



ACT Project

**INNOVATIVE WASTEWATER TREATMENT AND
RESIDENTIAL DEVELOPMENT IN
BRITISH COLUMBIA: INTERPRETING MUNICIPAL GOVERNMENT
ATTITUDES TO THE MUNICIPAL SEWAGE REGULATION 1999**

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PREFACE

The project documented in this report received a grant under the Affordability and Choice Today (ACT) program. ACT is a housing regulatory reform initiative sponsored by Canada Mortgage and Housing Corporation and jointly managed with the Federation of Canadian Municipalities (program administrator), the Canadian Home Builders' Association and the Canadian Housing and Renewal Association.

ACT, launched in 1990, encourages housing affordability and choice through regulatory reform. The United Nations Centre for Human Settlements recognized ACT in 1998 as one of the top global best practices for improving the living environment.

Over the years, ACT has created an impressive body of knowledge others can use to facilitate regulatory change in their communities. Projects range from innovative housing forms, secondary suites and streamlined approval procedures to NIMBY, alternative development and renovation standards, and more. ACT projects contribute in many ways to sustainable development. They have also served to enhance working relationships between local governments, the building industry and non-profit organizations.

In summary, ACT promotes regulatory reform through

- its database of solutions, which others may borrow and adapt freely to meet their needs (see Web site address below).
- grants to local governments, builders, developers, architects, non-profit organizations and others across Canada to help facilitate the development of innovative solutions;
- other means of promoting regulatory solutions, such as forums that are held from time to time to highlight ACT solutions and address specific regulatory barriers.

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DISCLAIMER

This project was partially funded by the ACT Program. The contents, views and editorial quality of this report are the responsibility of the author(s), and the ACT Program and its partners accept no responsibility for them or any consequences arising from the reader's use of the information, materials or techniques described herein.

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The new interrelated fields of innovative wastewater treatment, water reuse, and the alternative delivery of infrastructure services (innovative on-site, decentralized and distributed, with public and private ownership) are new and challenging subjects that are being introduced by sustainable planning advocates. Canada has the capacity to be in the forefront of this development taking the lead in the designing and implementation of alternative and innovative water and wastewater technologies that are more efficient, saving and even reusing limited energy and water resources.

This project has greatly benefited from ongoing work in the field of water reuse technologies and regulatory regimes being undertaken at NovaTec Consultants Inc. on behalf of clients ranging from the Federal Government of Canada, the Greater Vancouver Regional District the Capital Regional District to innovative land developers who are willing to explore new means by which to effectively solve the age old problem of sanitary management under new “green” approaches.

Financial support for this project has been provided by the *ACT Program*, Federation of Canadian Municipalities and by a VanCity Credit Union *Community Partnership Program -Community Project Grant* with assistance provided by the Ministry of Community, Aboriginal and Women’s Services.

1. INTRODUCTION

This ACT research report explores the regulatory gap between The Province of British Columbia's new Municipal Sewer Regulation, 1999 (that allows developers to provide advanced on-site wastewater treatment systems for the purpose of servicing new land development sites, with, in this case, water reuse applications) and municipal attitudes, policies or legislation that may prohibit subdivision of property if the development is seen to be dependent upon a package treatment plant or a privately owned or managed wastewater utility for servicing.

As early as 1997, a Canada Mortgage and Housing Corporation report noted that although no absolute regulatory barriers to innovate water reuse technologies and applications could be identified the major obstacles appeared to be created largely by the attitudes and perceptions of decision-makers.¹ This National level study supported the use of on-site wastewater treatment as a means of conserving water and reducing the need to expand infrastructure.² The report also noted that BC was developing a new Municipal Sewage Regulation that would be the most comprehensive regulation of its kind in Canada, stating that it *may serve as a guide to the future implementation of site water reuse.*³

This report reviews the ongoing barriers to the implementation of on-site wastewater treatment as supported by the MSR 1999 legislation based on the responses to the survey taken of municipal and provincial decision makers and makes recommendations that may help overcome these apparent barriers. It is expected that perceptions and attitudes regarding risk management at the municipal level continues to be the major barriers to the implementation of new residential land development projects that could be approved for *Registration To Discharge* under the MSR 1999. The present system has a major regulatory gap that is costing developers time and money as they proceed from the provincial regulation to the municipal level of subdivision and servicing approvals.

