Comox Valley REGIONAL DISTRICT

Staff Report

DATE: May 6, 2020

FILE: 5340-04

TO: Chair and Directors
Electoral Areas Services Committee

FROM: Russell Dyson
Chief Administrative Officer

Supported by Russell Dyson
Chief Administrative Officer

R. Dyson

RE: Septic System Mandatory Maintenance Program Options

Purpose

To present the results of a study of septic system mandatory maintenance program options for the Electoral Areas Services Committee's consideration.

Recommendation from the Chief Administrative Officer:

THAT, in order to further assess mandatory maintenance program options, the Comox Valley Regional District (CVRD) submit a formal request to Island Health for a data sharing agreement enabling CVRD access to complete *Sewerage System Regulation* filings held by Island Health.

Executive Summary

Management of wastewater in the electoral areas of the Comox Valley Regional District (CVRD) is primarily provided by private onsite wastewater systems, or septic systems, of which there are approximately 9,000. Prior analysis of groundwater in some areas has shown evidence of septic system failure. In 2005, the province enacted the *Sewerage System Regulation* (SSR), replacing the prior *Sewage Disposal Regulation*, and switching from a health authority oversight model to a professional reliance model. One concern with this model is that there is no longer a dedicated government role in inspection of septic systems. Homeowners are responsible for ensuring appropriate system maintenance is carried out, but may have limited awareness of system maintenance requirements and their legal obligations.

- In fall 2018, the CVRD launched a septic education program to help inform electoral area residents about proper septic system care and maintenance. Septic education programs are considered a foundational piece in the management of septic systems.
- Regulatory program options identified for the CVRD include mandatory pump-outs, mandatory inspection or mandatory inspection and maintenance.
- WSP Canada Group has prepared a report detailing these options, and identifying areas of the CVRD where program delivery could be effective in mitigating public and environmental health risks from failing septic systems.
- Higher risk areas in the CVRD electoral areas generally include areas of higher residential lot density, such as Royston, Union Bay, Saratoga Beach, Bates Beach and Ships Point.
- WSP's report suggests an inspection based maintenance program option is most appropriate in areas with higher risk.
- Public health is an area of concurrent provincial/local government authority. Initial guidance from provincial staff suggests an amendment to the *Comox Valley Regional District Regulation* to allow for CVRD management of onsite sewage systems would be necessary to implement a regulatory program. This would require Cabinet approval through an Order in Council, which is typically a 6 to 12 month process.

- Next steps could include continuing the existing septic education program, while further assessing septic system maintenance program options. More detailed analysis is required to better understand the administrative requirements and costs of a regulatory program for the electoral areas.
- The financial pressures many households are feeling as a result of the COVID-19 pandemic should also be carefully considered before committing to implementation of a costly new regulatory program.
- To support further analysis, it is recommended that a formal request be made to Island Health for a data sharing agreement to enable access to complete *Sewerage System Regulation* filings for the CVRD.
- When considering the effectiveness of potential program options, it should also be noted that no program option will solve issues related to improperly installed or sited septic systems, particularly in areas with poor ground conditions, steep slopes, high winter water table or urban levels of dwelling density.

Prepared by:	Concurrence:	Concurrence:
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Background/Current Situation

Management of wastewater in the electoral areas of the CVRD is primarily provided by private onsite wastewater systems, or septic systems. There are approximately 9,000 of these systems in the unincorporated areas of the CVRD, many of which have been in operation for several decades. Prior analysis of groundwater in areas such as Saratoga Beach, Royston and Union Bay has shown evidence of septic system failure, backing efforts to provide sewer servicing in these areas.

Following the results of the 2016 South Sewer Project referendum, CVRD Liquid Waste Planning staff researched other BC regional districts practices with respect to management of private onsite wastewater management systems. As an outcome of this research, in the fall of 2018, the CVRD launched the septic education program, consisting of a set of online resources (www.comoxvalleyrd.ca/septic), supported by four annual free educational workshops in the electoral areas.

A new addition to the septic education program, identified in the 2020-2024 financial plan for the liquid waste management planning service, function 340, is an incentive program, modelled after the Regional District of Nanaimo's SepticSmart rebate program. The RDN program provides rebates to help residents better maintain their systems including rebates for the installation of effluent filters, distribution boxes or risers. To support a CVRD incentive program, a request for funding assistance has been submitted to the WCOWMA Onsite Wastewater Management Association of BC (WCOWMA-BC).

Septic education programs are considered a foundational piece in the management of private onsite wastewater systems. Further steps in the spectrum of private onsite wastewater management programs include the following:

1. Mandatory pump-out programs – All homeowners with Type 1 septic systems are required to pump out their septic tank at a set interval (i.e. once every five years). The Capital Regional District operates such a program which also includes a requirement for Type 2 and 3 systems to be maintained once per year.
2. Mandatory inspection programs – All septic systems are inspected by an Authorized Person, and the homeowner is then provided with a maintenance plan. The homeowner is then responsible to follow up with maintenance and repairs identified during the inspection.
3. Mandatory inspection and maintenance programs – Similar to the mandatory inspection program, with an enforcement component to ensure identified maintenance is completed.

To assess the suitability of these types of programs, WSP Canada Group has provided a report (Appendix A), applying the findings of a 2016 report completed for the BC Ministry of Health (MoH) to the CVRD electoral areas. A summary of the maintenance program types listed above is included in Schedule A, and a summary of estimated program costs is provided in the Financial Factors section.

WSP's report identifies the following principles that should be considered for an effective septic system management program:

1. Avoid a "one size fits all" approach – There is some preference from homeowners for programs that are tailored to individual system needs.
2. Public education and awareness are key – Increased awareness is a critical first step in encouraging homeowners to properly maintain their septic systems.
3. Understand the risks and benefits – It is important that program selection is based on real risk rather than perceived risk. Understanding the value of implementing a program can help prioritize resources and funds to those areas of higher risk.
4. Collection and management of data – Access to proper, accurate data can help to make evidence-based decisions and evaluate the effectiveness of the program.
5. Enforcement – While enforcement may not be a required component of a program, it could be an important consideration for areas of higher risk.
6. Cost recovery – Implementation of program options will have cost implications, and recovery of costs in a fair and equitable fashion is important to successful program delivery.

When considering how the above principles would be met in the context of the CVRD's electoral areas, the following factors are important:

- Variability in land use/density – Land use in the CVRD's electoral areas varies considerably, from residential areas approaching urban levels of density, to resource lands with little to no human settlement. This contributes to a significant variation in the level of risk that onsite systems present to human and environmental health, making it difficult for a "one size fits all" approach to be effective in all areas. Land use/density and resulting levels of risk are also a consideration when assessing program cost recovery options.
- Staff have received access to a high level dataset of Island Health SSR filings for all sewerage systems that have been installed, repaired or replaced since the SSR was enacted in 2005. Approximately 2,800 of the 9,000 systems estimated to be in the CVRD's electoral areas are included on this list; 72% of these are Type 1 systems, 21% are Type 2 and 7% are Type 3. Collection of additional data through a mandatory maintenance program would be most effective if it were to be coordinated with Island Health's filings records; this would likely require a data sharing/confidentiality agreement with Island Health.
- Local Authorized Persons capacity to provide the services required to support program success is important. According to the *Sewerage System Regulation* (SSR), Authorized Persons can be registered onsite wastewater practitioners (ROWP), licensed by the Applied Science Technologists and Technicians of BC (ASTTBC), or professionals licenced by Engineers

and Geoscientists of BC (EGBC). A search of ASTTBC's ROWP finder and EGBC's list of SSR professionals shows there are only seven local Authorized Persons that provide inspection services, indicating that current local capacity to complete septic system inspections is limited. Implementing a program that substantially increases demand for inspections could result in frustration for participating homeowners, and could limit the effectiveness of the program.

- When considering the effectiveness of potential program options, it should also be noted that none of the program options will solve issues related to improperly installed or sited septic systems, particularly in areas with poor ground conditions, steep slopes, high winter water table or urban levels of dwelling density.
- Sites and systems that may have been marginally acceptable prior to the SSR and the Standard Practice Manual may not be acceptable today. This is especially pertinent to systems installed before the 1985 enactment of the previous *Sewage Disposal Regulation*. Enforcing maintenance for failing systems of this sort is a challenge not well addressed by the program options discussed in this report.

Other local government examples

While management and regulation of septic systems in Canada is typically a provincial matter, there are a few examples of local government programs that have been established to provide enhanced management and oversight. Information on two program examples is provided below.

Capital Regional District

The Capital Regional District (CRD) is the only BC regional district that has implemented a septic systems mandatory maintenance program. The CRD's Onsite Wastewater Management Program was established in 2010 after the Province mandated the inclusion of an onsite system management component in the CRD's Core Area Liquid Waste Management Plan. The CRD's program covers approximately 8,500 onsite systems in the participating member municipalities of Colwood, Langford, Saanich and View Royal. The CRD's "Onsite Sewage System Maintenance Bylaw No. 3479, 2007" mandates a five year pump-out frequency for Type 1 systems, and annual maintenance for Type 2 and 3 systems. The CRD has received pushback from some homeowners who feel the five year pump-out frequency is too prescriptive and doesn't account for different use patterns that would influence the need for a system pump-out. In response to this criticism of the "one size fits all" approach, the CRD has initiated a pilot project providing homeowners with the option to re-assess their pump-out frequency after a maintenance assessment by a preferred Authorized Person.

Huron-Kinloss, Ontario

The Township of Huron-Kinloss, located on the shores of Lake Huron in Ontario, started their mandatory Community Septic Inspection Program in 2007. The program, operated almost entirely by an engineering consulting firm, inspects approximately 3,000 systems in the Township once every eight years and is now on its second round of inspections. After an inspection, the property owner receives an inspection report with recommended maintenance, an aerial map of the property showing the onsite system and educational materials. The program does not include an enforcement component for the recommended maintenance, instead relying on the assumption that a properly informed homeowner will want to keep their system maintained. As inspections have been completed, an inventory of onsite systems within the Township has been developed, including a risk assessment of individual systems.

Summary of risk assessment in CVRD

The 2016 MoH report advocates for a risk-based approach in program selection; as such, a coarse assessment of septic system risk throughout the rural areas of the Comox Valley was also undertaken, based on prior mapping and analysis completed by EBA Engineering and additional

information provided by the CVRD. This assessment found several areas of the CVRD to be at an elevated risk of public and/or environmental health impacts from septic systems:

- Royston
- Union Bay
- Saratoga Beach
- Robinson Lake
- Bates Beach
- Ships Point
- Hornby Island

Should the CVRD proceed with a septic system regulatory program, these areas should be considered highest priority for program implementation. In areas where groundwater quality monitoring has not been completed, this could be an interim measure that would help establish a baseline for future evaluation of maintenance program effectiveness.

Next steps

If the Electoral Areas Services Committee chooses to further investigate a septic system mandatory maintenance program for the CVRD electoral areas, next steps are anticipated to include the following:

- Selection of a maintenance program option, and confirmation of further details on resourcing requirements, service establishment options, service area boundary and phasing options for program implementation, potentially through the selection of a high risk area for a pilot project. Phasing could also allow for local Authorized Person capacity to adapt to potential increased demand for services.
- Improved understanding of where septic system upgrades have recently occurred, via a formal request for access to Island Health *Sewerage System Regulation* filings.
- Further discussions with BC Ministry of Municipal Affairs and Housing staff to clarify the process required to enable CVRD authority in septic system regulation.
- Develop a community engagement plan dependent upon chosen direction.

Policy Analysis

Bylaw No. 2422, being the "Regional District of Comox-Strathcona Liquid Waste Management Planning Service Bylaw No. 2422, 2002" provides planning services to the rural areas with regard to liquid waste management. The purpose of the service is for "the co-ordination, research and analytical services in relation to liquid waste management requirements and options relating to the development of the regional district."

The British Columbia *Public Health Act*, *Sewerage System Regulation* (SSR) regulates wastewater systems that serve a single family residence or duplex, and sewerage systems with a domestic sewage flow of up to 22,700 litres per day that service a single lot or lots with a shared interest. Under the SSR, it is the responsibility of the homeowner to ensure that appropriate system maintenance is carried out.

Section 304 of the *Local Government Act* (Health Protection Authority) enables regional districts, subject to the *Public Health Act*, to enact bylaws that regulate or prohibit activities for the purposes of maintaining, promoting or preserving public health, or to undertake other measures it considers necessary for these purposes.

Section 284 of the *Local Government Act* provides regional districts the authority to enter on or into property for inspections to determine whether bylaws are being followed, provided the regional

district has the authority to regulate, prohibit and impose requirements on the matter. This authority would have to be provided through clear language in the bylaw in respect of its regulatory purpose.

The *Public Health Act* provides agencies, including local governments, with tools, including information gathering abilities, inspection and ordering abilities and other measures, to respond to public health impediments. The Act defines health impediment as a condition, thing or activity that:

- Cumulatively, over time, is likely to adversely affect public health
- That causes significant chronic disease or disability in the population
- That interferes with the objectives of public health initiatives regarding the prevention of illness in the population

Policy 25(2) of the "Rural Comox Valley Official Community Plan, Bylaw No. 337, 2014" states the following:

> Consider developing a sewage system maintenance bylaw and program that includes providing public education on sewerage system maintenance and the **development of maintenance plans for older sewage systems currently not under the sewerage system regulation.**

At the February 28, 2017, meeting of the CVRD Board, the following motion was passed:

> *THAT the implementation of a mandatory maintenance program specific to the electoral areas in the Comox Valley Regional District be further investigated.*

Options

Staff have developed the following options for the committee's consideration:

1. Continue to offer the existing Septic Education program, while also further assessing septic system maintenance program options, including the following tasks:
    a. Gain an improved understanding of recent septic system upgrades in the electoral areas via a formal request to Island Health for *Sewerage System Regulation* filings data.
    b. Continue discussions with Provincial staff to confirm the process required to enable CVRD authority for a mandatory maintenance program for septic systems.
2. Further investigate implementation of the Mandatory Inspection Program option in areas designated as "high risk" in WSP's Onsite System Maintenance Program Memo dated March 12, 2020.
3. Further investigate implementation of an alternate option identified in WSP's Onsite System Maintenance Program Memo dated March 12, 2020.
4. No longer investigate mandatory maintenance programs for septic systems, and to continue to deliver the existing Septic Education program.

Enhanced efforts regarding septic system education and/or regulation were identified as a key electoral area initiative by the Board's strategic planning process for the 2020-2024 financial planning period, and will help reduce public and environmental health risks in several electoral area communities. However, given current concerns regarding the COVID-19 pandemic and the resulting financial pressures many households are feeling, committing to implementation of a costly new regulatory program may not be well received by the public at this point in time.

Financial Factors

Septic system mandatory maintenance program costs range from approximately $1.1M for mandatory pump out, to $1.8 million for a mandatory inspection and maintenance program, as shown in Table 1. For the purposes of comparison, this table includes costs for a program that

would cover all systems in the CVRD electoral areas and costs for a program that would cover systems in high risk areas only. It should also be noted that the annual program costs don't include those that would be covered by the homeowner, as listed below for each program option. Annual program costs could also be adjusted by making some components homeowner costs rather than program costs.

Table 1 – Septic System Management Program Cost Comparisons

Program Type	**Estimated Annual Program Cost (all areas)**	**Estimated Annual Program Cost (high risk areas only - ~1,600 properties)**	**Additional Homeowner Costs**
Mandatory Pump-Out	$1,070,000	$330,000	Inspection, maintenance, repairs, etc.
Mandatory Inspection	$1,710,000	$480,000	Pump-out, maintenance, repairs, etc.
Mandatory Inspection and Maintenance	$1,830,000	$580,000	Pump-out, maintenance, repairs, etc.

The CVRD's current septic education program is funded through the existing liquid waste planning service, function 340. The maximum requisition for this service is $0.10 per $1,000 of assessed value, which translates to a maximum requisition of $706,370 for 2020. A 25 per cent increase in maximum requisition is possible once every five years by director approval. Any increase beyond 25 per cent would require an elector assent process in order to amend the bylaw accordingly.

The establishment bylaw for function 340 would also need to be amended to expand the scope of the service if a mandatory maintenance program were to be delivered under this service. While it is possible to amend an establishment bylaw with the consent of two-thirds of the participants and Inspector of Municipalities' approval, this is most appropriate when changes to the bylaw are minimal. Where substantive amendments are required like an expansion of the scope of the service, a regional district may choose to amend the bylaw in accordance with the requirements applicable to the adoption of the bylaw, including consent of the electors.

