated with these four options are summarized in the following paragraphs:

Option 1 – Do Nothing

- Lowest overall cost.
- The existing building does not meet current electrical, building and fire code requirements.
- The building would remain susceptible to major damage or structural failure during a seismic event, potentially crippling emergency response, injuring fire fighters, and/or causing damage to emergency vehicles and equipment that have a replacement value of approximately \$1.25 million (2007 dollars).
- The building and site would still require expansion/upgrading valued at \$400,000 (2007 dollars) to meet existing and future Fire Department needs. However, this building expansion would not be allowed under the current Building Code as it would not meet current code requirements and the upgrade requirements to meet the current Building Code levels are estimated at between \$750,000 and \$1,000,000 (2007 dollars). CH2M HILL has not performed a detailed assessment of the seismic upgrade requirements related to the upgrade of the Fire Hall. Further assessment is needed.
- A new training area would require additional Crown Land.
- The gravel yard and aprons would require paving in the future.

Option 2 – Upgrade the Existing Building to Meet Building Code Standards

- Less expensive than building a new Fire Hall, but cost estimates for such works are notoriously inaccurate.
- Truck Bays 3 and 4 would have to be demolished and rebuilt as a separate structure.
- Renovation/reconstruction of the existing building would involve a major disruption of normal Fire Department activities and the temporary relocation of vehicles, equipment and radio communications for the project duration.
- It is questionable whether upgrading the building and reconstruction of Truck Bays 3 and 4 would meet the needs of the community well into the future.
- A new training area would require additional Crown Land.
- The gravel yard and aprons would require paving in the future.

Option 3 – Construct a New Fire Hall

- Most expensive option, but would meet the needs for a Fire Hall and its associated training facility for the foreseeable future.
- Meet the structural, functional and community needs for a post disaster facility.
- It may be possible to cap the construction budget of a new Fire Hall at less than \$1.5 million, but a more detailed scoping and costing exercise is needed.
- Minimizes disruption of services during the construction period, and provides a smooth transition of services from the old to the new Fire Hall after construction.
- Potentially makes the old Fire Hall available for alternative community uses, although Building Code and “change of use” issues would need to be resolved.

Option 4 – Keep Existing Fire Hall but Build a New Building for Emergency Vehicles

- Less expensive than a new Fire Hall.
- Emergency vehicles would be safe in an earthquake.
- Fire fighters and radio communications centre would not be safe in a seismic event.
- Requires new land for emergency vehicle building.
- Having gear and equipment in separate areas makes for awkward operations.
- Additional training area would still be required.
- Eliminates the possibility of a manned Fire Hall in the future.
- Old building requires more maintenance.
- This option was rejected by local Fire Fighters.

Upon reviewing the Fire Hall Planning Report, members of the Hornby Island Fire Department determined that the preferred option was Option 3 – Construct a New Fire Hall. Option 4 was deemed to be the least favoured option.

2.6 Legal Issues

The property where the existing Fire Hall is located was provided to the CSRD through a grant with a proviso that it be used as a Fire Hall. When this is no longer the case, the property reverts back to the Crown and the building would have to be removed.

The preferred property for a new Fire Hall is owned by the BC MoTH. The CSRD will need to negotiate an agreement with BC MoTH on the transfer of the land.

If a new Fire Hall is constructed elsewhere, the CSRD would no longer need the existing Fire Hall property. Land and Water BC (LWBC) may be willing to consider changing the terms of the grant if the building were to be used for community purposes (Mr. Gordon Smaill, 1994). In this event, the grant could possibly still be held by the CSRD. Alternatively, the property could be purchased from LWBC.

2.7 Water and Sanitation

The CSRD is currently exposed to risk due by not having its own water supply well at the Fire Hall, and by relying on the water to be supplied from the BC MoTH property.

The existing Fire Hall should also have its own disposal system instead of relying on the beneficial arrangement with Joe King Park.

If a new Fire Hall is constructed, the CSRD should make provision for its own on-site water supply well to have full ownership and control under the HI Fire Department/HIRRA/CSRD. Similarly, the new site should include its own on-site wastewater disposal system.

2.8 Summary

1. The CSRD needs to either upgrade or replace the Fire Hall, which no longer meets current needs and building codes.
2. To assist with this decision, the CSRD may need a detailed seismic assessment of the existing structure with the options of either continued use as a Fire Hall, or as some other form of “public” facility.
3. In addition to a new building, a new Fire Hall facility should include a water supply, wastewater disposal system, driveways, aprons, readily accessible water storage tanks, and a gravel training area. It is possible that a new Fire Hall facility could also provide other municipal services if this is desired by the CSRD and the community.
4. The best site for locating a new Fire Hall is on Crown Land part of which is currently occupied by the BC MoTH gravel pit on the north side of Central Road, and the remainder of which is located on the immediate west side of the entrance to the gravel pit. The CSRD should consider purchasing this property.
5. Community groups may wish to explore whether there is sufficient support to reuse the existing Fire Hall building for other community purposes, and to negotiate such a change with the property owner.

3. Community Water Supply

3.1 Introduction

The main source of potable water on Hornby Island is groundwater from small residential wells. The Co-Op, the BC Ferries Terminal and many local residents and vacationers purchase bulk water from private purveyors to meet their potable water needs, particularly during the summer months when groundwater levels are lower and water quality is reduced. These private purveyors draw their water from wells located on residential lots, which has become a point of contention with several neighbours and a local island water stewardship group.

There are two public wells – a public well in Tribune Bay Provincial Park and a community well on Solans Road to the north of the New Horizons Centre. The wells are relatively shallow, are equipped with hand pumps, and are not the property of the CSRD. The chemical and bacteriological quality of the water from these wells is not regularly monitored. Further, the community well on Solans Road does not appear in the BC Ministry of Environment Records and has a permanent “Boil Water” order attached to it.

Some members of the Community have expressed interest in establishing a central well that would provide a safe, reliable potable water supply for the Island that is drawn from a well located on crown land. The well site would be owned and administered by the CSRD in some fashion. It is important to note that the CSRD does not have the authority to provide water to the public on Hornby Island as the island has not been designated as a service area.

This section examines the hydrogeologic, technical and economic issues related to the establishment of a community well by the CSRD.

3.2 Summary of Public Feedback

Respondents were polarized in terms of their responses on the need for a community well. Some members are very supportive, while others are philosophically opposed to the concept on the basis of a need for groundwater preservation.

- All respondents were in favour of continued education on water conservation.
- Respondents noted that the Official Community Plan encourages water conservation and the use of rain water harvesting as a preferential method of water supply.
- While this study only evaluated if an adequate groundwater source could support a community water supply, it is apparent that there are at least two sites that need further assessment – the Central Road area and a previously evaluated site on Lea Smith Road.
- The community wants further discussion about this issue with the CSRD.
- Some respondents suggested that the community well be integrated with the new Fire Hall.