Resolving the problems expressed by Municipal decision-makers could speed-up the process of servicing new sites for housing developments, while reducing public servicing costs associated with extending existing sewer systems. With the option to provide advanced wastewater treatment with water reuse, these developments could also help extend the life of existing treatment plants with reclaimed water being used for a range of uses including toilet flushing to irrigation which account for a high percentage of all potable water usage.

¹ CMHC (1997), *Regulatory Barriers to On-Site Water Reuse*, Prepared by Canadian Water and Wastewater Association, pg. iii

² CMHC (1997), *ibid*, pg. 1.

³ CMHC (1997), pg. 11.

1.1 Innovative Wastewater Treatment and Sustainable Housing Developments

In July of 1999 the British Columbia government brought into existence a new Municipal Sewage Regulation that had as one of its goals to:

Encourage the use of innovative technologies to provide an alternative for the "big pipe", improved source control, water conservation, water reuse and reduced discharge of treated effluent to the receiving environment.⁴

Examples of projects that could be built under this legislation include infrastructure services that provide **decentralized** and/or **distributed** wastewater services to new subdivisions taking them off the grid (*big pipe solution*). Secondly, MSR 1999 projects can be designed to provide **water reuse**⁵, allowing communities to reduce their consumption of potable water by using reclaimed effluent for a broad range of applications as allowed under the Regulation. These applications range from toilet flushing to irrigation, based on the level treatment and quality of the effluent being produced.

To date, the goal of this forward thinking regulation has remained almost unattainable, with few applications at the residential development level having been approved for sizable new community developments even 50 homes or larger. This is primarily due to:

1. Limited exposure and acceptance at the municipal government level;
2. Limited exposure and understanding of the legislation in the land development industry;
3. Challenges in interpreting the regulation among potential qualified professional practitioners
4. Financial costs associated with meeting MSR requirements, which limits application to regions of BC with higher value property;
5. Financial costs for assuring the establishment of a privately-owned wastewater utility as well as approved private sector assurance programs;

Regardless of this long list of barriers, the **Registrations to Discharge**⁶ issued to date indicate that the MSR 1999 is a tool that, with refinements, can be used to help create sustainable communities under specific land development conditions and in jurisdictions where water management is recognized as pressing concern. In other words, an effort needs to be made to target municipalities that are water deficit and under pressure for land development if we are going to be able to push the sustainable community initiative as it relates to water conservation through the MSR 1999.

⁴ R. D. Wetter, M.A.Sc., P.Eng., Municipal Sewage Regulation (MSR) Workshop, Speaking Notes. January 22, 2003, Richmond, BC

⁵ In this study wastewater that is treated to Regulatory Standards under the MSR 1999 for reuse as per the Regulation will be termed reuse water. Other terms include reclaimed water, effluent reuse, and in some cases gray water reuse.

⁶ A Registration to Discharge is the ultimate outcome of the process for the applicant, allowing them to build a wastewater treatment plant that meets the requirements of the MSR 1999 as approved under the Registration to Discharge.

The profile for successful projects indicates that the developer, who has to take the lead on sustainable projects, has a strong commercial and community-based motivation to find alternative servicing programs for the site. The developer, while working to placate strong community and/or municipal concerns over on site environmental issues also needs to ensure that the project is economically viable. Given the previously *uncharted* cost factors of delivering onsite and as such off-grid wastewater services this is another barrier that needs to be overcome. This decentralized wastewater treatment precludes normal DCC related to project service charges. In essence, in forgoing municipal services (*assuming they are available*) the developer is entering into a new realm of service costing that includes, environmental assessments, maintenance and operations plans, potentially setting up of a private wastewater utility with bonding and assurance programs, the management of the delivery of wastewater services to a community of users, including billings, and the environmental management of effluent discharge and potentially reuse. While many of these issues can be passed onto the Community as the ultimate owner of their own services, this does represent a new *uncharted* element of business planning (*pro forma*) for land developers.

Finally, the legislation has the potential to seriously challenge the normal operations of municipal planning and engineering departments as they work to regulate and manage urban growth through long-term infrastructure servicing agreements and planning, an issue that will be addressed more closely in the case studies.

1.2 The British Columbia Municipal Sewage Regulation

[The Municipal Sewage Regulation \(MSR\)](#), which came into effect in British Columbia on July 15, 1999, provides authorization with standards and requirements for the discharge or reuse of treated sewage effluent. The BC legislation is unique in Canada, in that it defines water reuse within a comprehensive Regulation dealing with both unrestricted public access (high risk) and restricted public access (low risk).⁷ Part of the process of complying with the regulation includes completing an [environmental impact study](#) and an [operating plan](#) prior to the submission of a [registration form](#).