As costs for mandatory maintenance options are significant, and the regulation of septic systems is beyond the scope of the existing service, establishing a new regulatory service to recover program delivery costs could be a better approach.

The septic system management study was partially funded by a BC Infrastructure Planning Grant, with the remaining costs covered by electoral areas community works funds.

Legal Factors

Under the *Sewerage System Regulation*, it is the responsibility of homeowners to ensure that regular maintenance and monitoring of their onsite wastewater management system is completed (Schedule B). There is currently no supporting provincial regulatory mechanism in place in BC to ensure that this responsibility is adhered to. However, if there is evidence of a public health hazard related to existing onsite wastewater systems, Island Health has the authority to inspect and take corrective action. Island Health can also hold liable the owner of the system, and/or the Authorized Person the owner hired to design, install or maintain the system.

Authority to move into a regulatory role for onsite wastewater management is granted to regional districts through Section 304 of the *Local Government Act*. As public health is an area of concurrent

provincial/local government authority, guidance from provincial staff suggests an amendment to the *Comox Valley Regional District Regulation* to allow for CVRD management of onsite sewage systems would be required. This would require Cabinet approval of an Order in Council, which is typically a 6 to 12 month process.

Local governments considering options for liquid waste management may choose to develop a liquid waste management plan (LWMP) following provincial guidelines. A completed LWMP, approved by the Province, provides local governments with the authority needed to implement the programs identified in the LWMP. Of note, the CRD's mandatory maintenance program is authorized through their core area LWMP, and the RDN's septic system education program was authorized through an amendment to their LWMP.

Without an approved LWMP, options to implement a new regulatory program for septic system maintenance include amending an existing service (i.e. liquid waste planning, function 340), or establishing a new service for this purpose. As discussed above in financial factors, constraints on using the existing liquid waste planning service include the requisition limits and the existing purpose of the service, thus indicating that establishing a new service would be the more appropriate path forward. The approval process towards a new service would include the following steps:

- Gain provincial approval through Cabinet approval of an Order in Council as discussed above.
- Confirm method of participating area approval (assent voting, or alternative approval process).
- Introduce the service establishment bylaw for three readings.
- Complete the participating area approval based on chosen method.
- Adopt bylaw once participating area approval is gained.

It should also be noted that if the CVRD were to move forward with a mandatory maintenance program, it would be the first instance in BC of a regional district regulating septic system maintenance in unincorporated areas. Careful consideration of the risks and implications of moving forward with a mandatory maintenance program are therefore required and will be considered if program options are further investigated.

Regional Growth Strategy Implications

All CVRD onsite wastewater management initiatives are developed to align with the goals and objectives of the Comox Valley Regional Growth Strategy (RGS) to "provide affordable, effective and efficient services and infrastructure that conserves land, water and energy resources."

The mapping work completed in support of the study has identified that many of the "high-risk" areas for septic systems correlate with those areas designated as Settlement Expansion Areas or Settlement Nodes (both part of the Core Settlement Areas).

In regard to settlement expansion areas, the RGS states the following: "Given the number and density of private systems located on the fringe of Municipal Areas, there is a need to develop a long-term strategy to prevent public health concerns before they arise… As a result, it is the long-term intention of the growth management strategy that existing neighbourhoods within designated SEAs will eventually be provided with publicly owned water and sewer services." Settlement Nodes are also designated as such subject to the provision of appropriate water and sewer services.

The RGS also states that for existing developments outside of Core Settlement Areas, where there are demonstrated onsite health related issues, publicly owned sanitary sewer services should be made available.

Intergovernmental Factors
Staff will continue to consult with Island Health during program assessment to ensure their support. Island Health staff have provided some high-level information on septic system filings received in the CVRD since the 2005 implementation of the SSR. If the CVRD were to proceed with a mandatory maintenance program that requires access to detailed septic system filing records, a data sharing agreement with Island Health would be required in order to obtain access to these records, and to share with Island Health information gathered by the CVRD program.

There are portions of the City of Courtenay taken in by recent boundary extensions where wastewater continues to be managed by onsite septic systems. Some of the CVRD septic system education sessions have had attendance from City of Courtenay residents. Staff estimate that of the approximately 9,000 septic systems in use in the Comox Valley, fewer than one hundred are now within the City of Courtenay.

Inclusion of septic systems within the City of Courtenay or other member municipalities as part of a regional district mandatory maintenance program would require municipal participation in the service area, and regional district authority to regulate septic system use within a member municipality. To date, there have been no discussions with municipal staff in this regard. Given the limited number of systems estimated in the City or other member municipalities, and the jurisdictional challenges in bringing these systems into a proposed regional district program, there would likely be limited value in municipal participation in a CVRD mandatory maintenance program for septic systems.

Interdepartmental Involvement
The Engineering Services Branch has taken the lead in preparing this report, with assistance from Legislative Services and Financial Services.

Citizen/Public Relations
Onsite sewage system owners who have a thorough understanding of how their system works and the benefits of proper maintenance and care have the best likelihood of following a recommended maintenance regime. The CVRD's existing septic education program has been very successful in this regard, with almost 300 attendees at the six workshops held thus far, the vast majority of whom came away from the workshops with an improved understanding of proper care and maintenance of their septic systems. Continuing this existing education program is recommended whether or not a regional district septic system regulatory program is established.

According to Ministry of Municipal Affairs and Housing staff, evidence of community engagement on mandatory maintenance program options would be one consideration in Cabinet's deliberation of an Order in Council granting the CVRD the necessary regulatory authority to manage onsite sewage systems. Outside of the current septic education program, past engagement on onsite system management has been through the 2014 rural CVRD official community plan update process, and the prior south sewer LWMP process.

Attachments: Appendix A – WSP Memo – CVRD – Onsite Maintenance Programs

Schedule A – Summary of Maintenance Program Types
Schedule B – Sewerage Systems Regulation Roles and Responsibilities

MEMO

TO: Vince Van Tongeren, CVRD

FROM: Aline Bennett, MASc, P.Eng., Al Gibb, PhD., P.Eng.

SUBJECT: **CVRD – Onsite System Maintenance Program**

DATE: **March 12th, 2020**

WSP was engaged in September 2019 to undertake a review of maintenance programs for onsite systems in the Comox Valley Regional District (CVRD) and make a recommendation on a suitable maintenance program for electoral areas in the CVRD. The scope of this memo includes:

- Review of onsite systems background and history in the CVRD;
- Review and evaluation of potential onsite system maintenance programs that may be suitable for electoral areas in the CVRD;
- Evaluation of costs and resources to undertake an onsite system maintenance program.

The goal is to identify an appropriate level of program for the regions in CVRD which use onsite systems.

1 BACKGROUND

Wastewater is primarily managed by private onsite wastewater systems within the CVRD electoral areas A, B and C. There are approximately 9,000 private onsite systems, serving almost 23,000 people in these electoral areas.

There are concerns over the effectiveness of onsite systems related in part to the findings of water quality monitoring in Baynes Sound and its in-flowing streams. The water quality may not meet standards for shellfish harvesting as reported in Associated Engineering's 2015 report discussing Onsite System Feasibility in the South Region. Monitoring of streams and ditches that enter Baynes Sound in the Union Bay area indicated that these waters had persistently high levels of fecal coliform counts with the presence of *E. coli* that were likely associated with septic fields (Cross 1996). Groundwater quality monitoring programs have also been completed in the electoral areas to evaluate the performance of onsite systems in suspected problem areas with smaller lots and higher lot density. These studies have shown evidence of onsite sewage system failures in these areas.

Monitoring was completed in Royston and Union Bay in 2009 by Payne Engineering Geology. The failure rate varied between areas, with the overall failure rate for the areas sampled being 25%. The highest failure rate was in Union Bay at 50%. Since 2006, Island Health has consistently recommended a centralized sewerage system for the Royston and Union Bay areas (VIHA 2006, 2009, 2011) due to the prevalence of small lots with no area for a replacement field, shallow soils, silty-clay soils, and high winter water tables. Malfunctioning systems generate complaints from neighbours about sewage odours on a routine basis.

Monitoring was completed in Saratoga in 2015 by Payne Engineering Geology which showed groundwater monitoring wells with nitrate and fecal coliform concentrations exceeding British Columbia water quality guidelines (10 mgN/L and 14 MPN/100 mL respectively). This was consistent in areas with over 4 and 6 lots per hectare respectively. Monitoring wells showed an overall failure rate of 19% in the Saratoga area, with some areas showing a failure rate of over 50%.

Work was completed by EBA Engineering in 2008 to assess the potential for onsite systems across the Regional District based on the terrain's slope, drainage, soil texture, depth of soil above an impermeable layer, and proximity to sensitive areas; parameters shown in Table 1. No field verification was completed to confirm these results, but this map was intended to serve as an initial guiding tool for onsite wastewater disposal planning in the Regional District.

Table 1 - Potential Wastewater Ground Disposal Model (EBA, 2008)

PROPERTY	GOOD POTENTIAL	MODERATE POTENTIAL	POOR POTENTIAL	VERY POOR POTENTIAL
Slopes	0% to < 15%	> 15% to < 25%	> 25% to < 35%	> 35%
Drainage	Well drained	Moderately well drained or rapidly drained	Imperfectly drained	Poorly or very poorly drained
Soil Texture	Sand, loamy sand, sandy loam, loam, silt, silt loam	Gravelly sand, very gravelly sand	Sandy clay loam, silty clay loam, clay loam	Sandy clay, silty clay, clay
Depth of Soil Above Restricted Layer	> 90 cm	60 to 90 cm	0.30 to 0.60 cm	0.15 to 0.30 cm
Sensitive Areas	Water wells, coastline, environmentally sensitive areas such as creeks, or problem areas identified by Vancouver Island Health Authority.			

A project to sewer the South Region of the CVRD, which includes the Union Bay and Royston areas, was proposed previously. However, following the South Sewer referendum which was rejected in 2016, an onsite system maintenance approach was pursued instead. Since 2018, the CVRD has put in place an onsite system education program to encourage homeowners to maintain their onsite systems in CVRD electoral areas. The CVRD is now looking at implementing a mandatory maintenance program to ensure that onsite sewage system maintenance requirements are being met by rural property owners. The CVRD would like to evaluate options for establishing an onsite system mandatory maintenance program that will produce results to protect public and environmental health. The project area for this study will include CVRD electoral areas A, B, and C.

The type of maintenance program recommended for the CVRD should be based on the risk that onsite systems in the CVRD are posing to public and environmental health. It is important to note that a mandatory maintenance program will not solve issues related to failing septic systems due to site-specific factors such as poor ground conditions, steep slopes, high groundwater table, shallow impermeable layers, or improperly installed systems, or lots that are too small for proper onsite ground disposal systems.

2 REGULATORY FRAMEWORK

The regulatory framework in British Columbia consists of Provincial regulations and guidelines which outline the planning, design and installation of onsite sewerage systems and are based around qualified professionals undertaking these roles.

Under the *B.C. Sewerage System Regulation*, it is the owners' responsibility to ensure appropriate onsite system maintenance is carried out. However, there is no supporting provincial enforcement or education program to ensure

system maintenance requirements are being met. As such, many onsite system owners may not be completing the minimum maintenance requirements for their system.

B.C. SEWERAGE SYSTEM REGULATION

The Sewerage System Regulation (SSR) of the *BC Public Health Act*[1] came into effect in 2004 and was last amended in June 2010. The SSR applies to the construction and maintenance of holding tanks and sewerage systems with a domestic sewage flow of up to 22,700 L/day servicing single or multiple lots that discharge to ground. Wastewater systems that service flows over 22,700 L/day are regulated by the Municipal Wastewater Regulation (MWR), regardless of whether the treated wastewater is discharged to ground or to a surface water body.

Section 2.1 of the SSR outlines the following activities as health hazards:

- The discharge of domestic sewage into drinking water, surface water or tidal water;
- The discharge of domestic sewage onto land;
- The discharge of domestic sewage into a sewerage system not capable of containing or treating domestic sewage (in the opinion of a health officer, which for the CVRD is a representative from Island Health); and
- The proposed construction or maintenance of a sewerage system that may cause a health hazard.

The rest of the SSR outlines how to minimize or eliminate exposure to these health hazards. For example:

- Section 3.1 outlines minimum recommended setbacks from water wells
- holding tank >15m from a well,
- remaining sewerage system >30m from a well.
- Sections 6 and 7 identify who is authorized to design, construct, and maintain onsite wastewater facilities. Registered onsite wastewater practitioners (ROWP) have authority to design and install Type 1 and 2 systems under 9,100 L/day. A professional engineer must be used for Type 3 systems or ones with flows over 9,100 L/day.
- Section 8 specifies that information on new or upgraded systems must be filed with the Health Authority before construction.
- Section 9 specifies that the ROWP or professional must provide a letter to the Health Authority certifying that the work is complete according to the SSR.

Under the SSR, the ROWP or professional engineer, determines the type of treatment method that is needed to protect human health and the environment at the site, and takes responsibility for certifying the system. There are three types of treatment methods:

- Type 1 – treatment by septic tank only.
- Type 2 – treatment that produces an effluent consistently containing less than 45 mg/L total suspended solids (TSS) and having a 5-day biochemical oxygen demand (BOD_5) of less than 45 mg/L.
- Type 3 – treatment that produces an effluent consistently containing less than 10 mg/L of TSS, BOD_5 of less than 10 mg/L, and a median fecal coliform density of less than 400 CFU/100 mL.
- Additional restrictions are outlined in the B.C. Sewerage System Standard Practice Manual

As previously noted, under the SSR, it is the owners' responsibility to ensure appropriate system maintenance is carried out, however, there is no supporting provincial education and enforcement program to ensure system maintenance requirements are being met.

B.C. SEWERAGE SYSTEM STANDARD PRACTICE MANUAL

In September 2014, Version 3 of the Sewerage System Standard Practice Manual (SPMv3) was adopted in B.C., bringing new requirements into effect for private onsite systems. The SPMv3 is an extension of the SSR, and owners, ROWPs, and professionals should follow the standards specified in the manual.

The SPMv3 identifies technical constraints and considerations to be identified and addressed when designing, operating and maintaining onsite wastewater systems. This document is a technical manual that relates how the ground conditions present at a site, and the treatment type (Type 1, 2 or 3) influences the dispersal area standards that will be used and the overall design criteria required for effective dispersal. Sewerage systems must be designed following the principles of the SPMv3, and any additional local regulatory requirements. Any deviation from the standard practices contained within must not compromise health and environmental protection and be documented.

To summarize, the standards for private on-site systems have increased with the latest versions of the SSR and SPMv3. As a result, sites and systems that were acceptable or borderline acceptable in the past may no longer be acceptable. Under the provincial regulatory framework, ROWP's or the qualified professional are responsible and liable for certifying that the system meets requirements.

VANCOUVER ISLAND HEALTH AUTHORITY

Since 2002, Island Health has periodically reviewed and amalgamated the previous standards for subdivision of lots serviced by onsite systems. The most recent Subdivision Standards were issued by Island Health in July 2013. The intent is to address the cumulative detrimental impact associated with increased development density using onsite sewerage systems. The VIHA standards are minimums for Vancouver Island, though local governments and other agencies may have additional requirements.

The Subdivision Standards outline site assessment and reporting requirements as part of a Subdivision Plan, reviewable by Island Health officers. These standards also include setback distances to wells and open water that in some cases exceed those stipulated by the SSR. For example, the setback from a holding or septic tank to a well must be greater than 15 metres under the SSR versus greater than 30.5 metres under VIHA. The more stringent setback applies for locations within VIHA jurisdiction.

The VIHA standards also set minimum lot sizes and effluent discharge areas based on slope and mineral soil depth depending on whether water supply is via a water supply system or a private well. For example, if the slope of the discharge area on the property is less than 15% and the native mineral soil depth is over 1.2 metres, the minimum lot size is 0.2 hectares (0.5 acres). With the same slope of 15% and the native soil depth of between 0.46 - 0.60 metres only, the minimum lot size increases to 2 hectares (5 acres). The absolute minimum lot size for servicing by an onsite system is 0.2 hectares.

The VIHA standards also outline conditions in which a more detailed hydrogeological assessment may be required; for example, if there is potential for surface water or groundwater contamination, steep slopes, high density development areas or historical problem areas. In these instances, the assessment should be completed by a qualified professional.

LOCAL REGULATIONS

The CVRD Zoning Bylaw, 2005 (Bylaw No. 2781) outlines servicing requirements for the different zoned areas. Part 500 – Subdivision Regulations, outlines the general provisions and standards for a subdivision permit or plan submission. Section 503.6 outlines the subdivision standards pertaining to works and services for a lot within the Regional District.