3.3 Hydrogeologic Assessment Report

The complete hydrogeologic assessment report for Hornby Island Community Services Study is presented in Appendix A. The report identifies one of the suitable areas on the Island where a community well might be located. This area spans both sides of Central Road between the Waste Management Centre and the Emcom Highways Maintenance Yard. There is potential in this area for developing a new community well with a sustainable yield of at least 0.3 L/s.

Apart from elevated iron, and possibly manganese, concentrations, the well water quality is expected to be very good. (Iron and manganese removal and pH adjustment from groundwater can be undertaken using conventional water treatment technologies.) There are many locations within this general area in which a community well could be sited. However, it is recommended that locations be avoided that are down gradient (i.e. to the northeast) of any potential or perceived sources of contamination, such as the Waste Management Centre (site of a decommissioned landfill) and the cemetery.

The study identifies the areas around the existing Fire Hall and the southeast end of the BC MoTH gravel pit as suitable locations for a community well as these have ready access to electric power as well as vehicle access to Central Road. While interference with neighbouring wells is unlikely to be significant at these locations, it is recommended that the proposed community well, or wells, under consideration be located at least 60 m from the nearest existing well.

3.4 Community Well Facility

It is assumed that the community well under consideration will cater to both bulk water sales using a delivery truck with a capacity of 2,200 L (500 gal), as well as a small-scale water sales in plastic containers with volumes as small as 18 L (4 gal). Further, it is assumed that the facility will be funded on a “user pay” principle.

In general, well water is pumped at a relatively slow, constant rate. On the other hand, bulk water loading must be relatively quick and is generally limited to the daylight hours. As a result, a 2-stage water storage system is required to provide the necessary medium term storage and limit bulk water loading times. The well water may need to be treated for iron removal, manganese removal and pH control prior to on-site storage. In addition, disinfection would be required immediately prior to loading/delivery.

Small-scale water sales could be facilitated using a coin operated waster treatment/dispensing unit similar to those currently located at the Co-op and Ford’s Cove. At a minimum, the community well facility should include the following units:

- Well with a sustainable yield of at least 3 L/s
- Water treatment process for iron removal, manganese removal, pH control, etc.
- Large in-ground concrete storage tank and pumping system;
Approximate volume = 225 m³
- Pumps and flow control/measuring units
- Disinfection system: Chlorination and/or UV disinfection

- Above ground day tank(s); Approximate volume = 22.5 m³
- Flow control/measuring units
- Bulk loading “Cardlock” charge system
- Coin/credit card operated water treatment/dispensing machine

The facility would also need to have vehicle access to Central Road, a truck loading bay, cardlock system, public parking, etc. The equipment would be housed in a small masonry block structure built to meet general municipal standards.

It is assumed that the above facility design would include the necessary automated control system so that a full-time operator was not required. However, the facility would need to be under the supervision of a suitably qualified water treatment plant operator.

3.5 Costs

The cost estimates provided are Class D cost estimates as defined by Public Works and Government Services Canada. Exhibit 3-1 contains a summary of conceptual costs for the facility not including land purchase costs.

EXHIBIT 3.1

Summary of Costs for Community Well Facility

Description	Estimated Cost
Capital Costs	\$1,270,000
Operating Costs	\$26,500
Twenty Year Life-Cycle Cost (excluding equipment replacements)	\$1,591,000

Notes:

1. Structural cost based on \$2,500/m² and a 100 m² footprint.
2. Cost does not include the cost for purchasing the land.

3.6 Liability Issues

The above community well and water supply depot would constitute a small municipal water distribution system as defined of the BC Ministries of Health/Environment. As a result, the CSRD would assume liability for ensuring that the water provided is potable and safe to drink.

3.7 Summary

1. The feedback from the Community indicates that further discussions are required to reach a consensus on the need for and services provided by a community water supply.
2. To facilitate this discussion the CSRD should complete the following activities:
 - Determine whether the liability for such a facility is acceptable to the CSRD.

- Carry out further investigations to better define water supply options and costs that could use the existing Fire Hall site, the new proposed Fire Hall site, and potentially a site on Lea Smith Road identified by one of the respondents.
- Assess the level of support for a community water supply from companies currently providing water delivery services.
- Hold more public consultations to discuss options for a community water supply.

4. Waste Management Centre

The Hornby Island WMC (the Recycling Depot) is a solid waste transfer station which operates to maximize diversion of recyclable material from the waste stream in line with the CSRD's Solid Waste Management Plan goals. The facility is currently undergoing upgrade planning to improve materials processing and maximize solid waste diversion, with construction scheduled for 2007/08.

The CSRD recently completed the following activities related to the operation of the Island's Waste Management Centre:

- CSRD Safety Adviser performed a Facility Safety Audit (2006)
- Municipal Insurance Association performed a Liability Risk Assessment (2006)
- CSRD staff working on a needs assessment for the facility (Ongoing)

The resulting reports included a series of recommendations related to workplace safety and general requirements at the site. The CSRD has taken steps to resolve many of the issues identified in the completed work and is completing a needs assessment for the facility. The CSRD asked CH2M HILL to:

- Identify options related to the provision of on-site water supply and sanitation services;
- Identify options that could lead to more streamlined operations at the Waste Management Centre.

This section provides a summary of the work performed.

4.1 Summary of Public Feedback

Respondents have very strong, and relatively unanimous, opinions regarding the current and future use of the Waste Management Centre. Issues that were raised include:

- A strong desire for more dialogue about the issues and options for upgrades to the facility particularly related to issues under consideration as part of the CSRD's Needs Assessment work.
- A general (but not unanimous) agreement that the staff need better sanitation facilities at the site.
- The strongly held view that the Community takes a lot of pride in this facility, and that the continued presence of the "Free Store" at the site is not an issue that is open to negotiation.
- A strong opinion that the public is adequately served by the existing composting toilet and sink and that the public should use their own facilities for washing and sanitation.
- A concern that a well water supply at the site could receive contamination from the old landfill area.

- A concern that the contingency allowances were too high.
- A concern that the cost estimates are based on “Big City” solutions rather than solutions that the community would preferentially implement.

Following discussions with CSRD staff, CH2M HILL has reworked budget costs and water demands to address issues raised by the respondents. Changes include:

- Reducing the water demand by removing hand washing facilities for the general public, eliminating the use of a shower on the site (an emergency shower facility should be included in the upgrades planned), reducing laundry allowance, and reducing the allocation for landscape irrigation. These changes reduced average annual water demand from 843 L/d to 130 L/d.
- Reducing the allowance for the Design/Construction Contingency from 40% to 25% and reducing the allowance for Engineering and Administration from 50% to 40%.
- Reducing storage tank and septic field sizes to reflect reduced needs.

The costs represented in this final report reflect these changes.

4.2 Existing Site Infrastructure

The Waste Management Centre includes a variety of structures and operations areas. Exhibit 4-1 contains a summary of the existing infrastructure and identifies the primary operations that occur there. Exhibit 4-2 contains an aerial view of the Waste Management Centre showing the main structures and operation areas of the site.