For residential developments where the discharger is not a government agency or municipality, the discharger must also comply with the applicable [financial security requirements](#) of the MSR⁸. As such, this legislation offers unique land development opportunities for developers who are willing to undertake the designing, building and operations, maintenance and management of a community's wastewater infrastructure as part of their development program. Under the Regulation, developers could provide centralized, decentralized or distributed wastewater treatment services to the communities they build or lease these facilities out to infrastructure management firms, without having to enter into site

⁷ Vassos, Troy, D., P. Eng. *Water Reuse Standards and Verification Protocol* Report for CMHC, June, 2004, Six provinces in Canada permit some form of water reuse practices. British Columbia is the only one that defines water reuse within a comprehensive Regulation dealing with both unrestricted public access (high risk) and restricted public access (low risk). All three Prairie Provinces permit effluent irrigation of forage crops for disposal purposes, with over 5700 ha. being irrigated. Both Alberta and Saskatchewan have published Guidelines for municipal effluent irrigation practices. Ontario has no specific policy, regulations or guidelines, but issues Certificate of Approvals for disinfected secondary effluent irrigation on an individual basis. Finally, Prince Edward Island has issued Permits for water reuse irrigation for golf course application.

⁸ See http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/129_99.htm#schedule1

servicing agreements with municipalities. Assuming the treatment technologies meet Regulatory standards they could also reuse the water for a variety of applications ranging from Restricted Public Access such as landscape waterfalls or impoundments to Unrestricted Public Access such as, toilet flushing, car washing, fire protection, golf course irrigation or stream augmentation.

1.3 The MSR 1999 in Review

The Regulation requires that qualified professionals (QPs) undertake the design, O&M plan, environmental impact assessment, and oversee the construction, commissioning and operation of the plant. Furthermore, the Regulation requires that the systems be supported by a stringent financial security plan with 100% replacement funding. As such, the MSR allows for private sector delivery of wastewater treatment services. Working within this legislation, private firms can deliver sewage treatment infrastructure to deliver new housing in the market place. In reality, few land development companies have attempted to navigate through this new legislation to supply services for new housing estates and those that have managed the regulatory challenge at the Provincial level have not necessarily been able to translate that success into development permits at the municipal level.

The BC Municipal Sewage Regulation, 1999 (MSR) sets new province-wide standards regulating the ownership, construction, management, security and effluent quality and application of wastewater treatment facilities including water reuse standards. It was established to:

1. **Time Delays** - Replace the requirement for site-specific permits under the Waste Management Act with an authorization under a performance-based regulation that reduces the time for receiving the authorization from about two years to 3 months;
2. **Protection** - Update discharge standards and security requirements to ensure that there is improved protection of the receiving environment; and
3. **Innovation** - Encourage the use of innovative technologies to provide an alternative for the "big pipe", improved source control, water conservation, water reuse and reduced discharge of treated effluent to the receiving environment.⁹

Based on case studies the MSR 1999 has successfully delivered on the reduction of Time Delays, with reports from QPs being regularly moved through the review process and Registrations to Discharge being authorized by the Ministry. However, QPs note that delays and problems have occurred with review of the process for approving water reuse provisions by Health:

- (7) No person may provide for the use of reclaimed water unless specifically authorized
 - (a) in writing by the local health authority having jurisdiction, or
 - (b) under a local service area bylaw under which the municipality or a private corporation under contract to the municipality assumes the responsibility for ensuring compliance with this regulation and that proper operation and maintenance will be carried out.¹⁰

⁹ R. D. Wetter, M.A.Sc., P.Eng., Municipal Sewage Regulation (MSR) Workshop, Speaking Notes. January 22, 2003, Richmond, BC

¹⁰ MSR 1999, Part 2 — Exemption under Certain Conditions from Section 3 (2) and (3) of the *Waste Management Act* for Discharge Use of reclaimed water, 10,

As per environmental protection, the MSR 1999 has effectively placed Qualified Professionals in the drivers seat to deliver scientific and engineering reports that effectively respond to the issues raised by government project officers. However, on the financial protection side of the issue the regulation has proved to be complicated and even onerous. With the developer or community of users (i.e. a Strata Council) expected to put up 100% of the capital replacement costs of the treatment plant at the time of commissioning through a program that has been approved by the government and run by a financial institution there have been few successful programs financed to date. As such, innovation has not been an achievable goal either, given the high costs of starting up such a program.