As sewerage servicing is primarily by onsite systems, there is currently no formalized Subdivision Servicing Bylaw in place for the CVRD at this time. Currently, subdivision approval includes a review by the local Environmental Health Officer from VIHA, who reviews applications against the Subdivision Standards they have adopted.

Note that the CVRD does not have jurisdiction over the approval and installation of onsite systems. Subdivision approval is by the Ministry of Transportation & Infrastructure and installation is by a ROWP. VIHA's involvement is limited to filing the onsite system documentation.

3 TYPES OF ONSITE SYSTEM MAINTENANCE PROGRAMS

A 2016 report for the British Columbia Ministry of Health titled 'Onsite Sewage System Maintenance Programs and Bylaw Review' recommended adopting a risk based approach to onsite system maintenance programs. This means implementing a program to manage onsite system maintenance based on the risk posed by onsite systems in specific areas to public and environmental health. Benefits of a risk based approach include:

- It identifies specific areas where onsite systems could pose environmental and public health risk,
- It enables the Regional District to focus resources on priority areas at greater risk of impacts to public and environmental health,
- It avoids a one size fits all approach, which can be poorly accepted by residents, if their onsite systems do not pose environmental or health risks.

Onsite system maintenance programs have been shown to be beneficial in ensuring that onsite systems are operating properly and preventing ground or surface water contamination. Beyond ensuring that the system is properly sited and installed, regular onsite system maintenance typically involves ensuring the system is being used according to it's initial design, inspecting the septic tank for cracks and leaks, inspecting the drainfields, cleaning effluent filters, regular pump outs.

Again, note that a mandatory maintenance program will not solve issues related to failing septic systems due to site-specific factors such as poor ground conditions, steep slopes, high groundwater table, shallow impermeable layers, or improperly installed systems.

There are different maintenance program models that are applicable depending on the risk posed by onsite systems to public and environmental health. These are generally categorized as Homeowner Education Programs, Mandatory Inspection Programs, or Mandatory Inspection and Maintenance Programs. If risk posed by onsite systems in an area is generally low, a homeowner education program may be appropriate to protect public and environmental health. If risk posed by onsite systems in an area is medium or moderate, a mandatory inspection program for all systems in that area should be considered. If risk posed by onsite systems in high, a mandatory inspection and maintenance program may be appropriate. Note that funding incentives for system improvements such as effluent filters or access risers can be a tool to encourage homeowner goodwill and participation in a maintenance program but is not a maintenance program in itself.

COMMON PRINCIPLES OF EFFECTIVE PROGRAMS

A jurisdictional review of many types of onsite system management programs was completed in the 2016 Ministry of Health report. A summary principles of effective management programs are;

- **Avoid a 'one size fits all' approach.** From the homeowner perspective, property owners respond better to an inspection based program as opposed to a mandatory pump-out program because it is not a 'one size fits all' approach. Property owners can choose what to do with their inspection report, which promotes understanding of the system leading to a more proactive approach.
- **Public education and awareness are key**. Ultimately, this kind of work is about changing behaviours and attitudes towards onsite system maintenance. Increasing the willingness of homeowners to maintain their onsite systems starts with increasing awareness through education of homeowners and elected officials.
- **Understand the risk and benefits**. Maintenance programs are implemented because of either perceived or real risk from the systems, generally based on population density, location, sewage flow rate of systems, proximity

to sensitive water bodies, and age of the systems. Homeowners and elected officials need to understand the value of implementing the program, which may include understanding the impacts on property values, or the opportunity cost associated with sewering an equivalent area. Understanding which areas are high risk allows prioritization of resources and funds.

- **Collecting and managing data**. Collecting good data and managing it appropriately are important components of an effective program because it allows the program managers to operate the program, make evidence based decisions and evaluate program objectives.
- **Enforcement**. It is not clear whether or not having enforcement mechanisms is essential to an effective onsite management program. Having a bylaw can be useful to enforce compliance, but passing that bylaw and getting endorsement to administer and enforce the bylaw should be a serious consideration. Whether or not enforcement mechanisms are part of the program could depend on the risk of onsite systems to public and environmental health in the region. Enforcement mechanisms as part of the program could depend on the risk of onsite systems to public and environmental health in the region.
- **Cost recovery**. The programs discussed which include educational, inspection or maintenance services for onsite systems generally recover the costs associated with the services. There are different mechanisms for recovering those costs including property taxes, septage tipping fees, or contractor fees. Ongoing operational program costs are typically not funded by more senior levels of government.

HOMEOWNER EDUCATION PROGRAM

A homeowner education program is focused on encouraging onsite system maintenance among property owners through education. These types of programs will typically include education and awareness campaigns which may include door knocking, pamphlets, radio advertisements, information on websites and workshop sessions.

Pros: This type of program is simple to develop and administer at a local government level. It is non-controversial as it does not require significant costs, regulatory mechanisms or enforcement to occur. These programs can have positive results whereby homeowners better understand their septic systems and feel empowered to maintain their asset long-term.

Cons: The true impact of this type of program is difficult to measure as it does not collect or provide information on the types, locations and conditions of onsite systems in the region. This makes it difficult to understand where the problems are, or how effective the program is. This also limits the impact that this type of system can have on public and environmental health as it may not address the most pressing issues related to improperly sited or installed onsite systems. For these reasons, a homeowner education system is most appropriate in areas where onsite systems are at a low risk of impacting public or environmental health.

Cost: Typically these programs tend to cost between $20,000-$40,000 per year for a local government to implement and administer including staff time and resources.

Level of Effort: The level of effort involved in administering a program of this type may take between 20 to 50% of one FTE's time.

Example programs: Regional District of Nanaimo's Septic Smart program, or the CVRD's own Septic System Education program.

MANDATORY PUMP OUT PROGRAM

A mandatory pump out program includes a mandatory onsite system pump out at each property at a specified frequency. The program is quite simple for homeowners to understand since pump-outs may be the only type of system maintenance that homeowners are familiar with. This type of program does not address the increased maintenance requirements for Type 2 or 3 systems.

Pros: Overall, this program ensures that pump-outs, which are a component of onsite system maintenance is occurring. The program is less expensive to the homeowner, as only pump outs are required, and it's likely there would be greater public acceptance of this approach since homeowners would readily understand the program.

Cons: This type of program tends to be viewed as a one size fits all approach, that doesn't accomplish the inspection or maintenance components of successful onsite system programs, and therefore provides no information to the local government regarding the location or condition of systems in the region. A pump-out program does not encourage homeowners to learn more about their systems and does not alert homeowners to potential problems with their system since they do not have that contact with ROWPs. Generally speaking, pumping out a septic tank does not equal system maintenance, and the impact on public and environmental health outcomes is difficult to measure.

Costs: A septic tank pump out typically costs about $400-500, and should occur at a regular interval depending on the system design and loading. Under this type of program, the costs for a pump out would be tied to property taxes and the homeowner would be directly responsible for any additional inspection or maintenance costs. Local government costs would include costs for the pump out, coordinating the pump-outs, data collection and the homeowner education program.

Level of effort: The local government would be responsible for coordinating the pumper truck and ensuring that homeowners are aware that pumper trucks will be arriving. The local government would also be responsible for developing an inventory of onsite system location and coordinating an education program. Based on other programs, this typically takes between 1-2 FTEs depending on the number of systems involved.

Example Programs: Capital Regional District Mandatory Pump-out Program

MANDATORY INSPECTION PROGRAM

A mandatory inspection program includes an onsite system inspection at each property. The Registered Onsite Wastewater Practitioner (ROWP) who conducts the inspection would provide the homeowner with a maintenance plan which they are then responsible to follow up with. This approach relies on education of the homeowner through the inspection process and the assumption that the homeowner will want to maintain the asset on their property once given the tools to do so. There is no additional enforcement from the local government to ensure that recommended maintenance has occurred. This type of program works best when also supported by a homeowner education program. Based on other programs reviewed, this program works well when inspectors and inspections are coordinated by the local government.

Pros: A flexible, inspection-based approach has been shown to empower homeowners by providing them with the information they need to maintain an expensive asset on their property. This type of program allows the local government to collect information on the types, locations and conditions of systems and create a database of systems in the region.

Cons: An inspection-based program takes more effort to administer at the local government level and can be more politically sensitive to implement as the costs are greater and require access to homeowner's property. A mechanism to enforce inspections if needed is recommended. Capacity of local ROWPs to perform this work is currently low, though it is expected that more capacity would be developed as the program is developed.

Costs: An inspection based program typically costs about $500-600 per property per inspection, and the frequency of inspection should depend on the type of onsite system on the property (i.e. A type 1 system requires inspections less frequently than a Type 2 or 3 system). The costs for the inspection would be tied to property taxes, and homeowners would be responsible for any additional pump-out or maintenance costs. There are additional local

government costs for administering the inspection, data collection and homeowner education program. Costs of pump-outs and other maintenance is not included here and considered a homeowner cost.

Level of effort: The local government is typically responsible for either coordinating inspections, or ensuring that inspections have taken place. The local government would also be responsible for developing a database of onsite system location and condition information, coordinating inspections, and coordinating an education program. Based on other programs, this typically takes between 2-3 FTEs depending on the number of systems involved. Use of additional tools such as incentive programs or low income homeowner subsidies to help with maintenance can be valuable tools in gaining public support for an inspection based program.

Example Programs: Township of Huron-Kinloss, Ontario Mandatory Inspection Program

MANDATORY INSPECTION AND MAINTENANCE PROGRAM

A mandatory inspection and maintenance program is typically used where there is a high risk of public or environmental health impacts from failing onsite systems. This type of program includes a mandatory inspection followed by mandatory maintenance that was a result of the inspection. This requires an enforcement component at the local government level, who is responsible for making sure inspections have taken place, filing and reviewing inspection reports and following up to ensure that necessary repairs have taken place. This type of program is also best supported by a homeowner education program.

Pros: This program allows for a high degree of understanding of the condition of onsite systems in the region and identifies and enforces maintenance requirements. This program can have a measurable impact on health and environmental outcomes.

Cons: There is a higher cost and administrative effort relative to a homeowner education and mandatory inspection program. A regulatory framework is typically put in place to outline program requirements, allow inspectors on the property, and local government staff to enforce the maintenance requirements. An enforcement mechanism is required for the program to have teeth which can be unpopular, particularly in an area with failing onsite systems which may require significant upgrades. Enforcing maintenance requirements for failing systems that were installed prior to the 2005 Sewerage System Regulation is a challenge not well addressed by these types of programs.

Level of effort: The level of effort for local government is greater than a mandatory inspection program given the additional enforcement requirement. It likely takes between 1-2 FTEs for program administration, database management, inspection coordination and delivering a homeowner education program, with an additional 1-2 FTEs for maintenance enforcement.

Costs: Similar to the mandatory inspection program, costs are likely around $500-600 per property per inspection, with additional costs for local government staff and homeowner education program material. Additional homeowner costs would be quite a bit more significant since maintenance is mandatory. Depending on the type of system in place, this could range from a few hundred to a few thousand dollars per year depending on the condition of the system.

Example Programs:

- Keuka Lake Mandatory Inspection & Maintenance Program, New York.
- Kitsap County, Washington State

4 PROGRAM COST ESTIMATES

Estimated costs for the four general program types described above are listed below. These costs are based on actual program costs from other similar types of programs across North America and conversations with ROWPs to inform current local costs of services. Costs that are not noted in this estimate, but may be incurred depending on the capacity of the local government include:

- costs to develop a database to manage the information, estimated at $25,000 based on other studies; and
- costs to develop educational material
- Ongoing groundwater monitoring.

Costs do not include additional maintenance or system replacement as those are considered homeowner costs. Additional costs for incentive or subsidy programs are also not considered here as these are not considered part of a core maintenance program. These costs also assume that all onsite systems in the Regional District would be required to participate in the program.

The costs listed for a Homeowner Education Program in Table 2 assume the following:

- These are costs to the local government for administering the program.
- The program consists of web based information, workshops and distribution of pamphlets/brochures.
- The number of staff required to administer the program is approximately 0.25 FTE.
- Costs are in 2020 $CAD and do not account for inflation

Table 2 – Annual cost estimate for a Homeowner Education Program

HOMEOWNER EDUCATION PROGRAM	UNIT	UNIT COST	QUANTITY	COST
Staff	FTE	$80,000	0.25	$20,000
Educational Workshops	Each	$800	4	$3,200
Educational Pamphlets, brochures etc.	LS	$5,000	1	$5,000
Estimated Annual Total				**$28,000**

The costs listed for a Mandatory Pump-Out program in Table 3 assume the following:

- These are costs to the local government for administering the program.
- The Regional District is responsible for hiring and coordinating the pump trucks (as opposed to the homeowner.
- The cost of a pump-out is estimated at $500 per property. It is assumed that all systems in the region are pumped out every 5 years for a Type 1 system (1,800 systems per year). A Type 2 or 3 system could have more frequent requirements. Type 1 systems are assumed in this estimate for simplicity.
- These costs do not include additional inspections, system maintenance or replacement. Those are homeowner costs if incurred.
- The number of staff required to administer and coordinate the program is approximately 2 FTE. This could vary depending on the number of onsite systems administered in the program.
- Costs are in 2020 $CAD and do not account for inflation.

Table 3 - Annual cost estimate for a Mandatory Pump-out Program

MANDATORY PUMP-OUT PROGRAM	UNIT	UNIT COST	QUANTITY	COST
Staff	FTE	$80,000	2	$160,000
Educational Workshops	Each	$800	4	$3,200
Educational Pamphlets, brochures etc.	LS	$5,000	1	$5,000
Pump-outs	Each	$500	1800	$900,000
Estimated Annual Total				**$1,070,000**

The costs listed for a Mandatory Inspection Program in Table 4 assume the following:

- These are costs to the local government for administering the program.
- The Regional District is responsible for hiring and coordinating system inspections (as opposed to the homeowner)
- The cost of an inspection is estimated at $1,000 per property. It is assumed that all systems in the region are inspected on a ~6-year inspection cycle for a Type 1 system (1,500 systems per year). A Type 2 or 3 system would likely have more frequent inspection requirements. Type 1 systems are assumed in this estimate for simplicity since it is unknown how many Type 2/3 systems are in the region.
- This cost does not include costs for pump-outs or additional system maintenance which are homeowner costs and would be based on inspection results.
- The number of staff required to administer and coordinate the program is approximately 2.5 FTE. This could vary depending on the number of onsite systems administered in the program.
- Costs are in 2020 $CAD and do not account for inflation.

Table 4 – Annual cost estimate for a Mandatory Inspection Program

MANDATORY INSPECTION PROGRAM	UNIT	UNIT COST	QUANTITY	COST
Staff	FTE	$80,000	2.5	$200,000
Educational Workshops	Each	$800	4	$3,200
Educational Pamphlets, brochures etc.	LS	$5,000	1	$5,000
Inspections	Each	$1,000	1,500	$1,500,000
Estimated Annual Total				**$1,710,000**

The costs listed for a Mandatory Inspection and Maintenance Program in Table 5 have similar assumptions as for a Mandatory Inspection Program. It is assumed that an additional 1.5 FTE would be required for the enforcement component of the program. The staff number is based on mandatory inspection and maintenance programs in other jurisdictions.

Table 5 – Annual cost estimate for a Mandatory Inspection & Maintenance Program

MANDATORY INSPECTION & MAINTENANCE PROGRAM	UNIT	UNIT COST	QUANTITY	COST
Staff	FTE	$80,000	4	$320,000
Educational Workshops	Each	$800	4	$3,200
Educational Pamphlets, brochures etc.	LS	$5,000	1	$5,000
Inspections	Each	$1,000	1,500	$1,500,000
Estimated Annual Total				**$1,830,000**

Additional costs taken on by the homeowner, based on results of inspection, may include:

- Pumping out a septic tank: $200 - $600 (depending on tank size)[2]
- Maintenance and monitoring: $100 - $800 per year
- System replacement costs: anywhere from $15,000 – $50,000 depending on whether a Type 1, 2 or 3 system is required.

A summary of the different maintenance program types is shown in Table 6.