EXHIBIT 4-1

Summary of Major Structure and Operating Areas at the Waste Management Centre

Item	Structure/Area	Function
1	Main Structure/Recyclables Receiving Building	Receiving and sorting area where the public drops off sorted materials, the “Free Store” and Manager’s office.
2	Composting Barrel Area	Free drop-off for organics composting.
3	Garbage Disposal Area	Roll-off bins for garbage disposal.
4	Metals Recycling Area	Area set aside for scrap metal.
5	Composting Toilet	Public and employee washroom facility

The Waste Management Centre currently collects and stores rainwater from the roof of the composting toilet structure for washing hands. Although staff has placed “Do Not Drink” signs beside the taps the safety consultant expressed concern over the lack of treatment and the potential for young children to ingest the water because they did not notice the signage.

The Waste Management Centre has no on-site sanitation (showers, laundry, washdown areas) for staff use. HIRRA recently constructed a composting toilet in the lower area of the site for public use.

4.3 Future Infrastructure

Earlier work completed by the CSRD identified the need for improved water supply, sanitary services, and wastewater disposal at the facility. This section identifies options related to the provision of these services at the site. The CSRD has also completed the “Hornby Island Waste Management Centre Needs Assessment” report. The report covers issues related to the Free Store and evaluates other options related to the provision of waste management services on the island. The reader is directed to this document for further information.

4.3.1 Sanitary Services

HIRRA constructed a composting toilet at the Waste Management Centre site in 2005. This facility serves as a washroom for staff and the public. The structure has no potable water supply and a rudimentary wastewater disposal scheme.

While the community can probably continue to use this facility for basic “toilet” needs, safety audits of the facility have identified the need for showers, laundry, and washing facilities for the specific use of the staff. This requirement includes a need for a reliable, safe water supply and an appropriate method of wastewater disposal.

4.3.2 Water Supply

The following options exist for supplying water at the Waste Management Centre site:

- WMC-1 – Drill a well on-site for a water supply dedicated to the Waste Management Centre.
- WMC-2 – Expand the rainwater collection/storage system to include other buildings and provide treatment as appropriate.
- WMC-3 – Provide a water supply from the community well via a pipeline from the well site to the Waste Management Centre.
- WMC-4 – Provide a hybrid system that uses rainwater as the primary source of water supply and groundwater as the back-up water supply.
- WMC-5 – Provide water for the site using a private water delivery service on contract.

Exhibit 4-3 contains a summary of the advantages, disadvantages, and technical recommendation related to future considerations. Exhibit 4-4 provides a summary of “concept-level” opinion of probable costs for each option. Appendix B contains a more detailed breakdown of the costs.

EXHIBIT 4-3

Summary of Water Supply Approaches for the Waste Management Centre

Option	Features	Preferred Option
WMC-1 – Provide groundwater well to provide water dedicated to use at the Waste Management Centre	<p>Provide well, pressurization tank, and UV disinfection to provide water supply for the staff shower/cleanup and laundry functions.</p> <p>Assume that water quality issues such as odour, taste and dissolved metals do not create issues.</p> <p><u>Advantages:</u></p> <ul style="list-style-type: none"> • Water supply of relatively constant quality and quantity • Lowest risk of contamination from surface influences • Storage of potable water probably not required and need for chlorine is minimal • Relatively simple mechanical/electrical components • Low maintenance cost • Relatively low capital cost <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • CSRD incurs power costs for pumping water out of the ground • CSRD incurs costs for regular water sampling, equipment maintenance, and additional asset replacement requirements • CSRD incurs the liability for providing a safe water supply 	Strongly consider
WMC-2 – Expand existing rainwater collection/storage system to provide all domestic water needs at the site.	<p><u>Advantages:</u></p> <ul style="list-style-type: none"> • Low cost related to the collection of water from building gutters. • Meets objectives of some community groups and potentially may satisfy sustainability approaches identified in the Hornby Island Official Community Plan. • Relatively passive approach to water collection ... but only part of total system. <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • Acidic rainwater may require pH adjustment to protect CSRD infrastructure assets. • Storage will require disinfection. • High level of automated control systems to remove liability related to staff commitment to manual assessment and control of system. • CSRD incurs costs for regular water sampling, equipment maintenance, and additional asset replacement requirements • CSRD incurs the liability for providing a safe water supply 	<p>Cost of storage is not an issue since water demand does not exceed average volume of water captured based on monthly rainfall values.</p> <p>Strongly consider.</p>

EXHIBIT 4-3

Summary of Water Supply Approaches for the Waste Management Centre

Option	Features	Preferred Option
WMC-3 – Provide a water supply from a “community” well system that services the WMC, the Fire Hall, and the general public from a well located near the site.	<p>Similar to WMC-1 although it potentially incorporates a much larger water demand from a single source.</p> <p>Assume that water quality issues such as odour, taste and dissolved metals do not create issues.</p> <p><u>Advantages:</u></p> <ul style="list-style-type: none"> • May provide a low cost solution to two or three water supply issues. • Water supply of relatively constant quality and quantity. • Lowest risk of contamination from surface influences. • Storage of potable water probably not required at the Waste Management Centre and need for chlorine is minimal • Relatively simple mechanical/electrical components • Low maintenance cost • Moderate capital cost as it would involve water distribution system off-site. <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • Some additional capital cost needed for water distribution system. • Some storage may be needed (further investigation is needed and is beyond the scope of this work.) • Cost-effective storage would require disinfection, cost-effective chlorine residual, and pH control in storage tanks. 	<p>Cost likely too high and infrastructure maintenance requirements much greater than other options.</p> <p>Do not assess any further.</p>
WMC-4 – Provide a combination water supply from a dedicated groundwater well and rainwater collection system.	<p>Similar to WMC-2 with reduced storage volume requirements.</p> <p>Assume that well water quality issues such as odour, taste and dissolved metals do not create issues.</p> <p><u>Advantages:</u></p> <ul style="list-style-type: none"> • Reduced storage needs as groundwater well augments stored rainwater water during the summer months. • Reduced reliability on rainfall as groundwater supply appears reliable at this site. • Partially meets the sustainability objectives of some community groups and the Hornby Island Official Community Plan. <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • Capital cost needed for dual system. • Storage still needed (further investigation is needed and is beyond the scope of this work.) • Cost-effective storage would require disinfection, cost-effective chlorine residual, and pH control in storage tanks. 	Strongly consider.

EXHIBIT 4-3

Summary of Water Supply Approaches for the Waste Management Centre

Option	Features	Preferred Option
	<ul style="list-style-type: none"> • High level of automated control systems to remove liability related to staff commitment to manual assessment and control of system. • More complex controls needed results in higher infrastructure needs. 	
WMC-5 – Provide water through the use of a local private water delivery service.	<p><u>Advantages:</u></p> <ul style="list-style-type: none"> • Proven, established delivery service currently used by BC Ferries and the Island Co-operative Store along with many residents. • Provides small economic development opportunity on the Island. • Low infrastructure upgrades required. <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • CSRD becomes dependent on an off-site water supply. • Some community members may find this approach unacceptable. 	Consider only if funding options for more capital cost intensive solutions do not materialize (i.e., CSRD cannot sell existing properties to fund infrastructure improvements on the Island).