Table 6 – Summary of Onsite System Maintenance Programs

PROGRAM MODEL	PROS	CONS	CONSIDERATIONS
Homeowner Education Program	– Appropriate for areas that are at **low risk** of public or environmental health impacts – Simple – Low cost – Low administrative requirements – Non-intrusive – Can improve onsite system maintenance practices	– No inventory of systems is developed – Difficult to measure impact on maintenance practices, health or environmental outcomes – Develops limited understanding of the cumulative risk from onsite systems – Can not solve issues related to improperly installed or sited onsite systems	– Should only be used for **low risk** onsite systems which will not significantly impact public or environmental health

PROGRAM MODEL	PROS	CONS	CONSIDERATIONS
Mandatory Pump Out Program	– Ensures that pump-outs are taking place on a regular basis – Readily understandable by homeowner – Develops inventory of onsite systems	– One size fits all approach – No understanding of system type or condition is developed – Difficult to evaluate impact on public or environmental health – Can not solve issues related to older, improperly installed or sited onsite systems	– Pump outs are a component of maintenance, but on their own, do little to encourage ongoing system understanding and maintenance.
Mandatory Inspection Program	– Appropriate for areas that are at **medium risk** of public or environmental health impacts – Can have measurable impact – Develops inventory of onsite systems – Identifies systems that require maintenance – Program can be flexible and adapted to onsite system condition and maintenance requirements	– High cost and administrative requirements – Can be considered intrusive by some homeowners – A mechanism to enforce inspections if needed is recommended. – Lack of enforcement capabilities for a failed onsite system. – Can not solve issues related to older, improperly installed or sited onsite systems	– Should incorporate homeowner education – Requires a sustainable financing model – Requires supporting regulatory framework – Requires development of a database – Relies heavily on homeowner goodwill and participation for implementation – Other programs report good homeowner participation when supported with appropriate education. – Use of additional tools such as incentive programs or low income homeowner subsidies to can be valuable tools in gaining public support.

PROGRAM MODEL	PROS	CONS	CONSIDERATIONS
Mandatory Inspection and Maintenance Program	– Appropriate for areas that are at **high risk** of public or environmental health impacts – Identifies and enforces maintenance requirements – Can have measurable impact – Develops inventory of onsite systems – Program can be flexible and adapted to onsite system maintenance needs and requirements	– High costs and administrative requirements to run program – Highest level of intrusiveness – Requires enforcement component which can be politically unpopular – Can not solve issues related to older improperly installed or sited onsite systems	– Should incorporate homeowner education – Requires a sustainable financing model – Requires supporting regulatory framework, in particular for enforcement to have teeth – Requires development of a database

5 RISK POSED BY CVRD ONSITE SYSTEMS

To develop a risk-based approach for onsite systems, the following parameters can be used to indicate potential public health and environmental risk:

- Soil type,
- Soil drainage,
- Ground slope and topography,
- Lot size,
- Surface water proximity,
- Floodplain location,
- Onsite system age,
- Groundwater susceptibility,
- Location of groundwater recharge areas, and
- Drinking water supply.

These parameters provide an indication of risk of ground and surface water contamination for a particular area by indicating the potential cumulative risk for a given area and which areas are more likely to cause deleterious effects to the environment and public health. A significant amount of work has already been done in assessing onsite systems in the CVRD and there is a good understanding of regions that either are or are not appropriate for onsite wastewater disposal. Gaps that remain in understanding risk posed include:

- Types of onsite systems;
- System Age;
- Floodplain mapping;
- Groundwater susceptibility; and
- Location of groundwater recharge areas.

Using these parameters as a guide, and the work completed by EBA in 2008, CVRD has identified areas where onsite systems potentially pose risks to public and environmental health. Figure 1 to Figure 15 incorporate slope, drainage, soil type, and soil depth data, existing lot sizes and water service area boundaries. Using this information, a coarse risk profile was developed for each of the areas, shown in Table 7. The risk is estimated using standard risk assessment methodology, where risk is the product of likelihood and consequence.

Table 7 – CVRD Onsite System Risk Profile Summary

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
Robinson Lake Area Figure 1	– Approximately 50 lots situated around Robinson Lake, most of which are <0.2 ha – Lots are on private wells	– Area is generally considered poor to moderate for onsite systems based on soil type, soil depth, topography – Area is not serviced by water systems – There is no site specific groundwater monitoring information for this area.	– Likelihood of failure around Robinson Lake is high based on development potential rating and lot size. – The area is not serviced by water systems, and lots are on private wells. – The area is near sensitive freshwater systems. – Consequence of onsite system failure are high from a public health and environmental perspective	– Characterized as **high** risk – Groundwater monitoring is recommended to confirm risk profile.
Saratoga Beach Area Figure 2	– Approximately 600 lots – 98% of lots are serviced by a community water system – Majority of lots close to Saratoga Beach are <0.2ha – There are a handful of lots on private wells	– Area is generally considered poor to moderate for onsite systems based on soil type, soil depth, topography – Many small lots less than 0.2 ha – Groundwater testing has indicated onsite system failures in the area – Situated over aquifer characterized as having 'moderate vulnerability'	– Majority of area is serviced by CVRD and non-CVRD water systems – Likelihood of onsite system failure is high given that groundwater monitoring has confirmed onsite failures – Consequences of failure are low from a public health as most properties are serviced via water systems. There is a potential risk to the lots on private wells. – Contamination of groundwater is occurring. Unclear if this is having an impact on the aquifer. – Consequence is high from an environmental perspective due to	– Characterized as **high** risk

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
			ongoing groundwater contamination	
Bates Beach Area Figure 3	– Over 200 lots – Approximately 150 lots <0.2ha – Lots are on private wells	– Area is generally considered poor to moderate for onsite system suitability based on soil type, soil depth, topography – Area is not serviced by water systems – Many small lots less than 0.2 ha – There is no site specific groundwater monitoring information for this area – Proximity to Kitty Coleman Creek and other freshwater systems	– Likelihood of onsite system failure is likely medium - high – Consequence of failure is high from a public health perspective as the area is on private wells, – Consequence of failure is high from an environmental perspective	– Characterized as **high** risk – Groundwater monitoring is recommended to confirm risk profile
Anderton Road Area Figure 4	– Over 200 lots – Approximately 150 lots <0.2ha – Majority of lots are serviced by the Comox water system	– Area is generally considered moderate to poor for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – There is no site specific groundwater monitoring information for this area	– Likelihood of onsite system failure is likely medium - high – Consequences of failure is likely low from a public health perspective as the majority of properties are serviced by water systems. – Consequence of failure is likely high from an environmental perspective	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
Lazo Road Area Figure 5	– Over 150 lots – Over 100 lots < 0.2ha – Lots are on private wells	– Area is generally considered moderate for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – Groundwater testing recorded zero onsite system failures in the area	– The area is not serviced by water systems, and lots are on private wells. – Likelihood of onsite system failure is likely medium to low given that monitoring showed no failures – Consequence of failure is high from a public health perspective – Consequence of failure is high from an environmental perspective	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile
Quenville / Little River Area Figure 6	– Over 300 lots – Over 200 lots <0.2ha – Some lots on private wells – A handful of lots on private wells are in close proximity to the small lots <0.2ha – Most lots are serviced by the CVRD water system	– Area is generally considered poor to moderate for onsite system suitability based on soil type, soil depth, topography. – Proximity to the Little River freshwater system. – Many small lots less than 0.2 ha – There is no site specific groundwater monitoring information for this area	– Likelihood of onsite system failure is likely medium – Consequence of failure is low from a public health perspective as most are on a the CVRD water service – Consequence of failure is high from an environmental perspective due to proximity to freshwater systems	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile
Sandwick Area Figure 7	– Over 200 lots – Over 150 lots <0.2 ha – Majority of lots are serviced by the CVRD water system – ~30 lots on private wells	– Area is generally considered very poor to poor for onsite system suitability based on soil type, soil depth, topography	– Likelihood of onsite system failure is likely medium to high given the density of small systems in a ‘very poor’ area – Consequence of failure is low from a public health perspective	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
		– There is no site specific groundwater monitoring information for this area – Many small lots less than 0.2 ha – Proximity to the Portuguese Creek system.	given that most are on the CVRD water system – Consequence of failure is high from an environmental perspective given proximity to Portuguese Creek	
Gartley Point Area Figure 8	– Over 300 lots – Over 200 lots <0.2ha – Lots are serviced by the Royston water system	– Area is generally considered very poor to moderate for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – Proximity to Copeman Creek, Trent River, Roy Creek, Beacon Creek – Groundwater testing in the Royston area has indicated onsite system failures in the area	– Likelihood of failures is high – Consequence of failure is low from a public health perspective given that lots are serviced by the Royston water system – Consequence of failure is high from an environmental perspective given proximity to Copeman Creek, Trent River, Roy Creek, Beacon Creek	– Characterized as **high** risk given known onsite system failures in the area – Since 2006 Island Health has expressed the opinion that Royston and Union Bay should have a community sewer system because of observations about poor septic system performance – Previous studies have indicated that onsite systems may not be a feasible long-term solution
Marsden Area Figure 9	– Over 400 lots – Over 200 lots <0.2ha – Lots serviced by CVRD water system	– Area is generally considered very poor to moderate for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha	– Likelihood of failures is high given density of systems in a ‘very poor’ area – Consequence of failure is low from a public health perspective given that lots are serviced by the CVRD water system – Consequence of failure is high from an environmental perspective given proximity to	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
		– There is no site specific groundwater monitoring information for this area – Proximity to the Morrison Creek, Hillemar Creek system.	Morrison Creek, Hillemar Creek, and other local freshwater systems	
Buckley Bay Area Figure 10	– Over 80 lots – Over 50 lots <0.2ha – Lots serviced by non-CVRD water system	– Area is generally considered moderate for onsite system suitability based on soil type, soil depth, topography – Proximity to Hindoo Creek, local freshwater systems and Baynes Sound – There is no site specific groundwater monitoring	– Likelihood of failures is medium – Consequence of failure is low from a public health perspective given that lots are serviced by a water system – Consequence of failure is high from an environmental perspective given proximity to Morrison Creek, Hillemar Creek, other local freshwater systems and Baynes Sound	– Characterized as **medium** risk – Groundwater monitoring is recommended to confirm risk profile
Ships Point Area Figure 11	– Over 200 lots – Over 150 lots <0.2ha – Lots serviced by non-CVRD water system – A few lots are on private wells	– Area is generally considered very poor to moderate for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – There is no site specific groundwater monitoring information for this area – Proximity to Cowie Creek, Wilfred Creek and Fanny Bay (Baynes Sound)	– Likelihood of failures is high given density of systems in a 'very poor' area – Consequence of failure is low from a public health perspective given that lots are serviced by a water system – Consequence of failure is high from an environmental perspective given proximity to freshwater systems and Fanny Bay (Baynes Sound)	– Characterized as **high** risk – Groundwater monitoring is recommended to confirm risk profile

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
Union Bay Area Figure 12	– Over 300 lots – Over 250 lots <0.2ha – Area is supplied by groundwater from a the local community water system, Union Bay Improvement District	– Area is generally considered very poor for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – Groundwater testing showed 25% of areas tested showed evidence of failing systems (	– Likelihood of onsite system failure is high – Consequence of failure is medium from a public health since the community water system relies on groundwater – Consequence is high from an environmental perspective due to proximity to Baynes Sound	– Characterized as **high** risk given known onsite system failures – Since 2006 Island Health has expressed the opinion that Royston and Union Bay should have a community sewer system because of observations about poor septic system performance – Previous studies have indicated that onsite systems may not be a feasible long-term solution
Graham Lake Area, Denman Island Figure 13	– Over 50 lots – Over 20 lot s<0.2ha – Lots serviced by non-CVRD water system supplied by Graham Lake	– Area is generally considered very poor to poor for onsite system suitability based on soil type, soil depth, topography – There is no site specific groundwater monitoring information for this area – Situated over aquifer characterized as having ‘high vulnerability’	– Likelihood of onsite system failure is medium – Consequence of failure is low from a public health perspective given that lots are serviced by a water system – Consequence of failure is medium from an environmental perspective	– Characterized as **medium** risk

AREA	CHARACTERISTICS	SUITABILITY OF AREA FOR ONSITE SYSTEMS	CONSEQUENCE AND LIKELIHOOD OF ONSITE SYSTEM FAILURE [1, 2]	RISK
Hornby North Area, Hornby Island Figure 14	– Over 200 lots – Over 150 lots <0.2ha – Area is on private wells	– Area is generally considered very poor to poor for onsite system suitability based on soil type, soil depth, topography – Many small lots less than 0.2 ha – There is no site specific groundwater monitoring information for this area – Situated over aquifer characterized as having 'high vulnerability'	– Likelihood of onsite system failure is high – Consequence of failure is high from a public health perspective given that lots are on private wells – Consequence of failure is medium from an environmental perspective	– Characterized as **high** risk – Groundwater monitoring is recommended to confirm risk profile
Hornby South Area, Hornby Island Figure 15	– Over 100 lots – Over 30 lots <0.2 ha – Area is on private wells	– Area is generally considered very poor to poor for onsite system suitability based on soil type, soil depth, topography – There is no site specific groundwater monitoring	– Likelihood of onsite system failure is medium – Consequence of failure is high from a public health perspective given that lots are on private wells – Consequence of failure is medium from an environmental perspective	– Characterized as **high** risk – Groundwater monitoring is recommended to confirm risk profile
	1 The likelihood of failure in a given area is difficult to be quantify. Estimates are given based on development potential and system density. 2 The consequence of system failure is estimated both from a public health and environmental perspective.			

6 SUMMARY

An overview of the history of onsite systems in the CVRD electoral areas shows that onsite systems have been historically problematic in certain areas due to poor soils, topography and lot sizes. This was confirmed by groundwater monitoring studies that showed evidence of onsite system failure in areas like Saratoga Beach, Royston and Union Bay. However, due to the high costs of sewering, options for maintaining onsite systems over the long-term are being explored.

Previous work has shown that onsite system maintenance programs can be effective in ensuring that onsite systems are operating properly and preventing ground or surface water contamination. However, maintenance programs cannot solve problems related to improperly sited or installed onsite systems and enforcing maintenance requirements for failing systems that were installed prior to the 2005 Sewerage System Regulation is a challenge, not well addressed by these types of programs.

Therefore, there may be areas in CVRD where onsite systems are feasible over the long-term and areas where they are not. This report is not intended to make a conclusion on the feasibility of onsite systems in certain areas, rather review maintenance program options in light of the risk profile posed by onsite systems in certain areas.

Where a maintenance program may have measurable impact, there are many approaches for implementing such a program. A jurisdictional review of other programs concluded that implementing a maintenance program based on the risks posed to public and environmental health had the best outcomes in terms of health and environmental impacts and public acceptance of the program. Given the medium to high risk profile of most areas in the CVRD based on potential public health and environmental risks, an inspection based maintenance program may be most appropriate.

While it is not possible to quantify the long-term impact that implementing an onsite maintenance program will have on public and environmental health outcomes at this time, it can be a less costly approach than sewering the equivalent area and be an important first step to understanding whether a maintenance approach can defer or even avoid sewering costs over the long-term. Next steps for the CVRD could include:

1. Confirming the onsite system risk profile of different areas and which areas may be feasible for moving forward with a maintenance program.
2. Select a preferred maintenance program approach. It is recommended that one type of program be implemented.
3. If an inspection based program is selected, determine required inspection frequency for systems depending on whether systems are Type 1, 2 or 3.
4. An inventory of systems should be developed. From the initial inventory, problem areas can be identified and the inspection frequency can be refined.
5. A sustainable funding model should be put in place to support ongoing delivery of the program.
6. Continuing with the homeowner awareness and education program in the region.
7. Implementing groundwater monitoring in targeted areas as part of the program to develop a baseline, confirm risk profiles and assess effectiveness of the maintenance programs.

7 REFERENCES

Associated Engineering (2015) *Comox Valley Regional District South Region LWMP: Feasibility of Continuing to Use Private Septic Systems as Primary Wastewater Strategy*. Completed for the Comox Valley Regional District.

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Millan, Garth, Registered Onsite Wastewater Practitioner (Personal Communication). February 6, 2020.

Payne Engineering Geology (2009) Royston and Union Bay Sewage Study: Effects of Onsite Sewage Systems on Water Quality. Completed for the Comox Valley Regional District.

Payne Engineering Geology (2016) *Report on the 2015 Saratoga Beach Groundwater Monitoring Program.* Completed for the Comox Valley Regional District.

Opus DaytonKnight (2016). *Onsite Sewage System Maintenance Program and Bylaw Review*. Completed for the British Columbia Ministry of Health.