EXHIBIT 4-4

Summary of Costs for the Waste Management Centre Water Supply and Wastewater Disposal Options

Description	Estimated Cost
WMC-1 – Provide groundwater well based water supply, distribution system, and septic field.	
Capital Costs	\$94,000
Operating Costs	\$1,900
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$117,000
WMC-2 – Provide rain water based water supply, distribution system, and septic field.	
Capital Costs	\$103,000
Operating Costs	\$3,900
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$150,000
WMC-3 – Provide rain water based water supply with a groundwater well support system from a Community Well, distribution system, and septic field.	
Capital Costs	\$315,000
Annual Operating Costs	\$3,600
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$358,700

EXHIBIT 4-4

Summary of Costs for the Waste Management Centre Water Supply and Wastewater Disposal Options

Description	Estimated Cost
WMC-4 – Provide rain water based water supply with a groundwater well support system from a dedicated well, distribution system, and septic field.	
Capital Costs	\$147,000
Operating Costs	\$3,400
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$188,400
WMC-5 – Provide water supply from a private delivery service, distribution system, and septic field.	
Capital Costs	\$107,000
Operating Costs	\$7,600
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$198,900

4.3.3 Wastewater Disposal

The CSRD needs to provide a wastewater disposal system for the Waste Management Centre. An on-site, ground disposal system is most appropriate for the location and the volumes that CH2M HILL expects that the Waste Management Centre operation will generate.

A wastewater disposal system for the site will consist of a septic tank and tile field. If rainwater collection forms part of the water use scheme, the system will need to involve additional, relatively minor infrastructure costs to incorporate the disposal of the “first-flush” and water storage tank overflows.

4.4 Operational Modifications

The previous reports by CSRD staff and other consultants identified a number of items of concern about the existing operations at the facility and also identified differences in the operation of the Waste Management Centre when compared to other facilities operated in the Region.

4.4.1 Free Store

The free store is unique to Hornby Island and allows residents to re-use household items in a manner that diverts the material out of the waste stream. The store is located within the main structure of the Waste Management Centre and is operated by volunteers.

The store is open to the public seven days a week although the vehicle access is only available during the normal operating hours of the Waste Management Centre. Previous studies identified the unlimited public access to the Free Store as a potential liability to the Regional District. Options to reduce that liability include:

- Limiting access to the site to the same hours as the rest of the Waste Management Centre;
- Relocating the Free Store to an independent location away from the Waste Management Centre;
- Closing the Free Store completely.

CH2M HILL does not consider closing the Free Store as an acceptable option for the Community. The CSRD may wish to consider the other two options.

If relocation provides the most agreeable solution, the old Fire Hall may provide an appropriate new site although the CSRD would need to undertake significant seismic upgrades prior to implementing the relocation.

4.4.2 Operations Modifications

The needs assessment by the CSRD identified a discrepancy between staffing needs for the recycling operation between the Waste Management Centre and other similar facilities within the Region. That work is currently ongoing and may result in modifications to the current operations.

4.5 Summary

1. The CSRD has to improve the water supply and sanitary services for staff and public use at the Waste Management Centre in order to resolve some of the safety issues identified in recent audits and internal reports.
2. Five options were evaluated. All options considered require a new septic tank and tile field.
3. The use of a well and ground water supply (WMC-1) appears to provide the most reliable and cost-effective solution to the CSRD. It also poses the lowest liability risk to the CSRD with respect to bacterial contamination.
4. A hybrid water supply approach using groundwater and rain water (WMC-4) would provide the most flexible and reliable water supply, with relatively low risk to the CSRD. The capital cost of the hybrid system is slightly higher than using a single water supply approach but the greater flexibility should offset the relatively small cost premium.
5. CH2M HILL recommends the hybrid supply approach (WMC-4), but suggests the CSRD engage the Community in further discussion to establish the costs and benefits of both feasible approaches represented by WMC-1 and WMC-4.

5. Septage Management

Wastewater disposal on Hornby Island consists of on-site disposal systems such as septic fields, cesspits, and privies. Newer residential properties also now often incorporate an on-site wastewater treatment plant designed for individual properties. All of these styles of on-site treatment and disposal involve a primary stage solids separation primarily in a septic tank that removes solids and fats, oils, and grease (FOG) prior to the treatment and disposal of the liquid fraction of the wastewater. The treated effluent is disposed of through tile fields. The solids retained in the septic tank degrade over time and the remaining material (referred to as septage) is removed periodically by the property owners who use private septage haulers to transport the material to the Comox Valley Water Pollution Control Centre (CVWPCC; status quo). The septage haulers base their operations on Vancouver Island.

At this time, the development of a mechanical wastewater treatment facility or facilities to provide centralized treatment on the Island does not seem cost-effective or necessary.

The CSRD is currently evaluating septage management on Denman, Hornby, Quadra and Cortez Islands. Septage from these islands is currently pumped out by private contractors, and transported by truck and ferry to the CVWPCC for disposal. The CSRD has directed CH2M HILL to consider alternatives to the status quo on Hornby Island to determine if a more sustainable solution exists. To complete this work, CH2M HILL has:

- Identified issues related to septage management and disposal.
- Developed an annual septage volume for use in comparing options.
- Completed an internet and technology search in parallel with an internal search for previous septage management assignments that match Hornby Island's circumstances.
- Defined potential septage disposal locations and approaches.
- Reviewed potential site locations for an on-site septage management facility.
- Reviewed the options for on-Island disposal of stabilized septage solids.
- Developed relative cost estimates for the status quo and other potentially viable options.
- Developed recommendations for future septage management.

This section provides a summary of the results of these investigations.

5.1 Summary of Public Feedback

Respondents generally agreed with the conclusion not to pursue "on-island" septage management approaches at this time. Some respondents did indicate a philosophical desire to manage the Community's waste within the scope of the community rather than shipping it away. However, there is no economical or viable long term solution at this time.

5.2 Septage Management Issues

Septage is the most difficult residential wastewater to handle and dispose of. It typically contains:

- High organic concentrations in the order of 5 to 20 times the strength of ordinary wastewater;
- High solids concentrations;
- High concentrations of inert solids, plastics, and other debris;
- High FOG concentrations; and
- High odours.

In addition, septage contains high concentrations of pathogenic (disease-causing) organisms and if not properly handled will attract “vector” organisms (e.g., rats, flies, and birds) that can transfer material and disease organisms off-site. Septage handling requires trained staff and proper equipment, storage, and disposal.

5.2.1 Septage Treatment and Disposal Methods

Septage disposal methods typically take three forms:

- Disposal to large storage lagoons which are drained periodically and the solids stabilized through lime addition or composting followed by disposal in either landfills or ground. This approach requires:
 - A large, unpopulated, and untravelled buffer zone around the lagoon site for odour dispersion;
 - Limited rainfall (to reduce the size of the lagoon storage capacity);
 - Septic field for disposal of lagoon overflows;
 - A periodic lagoon dewatering and solids disposal program;
 - Infrastructure such as power, water, and operator facilities;
- Stabilization through lime addition or composting followed by disposal through application to agricultural land (rangeland or forage crops);
- Screening and treatment at a municipal wastewater treatment plant (the status quo for Hornby Island).

The lagoon approach is not appropriate for Hornby Island.

The CSRD evaluated septage management alternatives for the region in 1994. The study concluded that the CVWPCC provided the most cost-effective location for septage treatment and disposal in preference to the construction of a separate septage management facility. It is unlikely that this conclusion would change if the study were completed today since the CSRD has invested in special septage handling, storage and other septage management activities at the CVWPCC. The construction in 2003 of the Pidgeon Lake biosolids

composting facility may lend itself to a modified approach to septage management for the Island (see below), but would not necessarily result in a completely “on-island” septage management solution.

Septage pick-up can be a complex and labour intensive project for property owners (particularly for non-resident owners) since they often require some preparation activities - e.g. opening up part of a deck, or locating or uncovering the septic tank covers. Recreational property owners also often have lockable gates on access routes to their property and would not want to leave the gate unlocked for the hauler to access the property while the owner is “off-island.” Most property owners chose to meet the haulers performing this service.

5.2.2 Septage Solids Disposal

The disposal of septage solids is the major issue for any successful, on-island master plan. The best septage collection scheme and stabilization process will be useless if the CSRD cannot dispose of the final product.

A major impediment to the disposal of septage solids is the aesthetic properties of the finished product. The CSRD would need to take great care in producing a final product that is free of unsightly debris and has no odour.

Although the Island has a number of actively utilized agricultural properties on it, CH2M HILL sees no obvious solutions to long term on-island septage solids disposal. However, opportunities may present themselves through further public consultation.

5.3 Septage Volumes – Basis for Planning

Section 1 presents the population and property statistics for Hornby Island. There are currently 840 “improved” residential lots on Hornby Island with a total of 1,130 available for development. There are also 8 commercial properties that contribute to septage generation on the Island. A detailed study of septage generation rates and characterization was beyond the scope of this assignment and is not deemed critical for a proper evaluation of options at this stage. CH2M HILL has developed a mass balance model for septage generation based on the information presented in Exhibit 5-1 for use in developing costs for the evaluation of septage management options.

EXHIBIT 5-1
Septage Characteristics

Parameter	Value Used
Number of Properties Serviced (total) ¹	900
Frequency of Pumping (typically every 3 to 5 years), years	3
Number of Properties Serviced Annually	300
Volume Pumped/Property, L	2800
Number of Properties Serviced per Trip	2

EXHIBIT 5-1

Septage Characteristics

Parameter	Value Used
Number of Properties Serviced (total) ¹	900
Frequency of Pumping (typically every 3 to 5 years), years	3
Cost per Pump out per Household, \$ (2007)	350.00
Annual Septage Volume, m ³ /y	855
Number of Round Trips to the CVWPCC per year	150
Suspended Solids Concentration, mg/L	15,000
BOD Concentration, mg/L	7,000

Notes:

1. Slightly Higher than current "improved" lot residential properties.

5.4 Septage Management Techniques for Similar Communities

CH2M HILL completed an evaluation of articles and advertising on the Internet, performed a literature search, and polled CH2M HILL's group of wastewater professionals to identify other septage management experiences that could be considered on Hornby Island.

By far the majority of reports discussed the use of dedicated lagoons and municipal wastewater treatment facilities for septage management. Some operators who apply septage to land have implemented a lime pretreatment stage to their operation in order to perform the "high pH" stabilization process during travel from the residential property to the disposal site. This approach will not improve the operation of the "status quo" condition, and will not help with any other options that were considered in this evaluation.

5.4.1 Saltspring Island

The Capital Regional District (CRD) of Southern Vancouver Island inherited a septage processing facility from a contractor who built and operated the site on a pilot basis. They have plans for a composting facility, but have not developed a full-scale operation at this time. According to the 2006 Census by Statistics Canada, Saltspring Island has a residential population of approximately 10,000 (i.e., ten times the size of Hornby Island) making the viability of an on-island septage management program more viable due to the economy of scale of the larger population base.

The existing facility receives all of the septage generated on the island, as well as sewage sludge generated at the two CRD wastewater treatment plants on the island. The septage/sludge is transferred to the facility by the local septage hauling contractors who work and live on the island. The facility receives approximately 2,350 m³/y (520,000 Imperial Gallons) of septage, and 1,325 m³/y (290,000 Imperial Gallons) of sludge. While the

CRD has made some improvements to the site, much of the facility is deemed “temporary” in nature. The existing facility components are generally described as follows:

- One receiving station with a quick connection for septage haulers and magnetic flow meter for volume measurement;
- One 25 mm (1 inch) bar screen with manual rake followed by a grit chamber;
- Two vertical storage and mixing tanks;
- Two vertical equalization tanks to buffer incoming flows against the capacity of the dewatering stage;
- One pump-fed Fournier Press for solids dewatering; and
- A membrane treatment facility for the liquid stream followed by in-ground disposal of the liquid effluent.

There is no odour control at the site.

The CRD currently loads the dewatered solids into sealed bins and trucks the bins to the Hartland Landfill in Victoria. The plant produces approximately 700 metric tons of solids annually, so hauling and disposal is costly.

The CRD has proposed to implement a biosolids composting operation to compost the solids on-island and eliminate the need to haul and landfill and are in the process of obtaining the approvals to develop the composting operation. The CRD purchased the land the facility was on when it was turned over to the CRD, so much of the revenue from septage disposal is used recover the land costs.

The composting component is being set up for a two-year pilot evaluation. The CRD has budgeted \$100,000 for equipment lease costs (mixers, loaders, blowers, etc.), site prep and materials for windrow pads/covers, consulting, and material testing costs. The budget does not include operating costs for labour and power. If the pilot study proves successful, the CRD will consider building a permanent, enclosed composting facility, but those costs have not been developed yet.²

The CRD did not provide information on the exact costs for disposal and have no information on the cost of the original facility. A quick assessment by CH2M HILL led to an opinion of probable cost that the tanks and equipment alone will cost between \$400,000 and \$500,000 installed. The liquid stream treatment would cost significantly more and other costs such as buildings, civil/siteworks, and the provision of utilities (power, water, and/or natural gas) would likely increase the cost of the existing facility over \$1 million. A composting operation would likely require similar capital cost outlays on Hornby.