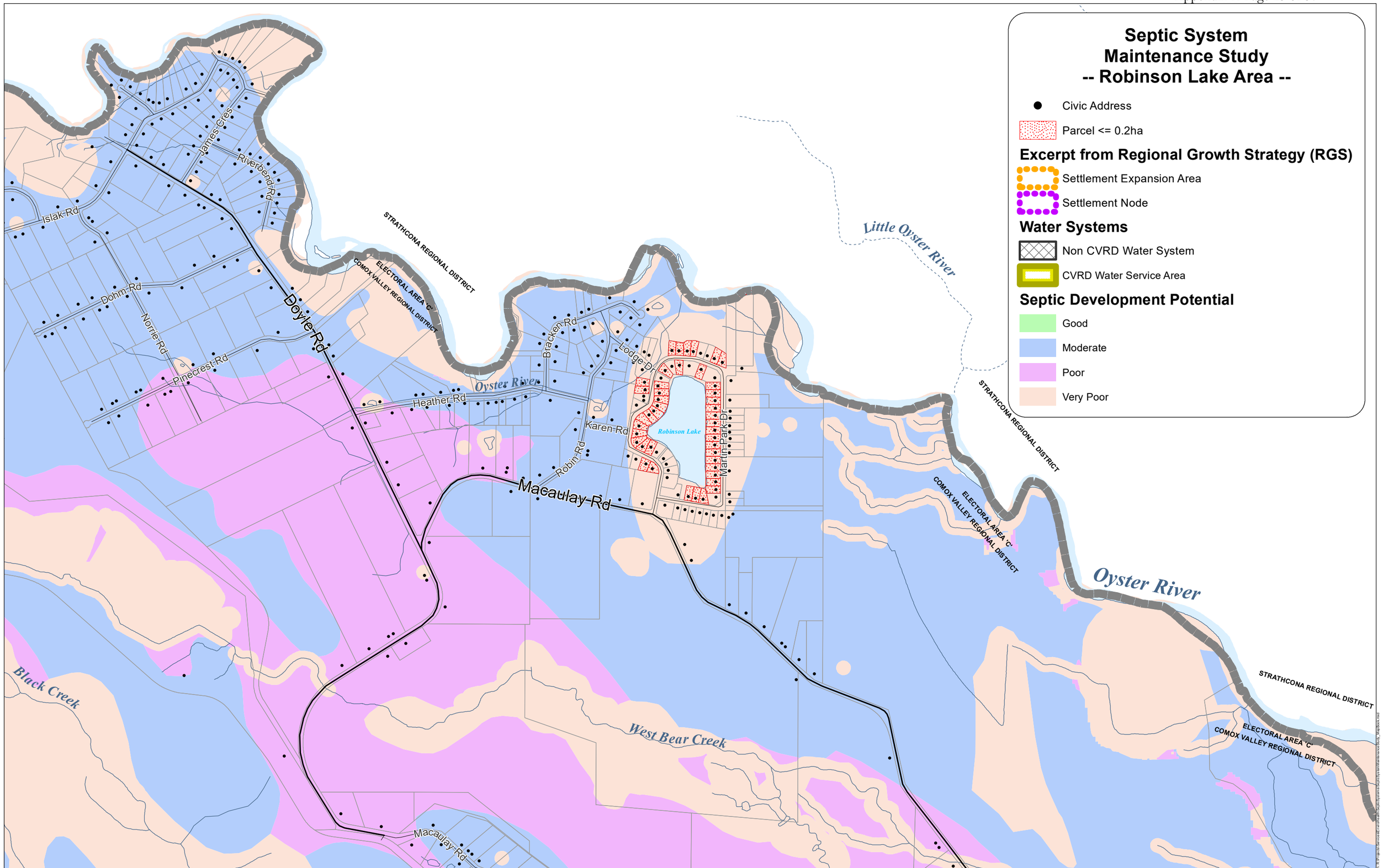
Septic System
Maintenance Study
-- Robinson Lake Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
Islak Rd
James Gres
Riverbend Rd
Dohm Rd
Norrie Rd
Pinecrest Rd
Doyle Rd
Heather Rd
Oyster River
Bracken Rd
Lodge Dr
Karen Rd
Robin Rd
Robinson Lake
Martin Park Dr
Macaulay Rd
Black Creek
West Bear Creek
Little Oyster River
STRATHCONA REGIONAL DISTRICT
ELECTORAL AREA 'C'
COMOX VALLEY REGIONAL DISTRICT

FIGURE 1

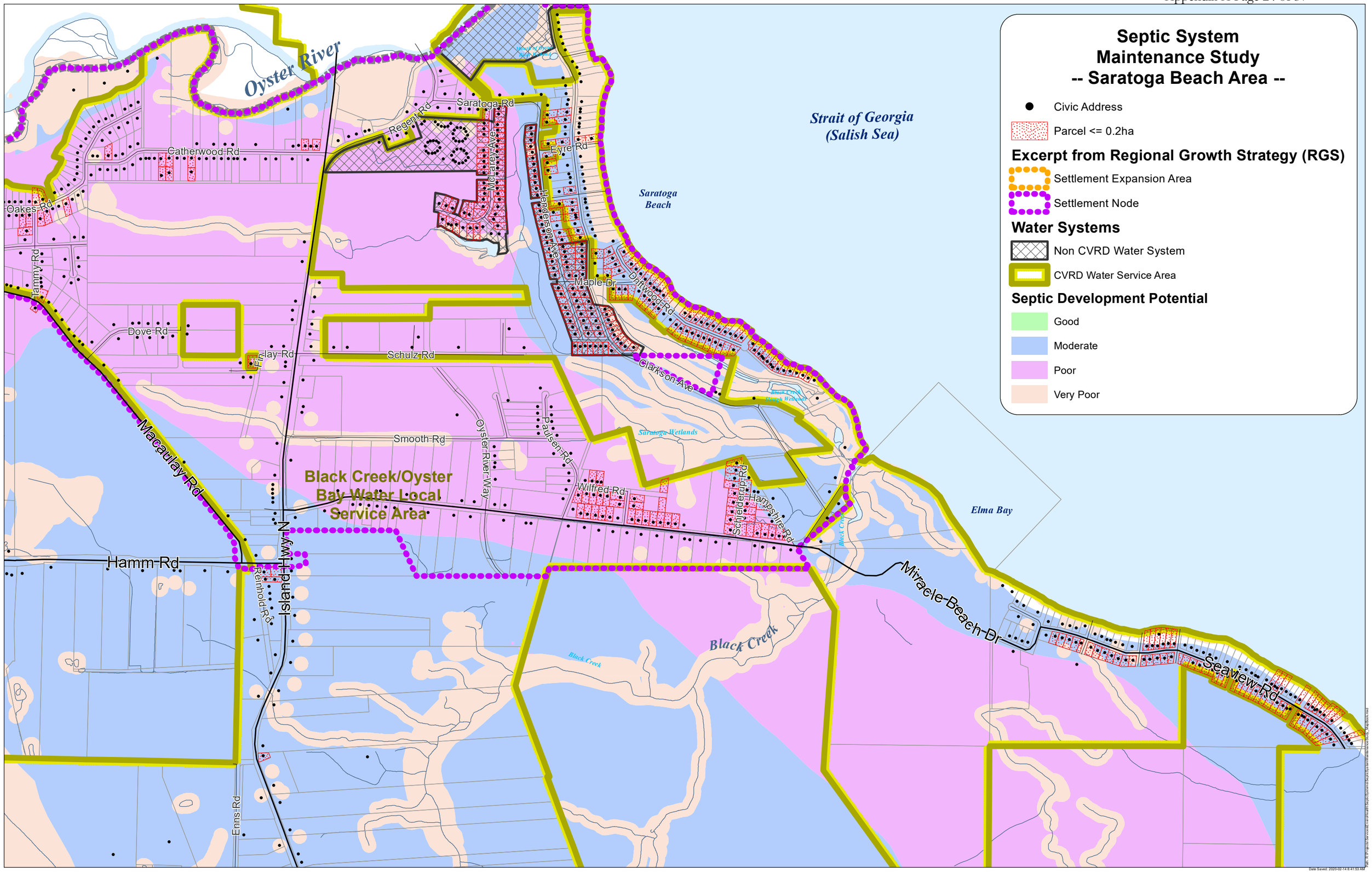
Septic System
Maintenance Study
-- Saratoga Beach Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
Oyster River
Strait of Georgia
(Salish Sea)
Saratoga
Beach
Saratoga Rd
Regent Rd
Catherwood Rd
Oakes Rd
Tammy Rd
Dove Rd
Finlay Rd
Schulz Rd
Macaulay Rd
Smooth Rd
Oyster River Way
Paulsen Rd
Wilfred Rd
Eyre Rd
McGarvey Ave
Henderson Ave
Maple Dr
Driftwood Rd
Clarkson Ave
Saratoga Wetlands
Black Creek
Beach Wetland
Schnieder Rd
Hampshire Rd
Elma Bay
Black Creek/Oyster
Bay Water Local
Service Area
Hamm Rd
Island Hwy N
Reinhold Rd
Enns Rd
Black Creek
Miracle Beach Dr
Seaview Rd

FIGURE 2

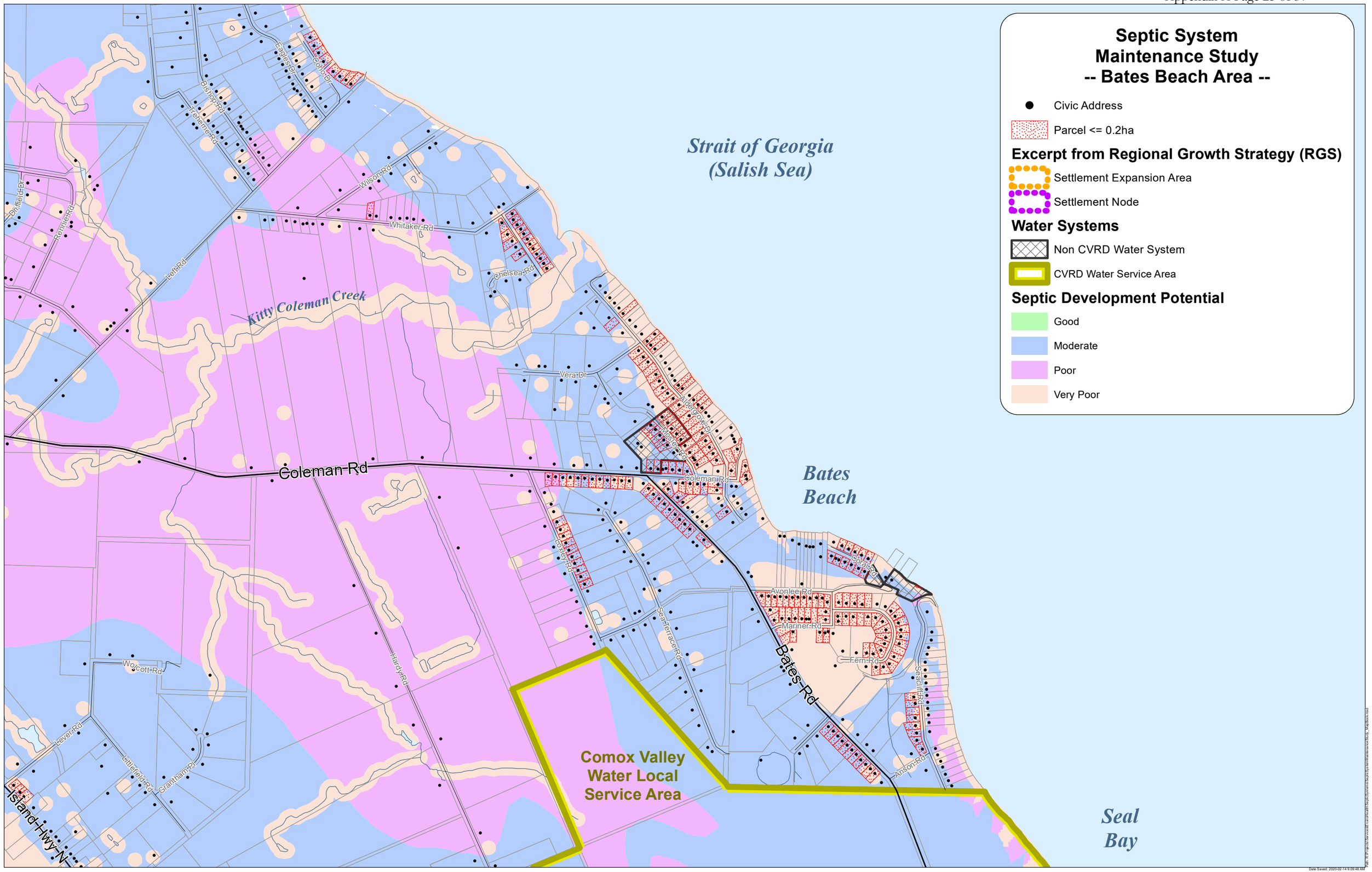
Strait of Georgia
(Salish Sea)
Kitty Coleman Creek
Bates
Beach
Seal
Bay
Comox Valley
Water Local
Service Area
Coleman-Rd
Bates-Rd
Island-Hwy-N
Wilson-Rd
Whitaker-Rd
Chelsea-Rd
Vera-Dr
Left-Rd
Renner-Rd
Dalfield-Dr
Bishop-Rd
Eagles-Dr
Gold-Dr
Hardy-Rd
Wolcott-Rd
Lever-Rd
Littlefield-Rd
Grantham-Pl
Foxley-Rd
Sea-Terrace-Rd
Avonlee-Rd
Mariner-Rd
Fern-Rd
Seacliff-Rd
Anson-Rd
Cory-Rd
Septic System
Maintenance Study
-- Bates Beach Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 3

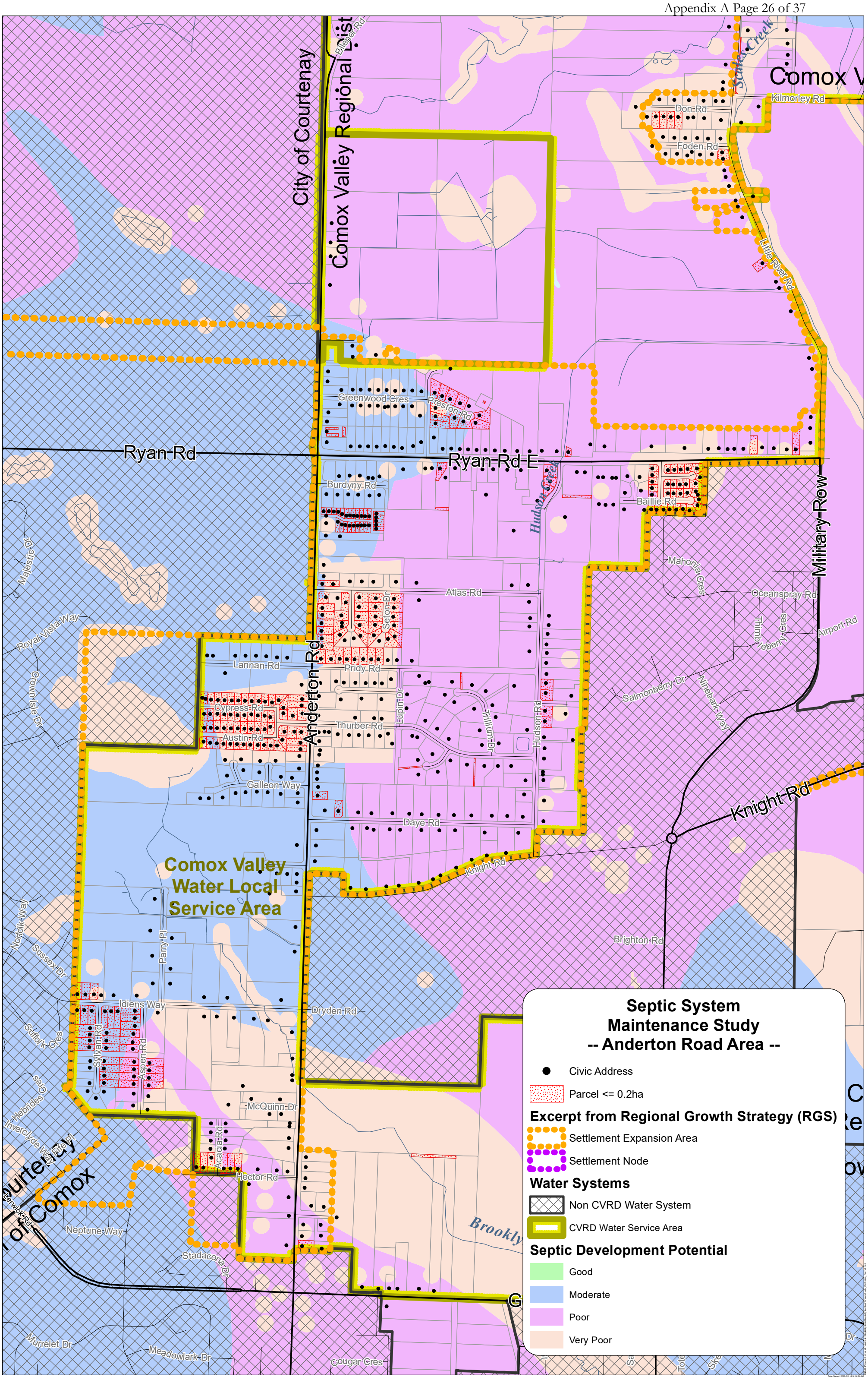
City of Courtenay
Comox Valley Regional Dist
Ellenor Rd
Comox V
Kilmorley Rd
Don Rd
Foden Rd
Little River Rd
Ryan Rd
Ryan Rd E
Greenwood Cres
Preston Rd
Burdyny Rd
Baillie Rd
Military Row
Majestic Dr
Royal Vista Way
Crown Isle Dr
Anderton Rd
Lannan Rd
Pridy Rd
Cypress Rd
Austin Rd
Thurber Rd
Lupin Dr
Seton Dr
Atlas Rd
Hudson Rd
Trillium Dr
Galleon Way
Daye Rd
Knight Rd
Mahonia Cres
Oceanspray Rd
Thimbleberry Cres
Airport Rd
Salmonberry Dr
Ninebark Way
Comox Valley Water Local Service Area
Norfolk Way
Sussex Dr
Parry Pl
Brighton Rd
Idiens Way
Dryden Rd
Suffolk Cres
Sylvan Rd
Aspen Rd
McQuinn Dr
Hebrides Cres
Inverclyde Way
Acacia Rd
Hector Rd
Berwick Rd
Neptune Way
Stadacona Dr
Murrelet Dr
Meadowlark Dr
Cougar Crès
Brookly
Septic System
Maintenance Study
-- Anderton Road Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 4

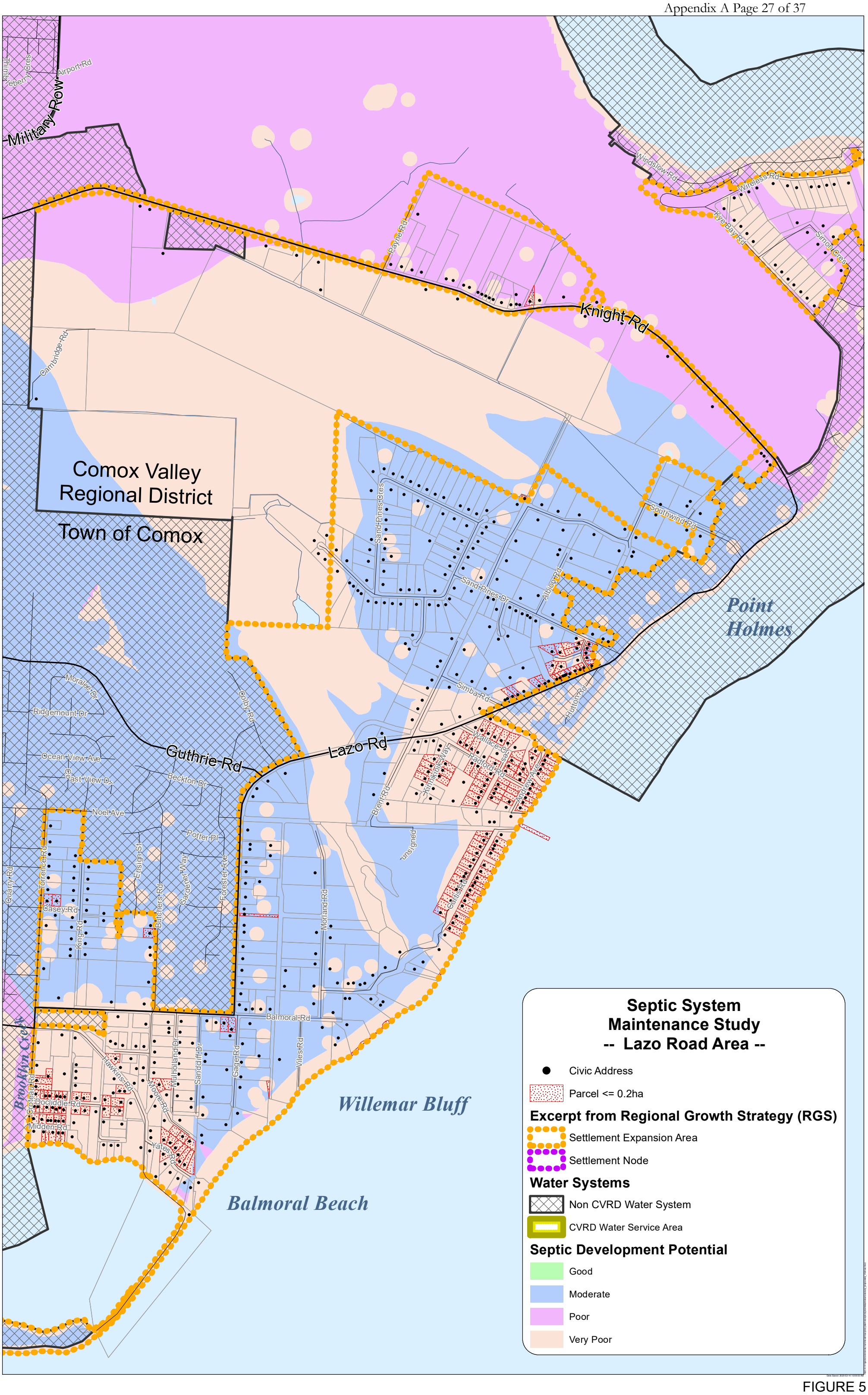
Comox Valley
Regional District
Town of Comox
Military Row
Airport Rd
Elmsley Cres
Windslow Rd
Wireless Rd
Kye Bay Rd
Simon Cres
Payne Rd
Knight Rd
Gambridge Rd
Sand Pines Cres
Southwind Rd
Sand Pines Dr
Albion Rd
Point Holmes
Morales Dr
Ridgemount Dr
Ocean View Ave
East View Dr
Beckton Dr
Noel Ave
Potter Pl
Torrence Rd
Ensign St
Gardener Way
Forester Ave
Quarry Rd
Casey Rd
King Rd
Butchers Rd
Colby Rd
Guthrie Rd
Lazo Rd
Simba Rd
Hutton Rd
Brent Rd
Kimmikin Way
Wallace Cir
Raiford Rd
Andrew Ave
Curtis Rd
Morland Rd
Unsigned
Balmoral Rd
Brooklyn Creek
Cruickshank Rd
Doolittle Rd
Midden Rd
Hawkins Rd
Moore Rd
Mulholland Dr
Sandcliff Dr
Gage Rd
Viles Rd
Yates Rd
Willemar Bluff
Balmoral Beach
Septic System
Maintenance Study
-- Lazo Road Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 5

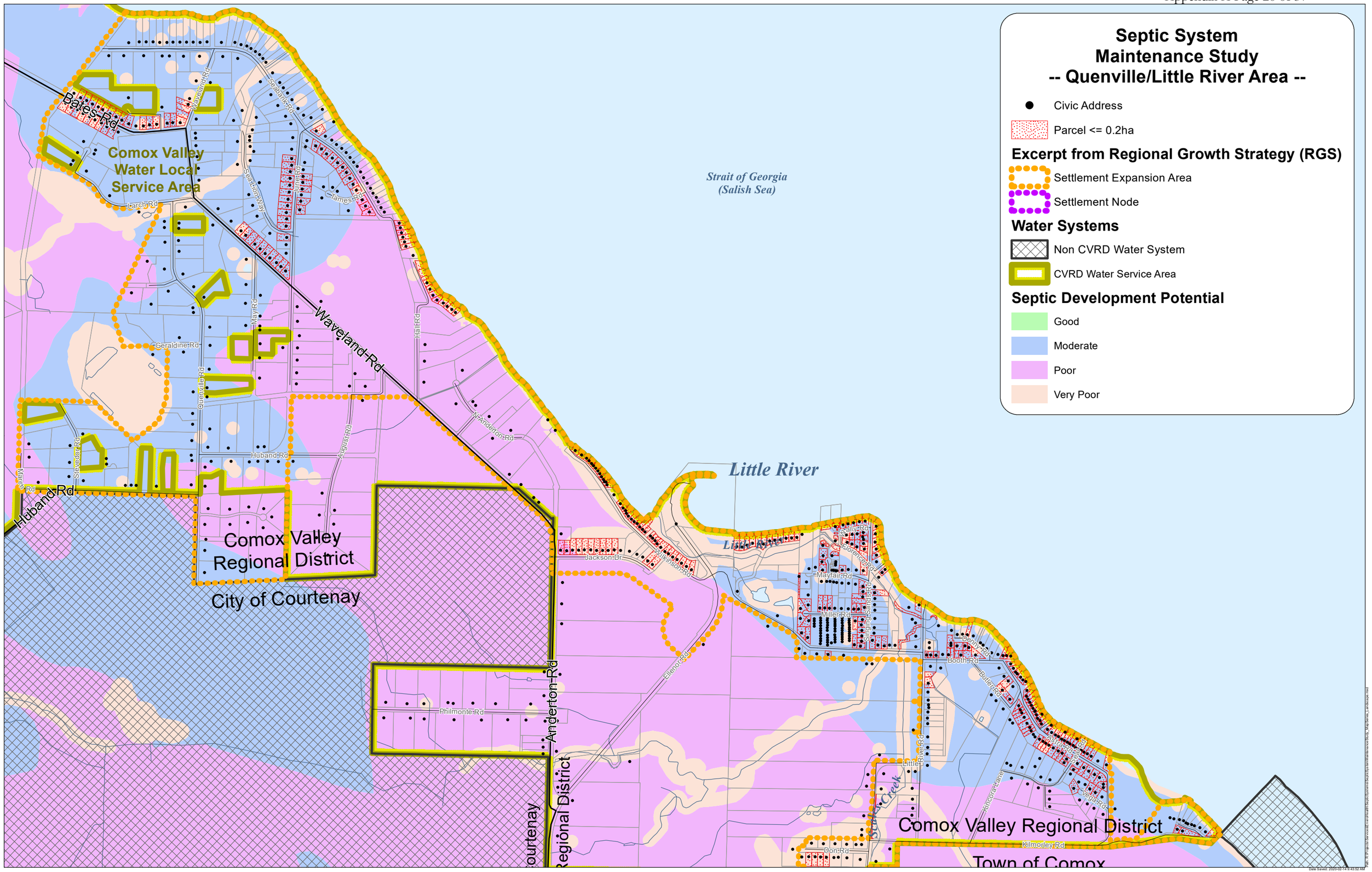
Septic System
Maintenance Study
-- Quenville/Little River Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
Strait of Georgia
(Salish Sea)
Little River
Comox Valley
Water Local
Service Area
Comox Valley
Regional District
City of Courtenay
Comox Valley Regional District
Town of Comox
Bates Rd
Waveland Rd
Hubband Rd
Anderton Rd
Ellenor Rd
Kilmorley Rd
Seaban Rd
Seaton Way
June Rd
James Rd
Larch Rd
Geraldine Rd
Quenville Rd
Mary Rd
Hall Rd
August Rd
Jackson Dr
Mayfair Rd
Miller Rd
Booth Rd
Butler Rd
Little River Rd
Don Rd
Stotts Creek
Philmonte Rd

FIGURE 6

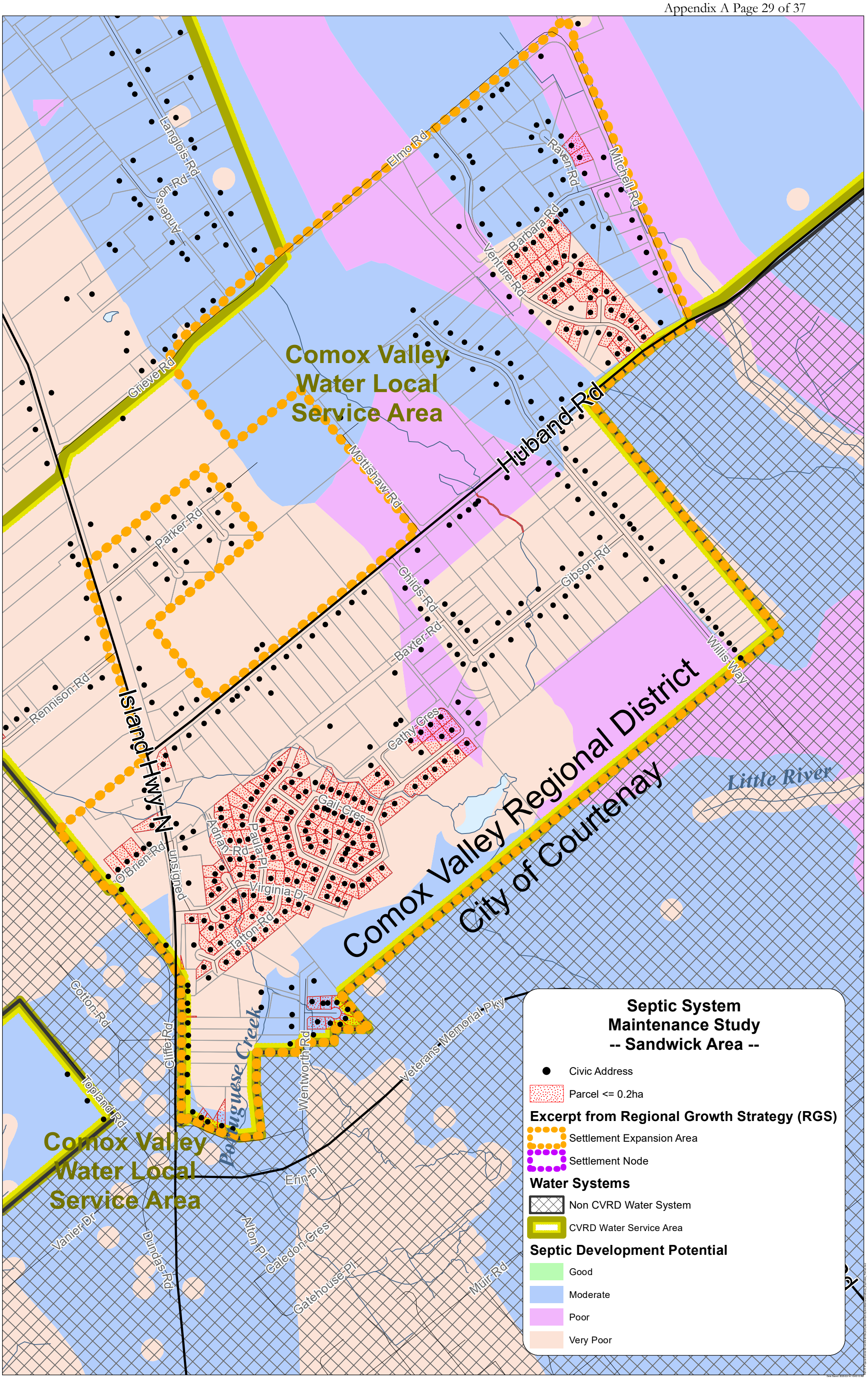
Comox Valley Water Local Service Area
Comox Valley Water Local Service Area
Comox Valley Regional District
City of Courtenay
Little River
Portuguese Creek
Elmo Rd
Langlois Rd
Anders Rd
Grieve Rd
Raven Rd
Mitchell Rd
Barbara Rd
Venture Rd
Hubband Rd
Mottishaw Rd
Parker Rd
Childs Rd
Baxter Rd
Gibson Rd
Willis Way
Rennison Rd
Island Hwy N
Cathy Cres
Gail Cres
Adrian Rd
Paula Pl
Virginia Dr
Tatton Rd
O'Brien Rd
unsigned
Cotton Rd
Cliffe Rd
Wentworth Rd
Veterans Memorial Pky
Topland Rd
Vanier Dr
Dundas Rd
Erin Pl
Alton Pl
Caledon Cres
Gatehouse Pl
Muir Rd
Septic System Maintenance Study
-- Sandwick Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 7