5.4.2 Province of Nova Scotia – Septage Management Pilot Program

The Province of Nova Scotia (Province) has more than 150,000 septic tanks that provide on-site treatment for more than 45% of its population. The Province has embarked on a

² The CSRD has substantial experience with biosolids composting with windrows, aerated static piles, and enclosed systems. Due to odour concerns and vector transfer issues, it is highly unlikely that the CSRD would ever support a windrow composting operation for septage solids on Hornby Island.

small pilot project to test the effectiveness a mobile sludge dewatering facility. The centre of the dewatering device is a Norwegian technology called a Maskozol™ unit. The unit has been marketed for about a decade for wastewater screening. The units are relatively complex mechanically and early models of the equipment had issues with fats and greases. CH2M HILL was unable to obtain costs on the units, but a website showing pictures of the process leads CH2M HILL to a conclusion that the mobile unit would cost between \$500,000 and \$750,000.

5.4.3 County of Dukes County, MA – Martha's Vineyard and the Elizabeth Islands

The County of Dukes County (County) provides municipal services to this well known seashore community located on the Atlantic seaboard. Similar to Hornby Island in seasonal population changes, Martha's Vineyard has a permanent population of approximately 15,000 with summertime populations that exceed 100,000. Eight-five percent of the properties use septic fields for wastewater disposal. Like the previous examples, the population base is much greater than that of Hornby Island.

The County is currently entertaining submissions for a mobile septage dewatering system called a Hamstern unit that would allow septage haulers to service a local service area in a manner that dewateres the septage, and returns the liquid portion back to the haulers truck for return to the resident's septic tank. The dewatered solids would be loaded into bins for transport to the mainland for stabilization and disposal.

The proponent of the mobile system claims a fifty percent reduction in the cost of septage transport related to the status quo. However, no substantiating data was available and, at the least, CH2M HILL feels that the cost model for Martha's Vineyard is significantly higher than that for Hornby Island since septage is apparently deemed a hazardous waste for transportation by ferry in Massachusetts.

The cost for a Hamstern Unit was presented at \$750,000 US and is probably similar to the cost of one that would be needed for Hornby Island.

5.5 Hornby Island – Septage Management Alternatives

Septage management on Hornby Island could take the following four forms:

Option SEP-1 – Maintain the status quo of transporting septage in its liquid form to the CVWPCC

Option SEP-2 – Provide on-island processing and dewatering at a permanent site with off-site solids disposal

Option SEP-3 – Provide on-island processing and dewatering at a mobile site with off-site solids disposal

Option SEP-4 – Provide on-island processing, dewatering, stabilization and disposal at a permanent site with off-site solids disposal

Exhibit 5-2 contains a summary of the advantages, disadvantages, and technical recommendation related to future considerations. Exhibit 5-3 provides a summary of “concept-level” opinion of probable costs and annualized NPV costs for Options SEP-1 and SEP-3. The other two options are considered much more expensive due to the land purchase costs and the cost of permanent infrastructure. Appendix C contains a more detailed breakdown of the costs.

EXHIBIT 5-2

Summary of Septage Management Approaches and Recommendations

Option	Features	Preferred Option
SEP-1 – Maintain the status quo of transporting septage in its liquid form to the CVWPCC.	<p><u>Advantages:</u></p> <ul style="list-style-type: none"> Processes in place Uses infrastructure already installed at the CVWPCC No need to implement and manage a pump-out schedule to ensure an income stream to cover costs of on-island infrastructure and operations Processing and disposal is performed by specially trained staff No impact on property owners No impact on existing septage haulers' business costs <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> On-going cost incurred for the transportation and treatment of liquid fraction of the septage Liquid fraction of septage continues to need treating at the CVWPCC Perception may be that this option does not meet sustainability objectives of the Hornby Island OCP 	Strongly consider
SEP-2 – Provide on-island processing and dewatering at a permanent site with off-site solids disposal.	<p><u>Advantages:</u></p> <ul style="list-style-type: none"> Volume of material taken off-island decreases Possible small economic opportunity for the Island residents May partially meet sustainability objectives, but further work would be needed to develop a full triple bottom line (TBL) evaluation (social, environmental and economic evaluation). <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> High cost for new infrastructure Need to implement and manage a pump-out schedule to ensure an income stream to cover costs of on-island infrastructure and operations At 300 tanks serviced per year, facility will only operate for part of the year. One truck could service 6 properties/day requiring 50 working days (10 weeks) per year Septage hauler and processing facility operator would have to stay on-island to maximize effectiveness of the program. This would add to the cost. 	<p>Cost likely too high.</p> <p>Do not assess further.</p>

EXHIBIT 5-2

Summary of Septage Management Approaches and Recommendations

Option	Features	Preferred Option
	<ul style="list-style-type: none"> • Odour management is a major issue. • Impact on property owners who would have to schedule pumping every three years and whose travel plans may not necessarily fit with the septage pumping window and the availability of the hauler to pump out the individual tanks. (A single hauler would not be able to service all three hundred properties during the peak August season). • Creating a septage management policy that causes non-resident property owners to make unplanned trips to the island to provide access for septage haulers would not meet the sustainability objectives of the OCP. • Impact on existing septage haulers' business costs 	
SEP-3 – Provide on-island processing and dewatering at a mobile site with off-site solids disposal.	<p>Similar to SEP-2 although it could free up the equipment for use on other islands. Issues that are unique to SEP-3 include:</p> <p><u>Advantages:</u></p> <ul style="list-style-type: none"> • Possibly lower cost than Option SEP-2 <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • Coordinating on-site septage management with the presence of non-resident property owners means having the facility in operation during the summer months. Use of the mobile facility on islands that have similar summer peaks may not work well for efficient year round use of the mobile equipment. 	<p>Cost likely too high.</p> <p>Unlikely a suitable option.</p>
SEP-4 – Provide on-island processing, dewatering, stabilization and disposal at a permanent site with off-site solids disposal.	<p><u>Advantages:</u></p> <ul style="list-style-type: none"> • May meet sustainability objectives of the OCP. • Will produce on-island economic opportunities. <p><u>Disadvantages:</u></p> <ul style="list-style-type: none"> • Very high capital cost. • Very high operating cost. • Odours are a major concern. • Septage hauler and processing facility operator would have to stay on-island to maximize effectiveness of the program. • Need to implement and manage a pump-out schedule to ensure an income stream to cover costs of on-island infrastructure and operations • Approach significantly changes operating practices for current septage haulers. • Final solids disposal approach is unclear. 	<p>Volume of septage generated not large enough to allow for an economy of scale.</p> <p>Unlikely a suitable option.</p>

EXHIBIT 5.3

Summary of Costs for Septage Management Options

Description	Estimated Cost
SEP-1 – Maintain the status quo of transporting septage in its liquid form to the CVWPCC.	
Capital Costs (Assumed cost for Septage Trucks)	\$150,000
Operating Costs	\$77,000
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$1,109,250
Estimated Cost per Pump-Out	\$350
SEP-3 – Provide on-island processing and dewatering at a mobile site with off-site solids disposal.	
Capital Costs	\$900,000
Operating Costs	\$56,600
Twenty Year Life-Cycle Cost (equipment replacements not included)	\$1,605,750
Estimated Cost per Pump-Out	\$435

Notes:

- Costs do not include the cost for managing the database to ensure 3-year pump out.
- SEP-3 costs assume that the CSRD will keep the same cost/tonne for solids received at the Pidgeon Lake Biosolids Composting Facility as for that currently charged at the CVWPCC. On review, this cost may need to increase significantly to cover additional septage management costs incurred at the Compost Site.
- SEP-3 costs do not include the cost for screenings disposal.