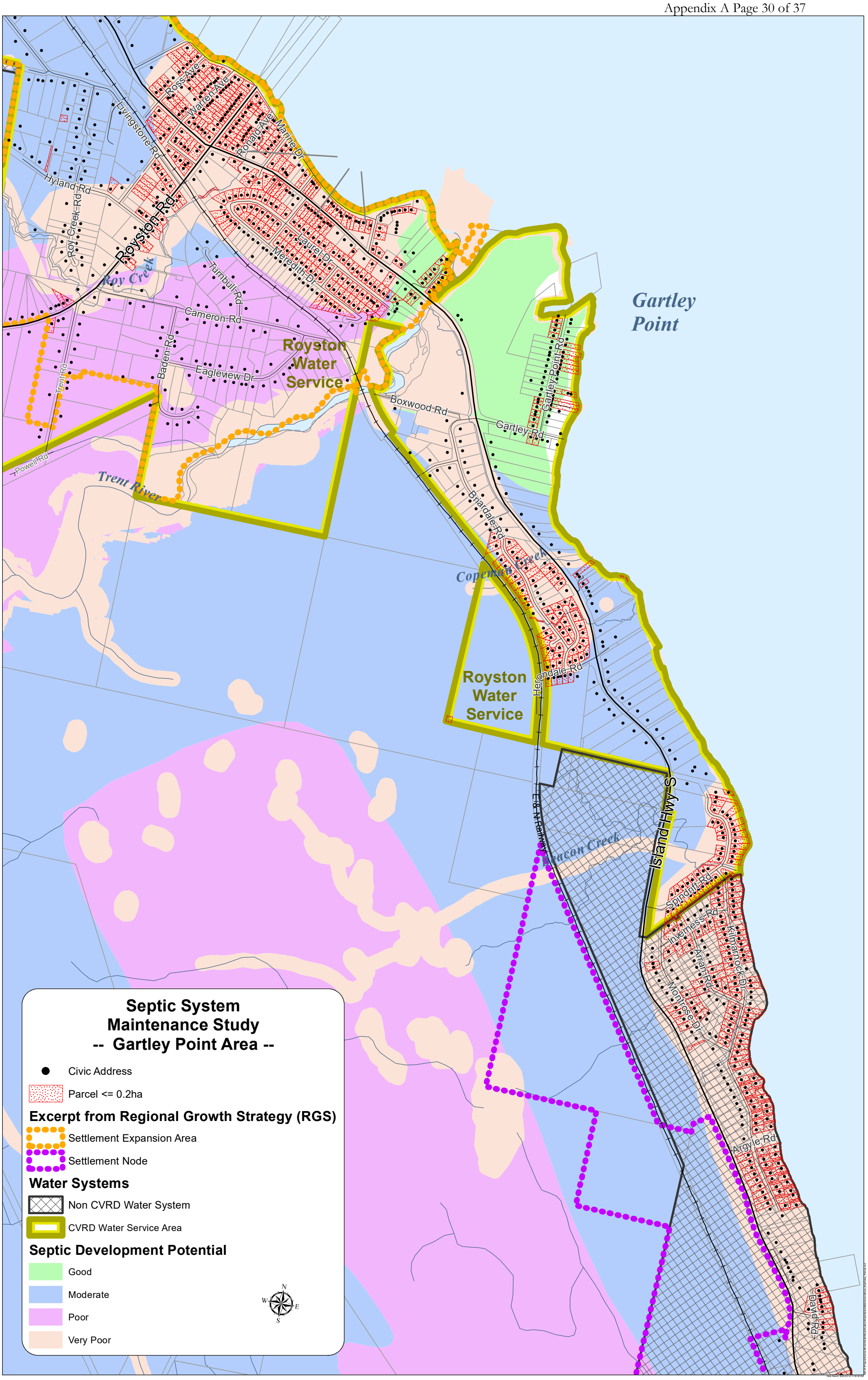
Gartley Point
Royston Water Service
Royston Water Service
Royston Rd
Livingstone Rd
Hyland Rd
Roy Creek Rd
Roy Creek
Ross Ave
Warren Ave
Ronald Ave
Marine Dr
Laurel Dr
Meredith Dr
Turnbull Rd
Cameron Rd
Baden Rd
Eagleview Dr
Trent Rd
Powell Rd
Trent River
Boxwood Rd
Gartley Rd
Gartley Point Rd
Briardale Rd
Copernicus Creek
Herondale Rd
E & N Railway
Island Hwy S
Beacon Creek
Spindrift Rd
Inverness Rd
Arran Rd
Kilmarnock Dr
Montrose Dr
Argyle Rd
Bay Rd
Septic System Maintenance Study
-- Gartley Point Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
N
W
E
S

FIGURE 8

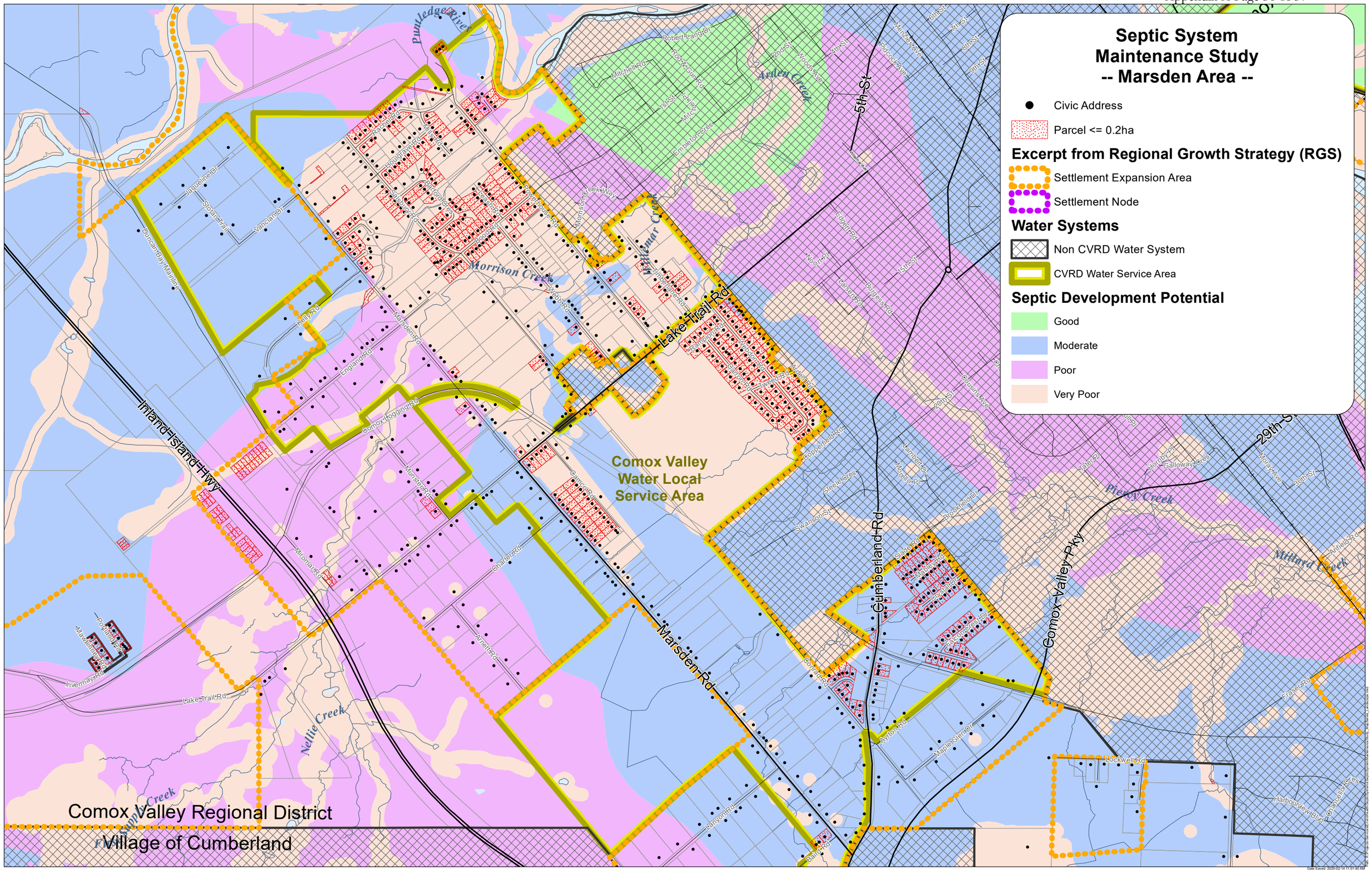
Septic System
Maintenance Study
-- Marsden Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
Comox Valley
Water Local
Service Area
Comox Valley Regional District
Village of Cumberland
Puntledge River
Arden Creek
Morrison Creek
Millimar Creek
Nellie Creek
Piercy Creek
Millard Creek
Lake Trail Rd
Marsden Rd
Cumberland Rd
Comox Valley Pky
Inland Island Hwy
5th St
29th St

FIGURE 9

Septic System Maintenance Study -- Buckley Bay Area --

- Civic Address
- Parcel <= 0.2ha

Excerpt from Regional Growth Strategy (RGS)

- Settlement Expansion Area
- Settlement Node

Water Systems

- Non CVRD Water System
- CVRD Water Service Area

Septic Development Potential

- Good
- Moderate
- Poor
- Very Poor

BC Ferry Route:
Vancouver Island - Denman Island
(Buckley Bay-Denman West)

FIGURE 10

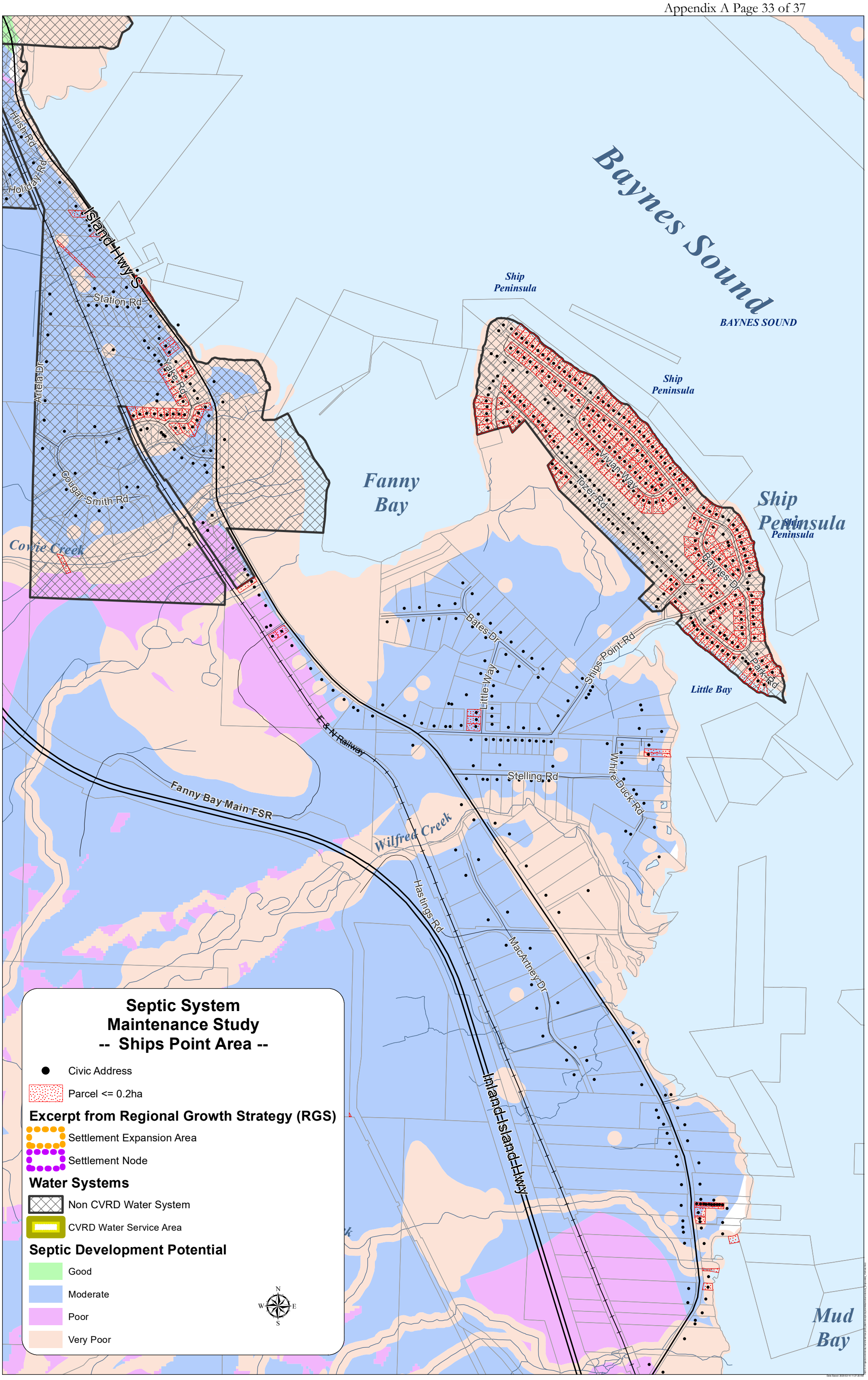
Baynes Sound
BAYNES SOUND
Ship Peninsula
Ship Peninsula
Ship Peninsula
Ship Peninsula
Fanny Bay
Covie Creek
Little Bay
Mud Bay
Wilfred Creek
Hush Rd
Holiday Rd
Island Hwy S
Station Rd
Yake Rd
Arlela Dr
Cougar Smith Rd
Tozer Rd
Bates Dr
Little Way
Ships Point Rd
Point Rd
E & N Railway
Stelling Rd
White Duck Rd
Fanny Bay Main FSR
Hastings Rd
MacArtney Dr
Inland Island Hwy
Septic System
Maintenance Study
-- Ships Point Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
N
W
E
S

FIGURE 11

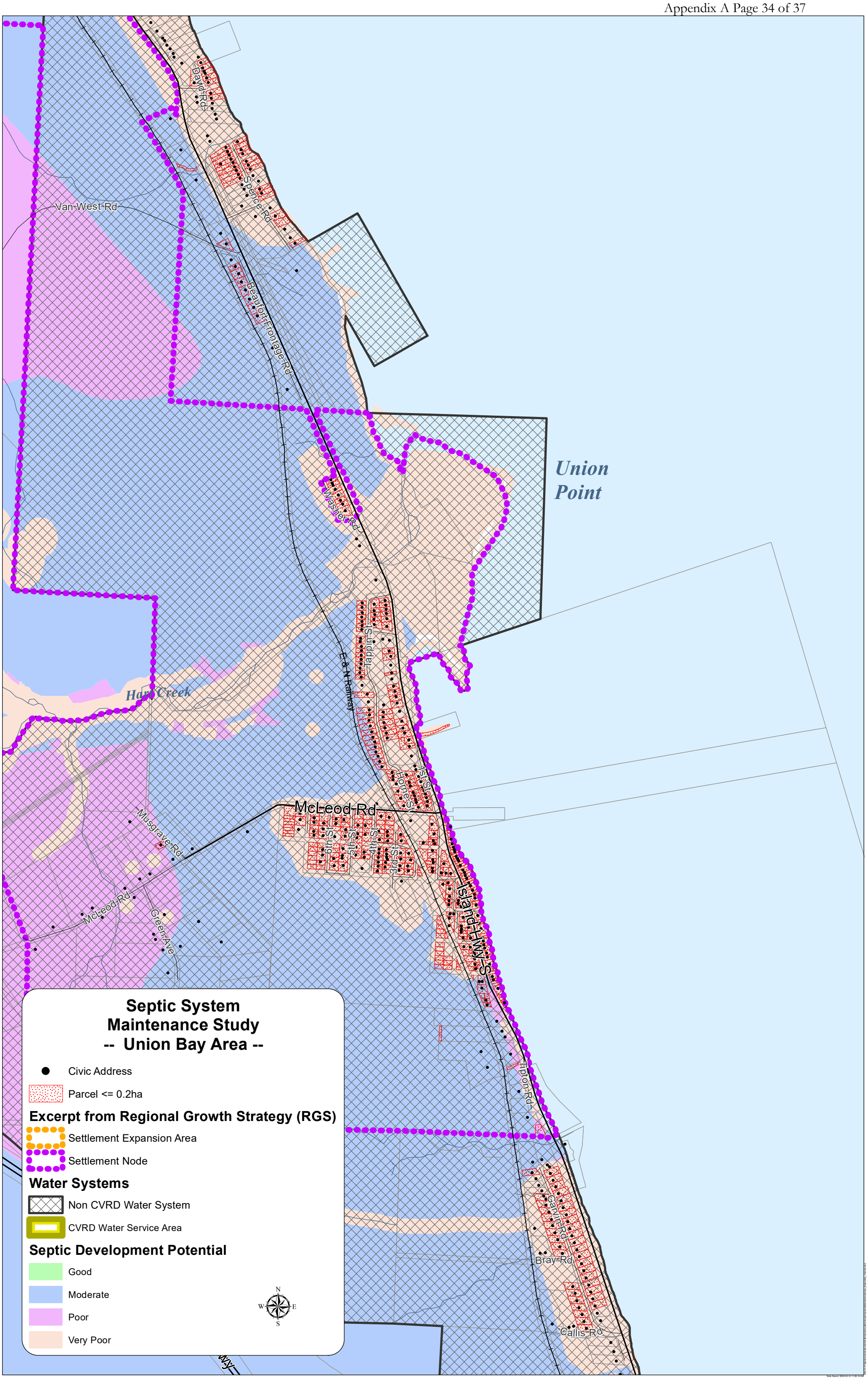
Septic System
Maintenance Study
-- Union Bay Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
N
W
E
S
Union Point
Hart Creek
Van West Rd
David Rd
Spence Rd
Beaufort Frontage Rd
Washer Rd
Tappin St
E & N Railway
1st St
Home St
McLeod Rd
Musgrave Rd
6th St
5th St
4th St
3rd St
Island Hwy S
Green Ave
Fipton Rd
Garvin Rd
Bray Rd
Callis Rd