5.6 Summary

- Any form of on-island septage management strategy will require the management of a pump-out schedule that may be difficult to control due to the large number of non-resident property owners and the need for many of these property owners to be at hand to provide access to the septic tanks.
- On-island septage dewatering facilities would require odour controls and a suitable site for the operations. The Waste Management Centre may provide an appropriate location although the site has the disadvantage of being accessible to the public, and is close to an important surface watershed.
- A reliable long-term solids disposal solution is the most important issue for a completely on-island septage management strategy. This disposal solution was not readily identifiable, but must be found before taking this strategy further.
- The best option appears to be maintaining the status quo of transferring septage in liquid form to the CVWPCC.

6. Summary of CSRD Assets

The CSRD either owns, or has occupational rights to, a variety of properties related to the Waste Management Centre, the Fire Hall, Regional Parks, and other governmental service related activities. With the exception of activities at the Waste Management Centre and the redevelopment of the Fire Hall, these properties are not the focus of this assignment.

The CSRD also owns six properties on the northeast quadrant of the island. These six properties would not meet the requirements for any of the infrastructure services that could be provided by the CSRD.

The CSRD has indicated that it may wish to divest of these properties and use the proceeds of the sales to finance infrastructure improvements for the Community. The CSRD has asked CH2M HILL and its subconsultant, Landworks, to:

- Confirm the potential for the CSRD to use the sites for the infrastructure services covered by this assignment.
- Identify issues related to current uses of the sites that expose the CSRD to liability (primarily related to the use of groundwater supplies on the sites).
- Determine the potential real estate value of the CSRD properties based on land sales within Area K of the CSRD (specifically sales on Denman and Hornby Islands).
- Investigate and report on the issues related to current land use options for the sites.
- Investigate and report on issues that the CSRD would need to resolve as part of its efforts to divest of the land.
- Make recommendations on the approach to land divestiture.

The following subsections provide a summary of these efforts. Appendix D contains a more detailed report by Landworks on the issues. Exhibit 6-1 shows a map of the relative locations of the CSRD properties.

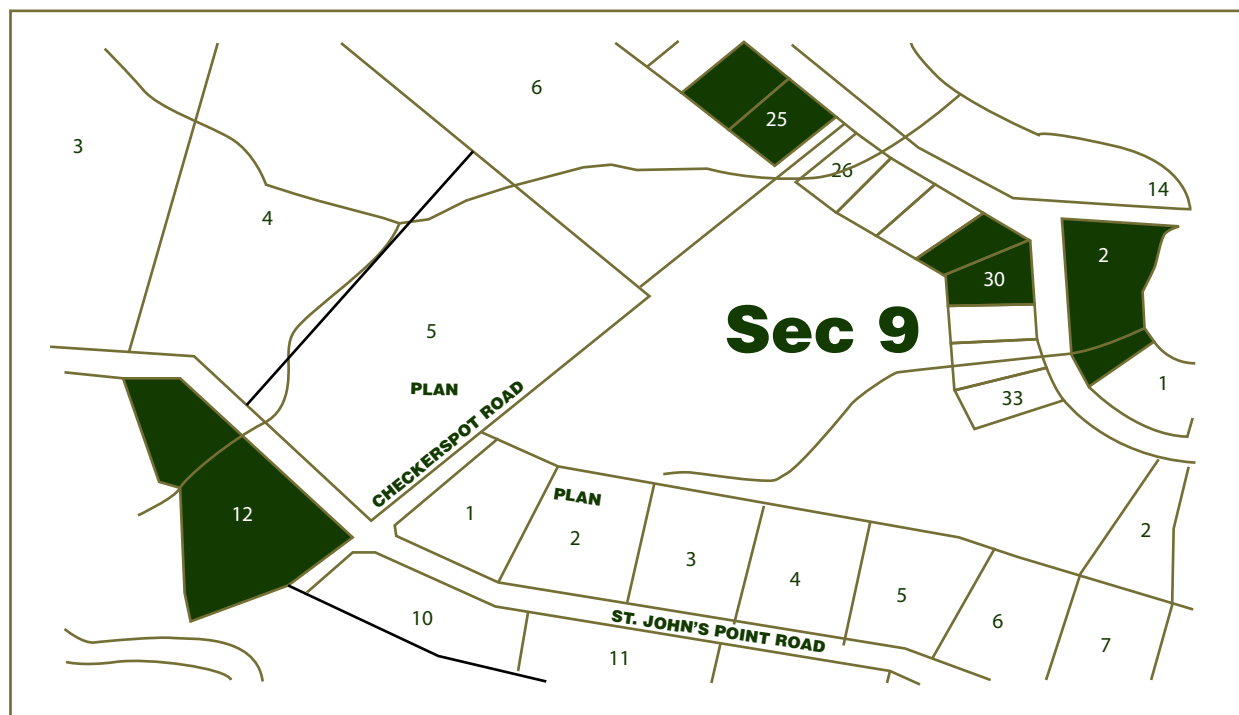


EXHIBIT 6-1
Location of CSRD Properties

6.1 Summary of Public Feedback

Respondents have very strong, and relatively unanimous, opinions regarding the current and future use of the properties considered in CH2M HILL's scope of work. Issues that were raised include:

- The widely held belief that the properties were deeded to the CSRD by the original developer to replace a promised water supply and distribution system, and that the CSRD would maintain the properties for that use in perpetuity. Respondents have indicated that they have documentation to back up these claims and that they would provide them to the CSRD if asked.
- The wells on the properties are still being used by residents who rely on the sites as their only source of water.
- The properties would require rezoning in a manner that would require an amendment to the Official Community Plan and would require approval from the Island's Trust. Members of the community have indicated that they will strongly oppose any changes to the current situation.
- The pond on the St. John's Point Road property serves as a water supply for wetlands on neighbouring properties. Members of the community have indicated that they will strongly oppose any changes to the current situation.

6.2 St. John's Point Road – Lot 12

This relatively large property located to the south of St. John's Point Road and east of High Salal is relatively undeveloped and zoned R-3. The Fire Department uses the pond on the site as a fire suppression water supply. The CSRD has also given written approval for a local group to construct a public bike path along the perimeter of the property beside the road. There may be a drilled well on this site although its location is unknown.

The property is zoned R-3 for residential use and is approximately 1.6 ha in area. The site has a restrictive covenant on it that prohibits the construction of structures. This covenant would have to be removed prior to the land sale.

6.3 Anderson Road – Lots 24, 25, 29, and 30

These four lots were transferred to the CSRD subsequent to the original development of the Whaling Station Bay/ Anderson Road subdivision in 1976. Lots 24 and 25 are designated as Public Park – Undeveloped (PR2) in order to protect groundwater supplies. Similarly, Lots 29 and 30 are designated as Water Supply Protection Areas in addition to being designated as Public Park – Undeveloped (PR2) in order to protect groundwater supplies. The Islands Trust and Local Islands Trust Council (LTC) have a mandate to control issues related to development on Hornby Island. These controls relate primarily to groundwater management, population density, and sustainable development.

The lots were subdivided prior to incorporation of Hornby Island into the Islands Trust and do not meet the minimum area requirements for residential lots (R-1). Landworks considered combining the adjacent lots into two properties. The combinations still do not meet minimum area requirements for residential lots (R-1) and rezoning approval would need to be obtained from the Islands Trust prior to development.

The Anderson Road area, and specifically the CSRD sites have very restrictive requirements for development and would require significant effort by the CSRD to obtain the rezoning approvals that are likely needed before the CSRD can divest of the land.

6.4 Anderson Road – Lot 2

This lot was transferred to the CSRD subsequent to the original development of the Whaling Station Bay/ Anderson Road subdivision in 1976. The lot is designated as a Water Supply Protection Area in addition to being designated as Public Park – Undeveloped (PR2) in order to protect groundwater supplies.

Lot 2 is considered low-bank waterfront and has significant real estate potential on initial consideration. However, the property has been designated as a groundwater recharge zone and also has wells upon it that may be used by at least one neighbour. The Anderson Road area specifically the CSRD sites have very restrictive requirements for development and would require significant effort by the CSRD to obtain the rezoning approvals that are likely needed before the CSRD can divest of the land.

6.5 Summary

1. The community has responded strongly against the concept of changing the current land uses for the sites in question.
2. The CSRD has acknowledged the community's issues and will not proceed with its plan to divest the assets.
3. The CSRD should meet with members of Anderson Road and other local representatives to formalize the agreements on water use and applicable transfers of liability.
4. The CSRD should take the internal steps needed to transfer ownership of the properties to its Regional Parks group where the properties can be managed more effectively.

7. Conclusions and Recommendations

7.1 Conclusions

CH2M HILL recommends that the CSRD use these conclusions as the basis for further evaluations and potential improvements to Community Services on Hornby Island.

Based on the information presented in the previous sections, the following is concluded:

Property Management

1. There are many significant issues related to selling the CSRD properties for residential development. Involvement of the Islands Trust and/or the HI Local Trust Council will be required to resolve these issues.
2. Members of the community believe that these properties were given to the CSRD by the original developer for the CSRD to maintain in perpetuity as undeveloped parkland and as a groundwater supply for the neighbourhood residents.
3. Based on public feedback, it is doubtful whether there would be sufficient community support for increased infrastructure and service improvements in exchange for the loss of these properties.
4. As property owners, the CSRD has direct exposure to liability arising from the existing groundwater wells on these properties.

Fire Hall

5. The existing Fire Hall does not meet seismic requirements in the 2005 NBC (National Building Code) and 2006 BCBC (BC Building Code) for post-disaster structures. Neither does it meet present needs with respect to vehicle storage, egress and access. The property also lacks a dedicated water supply and wastewater disposal system.
6. The property on which the existing Fire Hall is located is owned by the Crown. If the property ceases to be used for a Fire Hall, control of the site reverts back to the Crown. The CSRD may be able to negotiate an alternate “municipal” use for the property.
7. The BC MoTH owns a property located north of the Waste Management Centre which would be suitable for a new Fire Hall. The BC MoTH has indicated their willingness to sell all or a portion of the property to the CSRD for this purpose.

Community Water Supply

8. Several entrepreneurs presently operate bulk residential water delivery businesses. This indicates that a significant number of property owners rely on this service.

9. The hydrogeology study determined that a good quality, reliable water supply of up to 0.3 L/s could be located in the Mount Geoffrey escarpment without impacting neighbouring residential wells. Iron and manganese removal may be needed.
10. At least one other area on the Island may be able to provide an adequate water supply, but was not investigated during this study.

Waste Management Centre

11. The CSRD is completing an assessment of facility needs and the potential for improving operational efficiency at the facility.
12. The Waste Management Centre needs a reliable potable water supply and a wastewater disposal system.
13. A potable water supply based on rainwater collection alone would require a storage reservoir, pH control and disinfection. This would fully meet the objectives of the HIOCP with respect to rainwater harvesting.
14. A potable water supply based solely on a dedicated well is the most cost-effective solution, and the solution which minimizes the CSRD's exposure to liability.
15. A potable water supply using a combination of rainwater storage and a back-up groundwater well is also feasible.

Septage Management

16. There are significant challenges to the feasibility of "on-island" septage management and disposal. These include: the possibility of odours, the cost of septage management, and the lack of a long-term disposal solution.
17. The relatively small volume of septage is insufficient for an on-island septage disposal solution. Maintaining the status quo represents the most economical and sustainable approach.

7.2 Recommendations

Based on the information presented in the previous sections, CH2M HILL makes the following recommendations:

Property Management

1. Formalize the designation of the CSRD properties for use as undeveloped parklands, and complete internal transfers of the properties to the Regional Parks group, which is best able to manage and maintain these properties.
2. Recognizing that the RDCS does not provide treatment and has no control over the use of water obtained from the existing wells, the CSRD should seek to limit its exposure to liability in return for leaving the current wells and privately-owned distribution systems in place.

3. The CSRD should remove the existing groundwater wells if it is their desire to minimize liability exposure.

Fire Hall

4. To obtain the information needed to decide on the Fire Hall, the CSRD should:

Carry out further investigations in order to better define the cost to upgrade the existing Fire Hall. These investigations should include the costs of new “stand alone” water supply and wastewater disposal facilities for the Fire Hall.

Undertake a conceptual design and costing exercise for a new Fire Hall on the recommended site.

5. The CSRD should explore options to purchase the recommended site for the new Fire Hall.

Community Water Supply

6. To obtain the information needed to make a decision related to providing a community water supply on Central Road adjacent to the Mount Geoffrey Escarpment, the CSRD should:

Engage the community to assist in determining the desire for a community water supply facility.

Carry out further investigations in order to better define the cost for such a facility that meets the requirements of the CSRD with respect to liability exposure.

Waste Management Centre

7. The CSRD should provide a groundwater-based potable water system for the Waste Management Centre, as this minimizes the CSRD’s exposure to liability.
8. The CSRD should provide an on-site, ground disposal wastewater system consisting of a new septic tank and tile field.

Septage Management

9. The CSRD should maintain the status quo of transferring septage in liquid form to the CVWPCC.