FIGURE 12

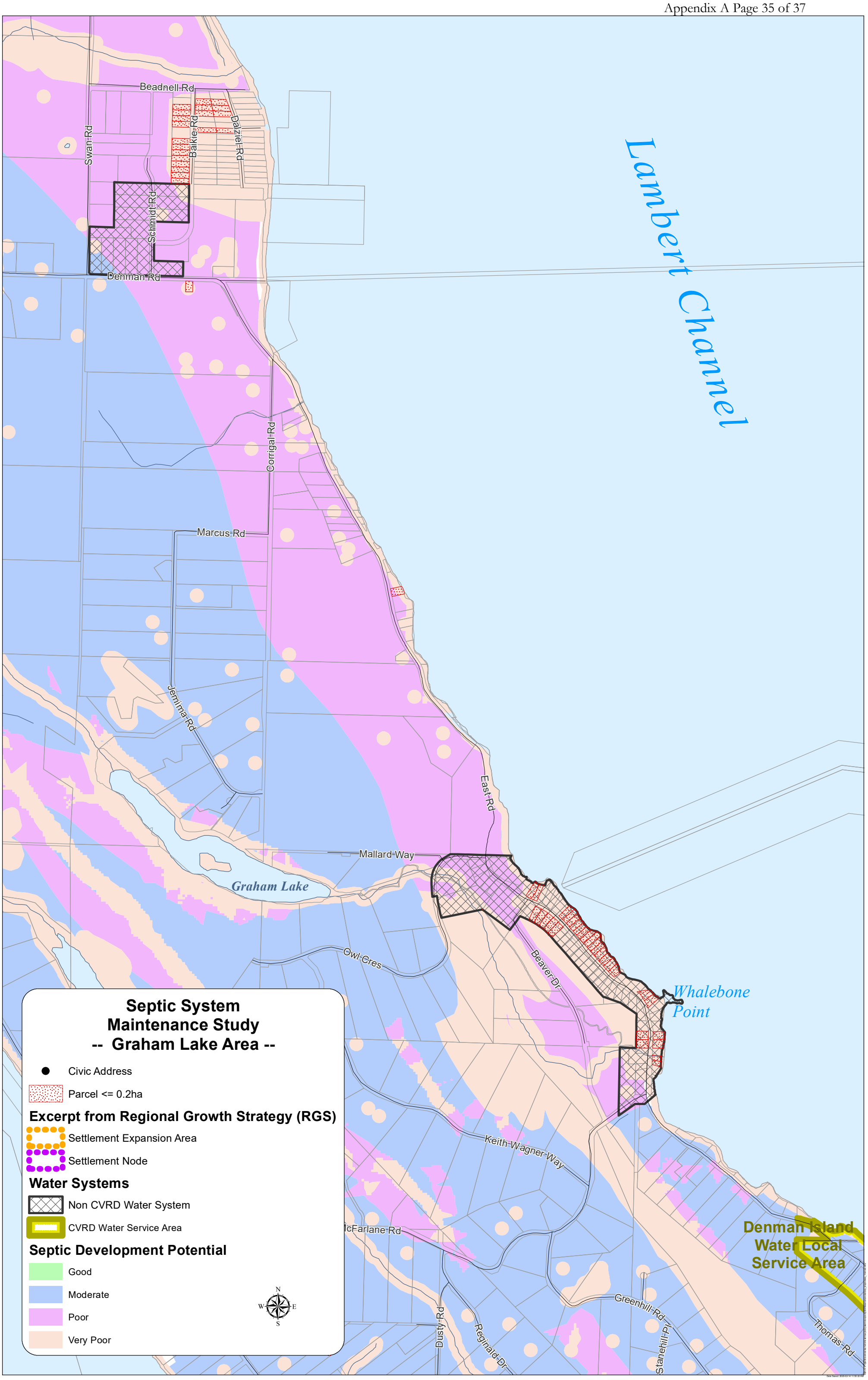
Lambert Channel
Beadnell-Rd
Swan-Rd
Baikie-Rd
Dalziel-Rd
Schmidt-Rd
Denman-Rd
Gorrigal-Rd
Marcus-Rd
Jemima-Rd
East-Rd
Mallard-Way
Graham Lake
Owl-Cres
Beaver-Dr
Whalebone Point
Keith-Wagner-Way
McFarlane-Rd
Dusty-Rd
Reginald-Dr
Greenhill-Rd
Stanehill-Pl
Thomas-Rd
Denman Island Water Local Service Area
Septic System Maintenance Study
-- Graham Lake Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor
N
W
E
S

FIGURE 13

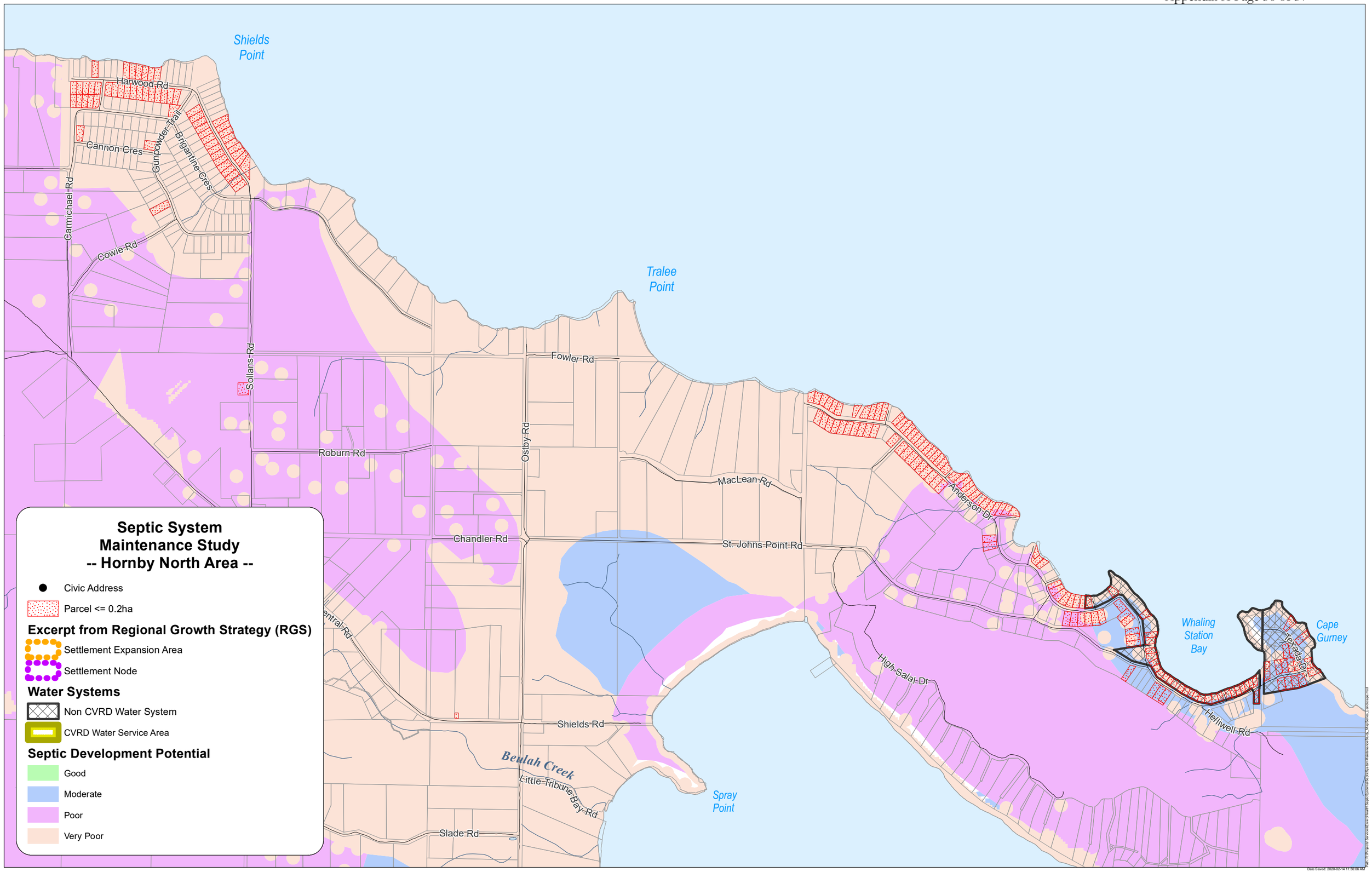
Shields Point
Harwood Rd
Gunpowder Trail
Brigantine Cres
Cannon Cres
Carmichael Rd
Cowie Rd
Sollans Rd
Roburn Rd
Ostby Rd
Chandler Rd
Tralee Point
Fowler Rd
MacLean Rd
Anderson Dr
St. Johns Point Rd
Whaling Station Bay
Cape Gurney
Texada Dr
High Salal Dr
Helliwell Rd
Shields Rd
Beulah Creek
Little Tribune Bay Rd
Spray Point
Slade Rd
Septic System
Maintenance Study
-- Hornby North Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 14

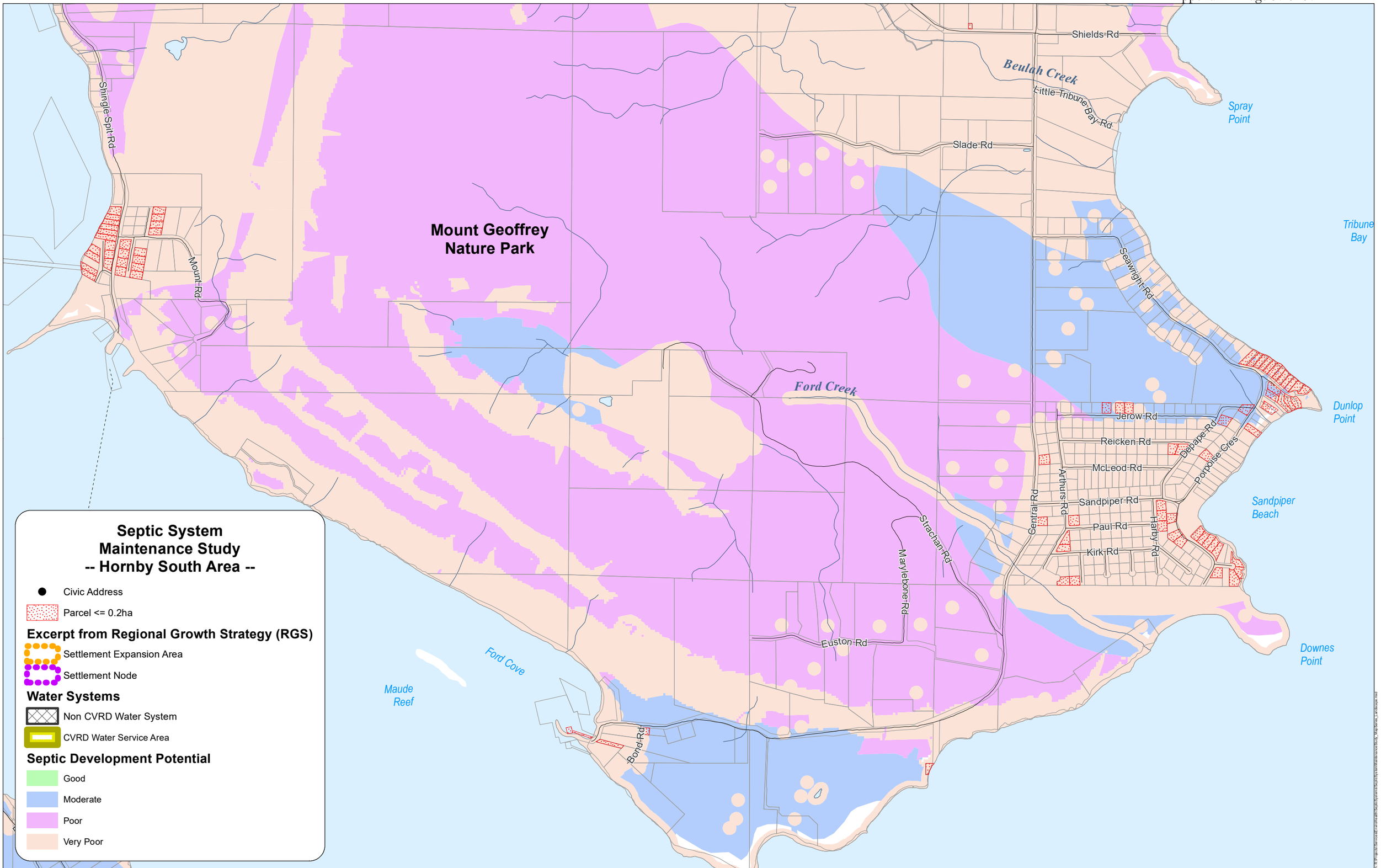
Mount Geoffrey
Nature Park
Shingle Spit Rd
Mount Rd
Shields Rd
Beulah Creek
Little Tribune Bay Rd
Spray
Point
Slade Rd
Tribune
Bay
Seawright Rd
Ford Creek
Dunlop
Point
Jerow Rd
Reicken Rd
McLeod Rd
Sandpiper Rd
Paul Rd
Kirk Rd
Depape Rd
Porpoise Cres
Arthurs Rd
Centrair Rd
Harby Rd
Sandpiper
Beach
Strachan Rd
Marylebone Rd
Euston Rd
Downes
Point
Ford Cove
Maude
Reef
Bond Rd
Septic System
Maintenance Study
-- Hornby South Area --
Civic Address
Parcel <= 0.2ha
Excerpt from Regional Growth Strategy (RGS)
Settlement Expansion Area
Settlement Node
Water Systems
Non CVRD Water System
CVRD Water Service Area
Septic Development Potential
Good
Moderate
Poor
Very Poor

FIGURE 15

Program Type	Description	Advantages	Disadvantages
Homeowner Education Program	Education program to encourage septic system maintenance by homeowners.	• Simple, low-cost and non-intrusive with low administrative requirements • Can improve onsite system maintenance practices through increased awareness	• Does not result in an inventory of onsite systems, or improve understanding of cumulative impacts of onsite systems • Can be difficult to measure impact on public and environmental health or maintenance practices
Mandatory Pump-Out Program	A program requiring septic system pump-outs at a set interval (i.e. 5 years)	• Familiar, due to similarities with Capital Regional District's Onsite Wastewater Management Program • Lower cost than inspection-based programs	• Requires administrative capacity to track pump-out records • "One size fits all" approach may not be appropriate for all systems or household use patterns(i.e. two-person household vs larger family or addition of carriage home), and may result in public pushback • Can create perception that systems are being maintained, even though pump-outs are only one component of proper septic care and maintenance
Mandatory Inspection Program	Each septic system participating in the program is inspected by an Authorized Person, and the homeowner is provided with a maintenance plan	• Flexible, inspection based approach provides homeowners with information tailored to the needs of their system • Can develop an inventory of onsite systems, and thus help improve understanding of cumulative impacts • Can have measurable impact through identification of system maintenance requirements	• Requires administrative and technical capacity to coordinate and conduct inspections • May be considered intrusive by some homeowners • Requires a mechanism to enforce inspections • Does not include enforcement capacity for required maintenance

Program Type	Description	Advantages	Disadvantages
Mandatory Inspection and Maintenance Program	Similar to the Mandatory Inspection Program, with the addition of an enforcement component to ensure maintenance plan is followed by homeowner	• Inspection-based approach identifies required maintenance and enforcement ensures maintenance is completed • Can have measurable impact through identification of systems that require maintenance and follow up to ensure maintenance is completed • Can develop an inventory of onsite systems, and thus help improve understanding of cumulative impacts	• Requires administrative, technical and enforcement capacity to coordinate and conduct inspections, and confirm required maintenance is completed • High level of intrusiveness may not be popular with some homeowners

Sewerage Systems Regulation Roles and Responsibilities