Innovation is also difficult to achieve in an municipal services engineering environment that has to carefully select and approve technologies and treatment processes based long term community safety and also on a limited experience of systems outside of traditional municipal big-pipe solutions. Presently, BC municipal engineers and infrastructure planners have no local third party organization that they can turn to for advice on water or wastewater technologies to ensure that their communities can be both innovative, green, consumer smart and safe.¹¹

The MSR 1999 has failed to deliver on two of its three goals over the first five years of its existence. This is partially due to problems with the legislation, some of which are being effectively worked out, and partially due to barriers to change at the municipal level and in the land development industry. However, these problems exemplify a much larger problem that green or innovative technologies face across the entire spectrum from bioproducts to renewable energies to water and wastewater treatment that is a lack of demonstration sites and an unusually high perception of risk that needs to be mitigated.

1.4 Problem Definition

Since the proclamation of the MSR in 1999 there have been very few discharges “registered” for private sector residential projects (Table 1), and as of the published 2002 data, only one confirmed with the potential for water reuse.¹² This suggests that regulatory and /or market condition barriers may be complicating the approval of projects under the new Regulation.

Water, Land and Air Protection (WLAP) is managed through seven regional offices, each of which handles local registrations to discharge under the MSR, 1999. Telephone interviews were held with district managers and most commonly with compliance officers in the regions. Compliance officers offered a wide range of opinions regarding the MSR and its application. The most common problems that they referred to include:

- 1 Inability to interpret Assurance Plan Requirements to developers.
- 2 Inability of smaller developments to finance servicing under the MSR Assurance Plan Requirements program requirements.

¹¹ They can turn to the National Sanitation Foundation for ETV US-EPA approved technology reports for water and wastewater technologies, assuming that the manufacturers have undertaken this voluntary verification process.

¹² The first registration in the Lower Mainland was for tertiary level wastewater treatment plant with an “unrestricted” water reuse application, for a residential project of 100 homes. WLAP has registered only three discharges that require security and capital replacement funds in their Lower Mainland Office from 1999 to 2002.

- 3 Costs incurred by Developers to follow through with the requirements of the MSR requirements (consulting fees) are too onerous on developers outside of higher land price regions.
- 4 Inability of regional engineering and environmental firms to work through the MSR; or basically a lack of QP in remoter parts of the Province.
- 5 Inability to meet compliance after the Discharge has been Registered has resulted in Registrations being withdrawn.
- 6 Lack of indexing and text-based assistance programs to help Regulatory (provincial and municipal) and development communities to work through the MSR.

TABLE 1
Registrations Under MSR 1999 as of June 2002

WLAP Regional Office	Number of Registered Discharges	Residential Development (Excluding municipalities)	Proposed Water Reuse Options
Nanaimo	18	4	0
Surrey	15	1	1
Kamloops	25	4	0
Nelson	6	2	0
Williams Lake	2	0	0
Smithers	1		
Prince George	11	2	0
Total Number	79	10	

NB: Please note that the Ministry has not updated information on this information since June 17, 2002, over two years ago.

The MSR was designed to reduce the time required for approval by government to 90 days, compared to the previous permitting system that averaged up to two years. While Ministry processes have been streamlined, new barriers appear to have arisen at the municipal level that are impeding the application of the MSR legislation to residential land development projects. These barriers include, but are probably not limited to:

1. The Section of the Regulation pertaining to financial security requirements (Assurance Plan) places an onerous burden on developers, is difficult to interpret and has a very limited acceptance in the market place with only two “Financial” firms having made the effort to have their Assurance Programs approved by the Province for use by developers.¹³
2. Experience with the Regulation at the municipal level are limited and impacts unknown, leaving overworked and understaffed engineering and planning departments, as well as municipal legal staff in a state of uncertainty regarding the implications of allowing the private delivery of wastewater services or water reuse. **Uncertainty equals risk, risk equals rejection.**
3. As applications are frequently for development properties outside, or beyond, the existing serviced region of the municipality there is a tendency for planning departments to see applications as leading to or creating urban sprawl – even where the property may be designated for urban development.
4. Interpretation of the MSR 1999, the carrying out of Environmental Impact Assessments, selecting and acquiring on-site (frequently advanced) wastewater treatment plants and finding viable and appropriate discharge options require environmental and engineering services that demand that the developer recoup their return on researching the problem and designing the *green* solution. This means that projects designed under the MSR 1999 have a cost sensitivity.

¹³ The two firms referred are VanCity Credit Union through at the time their VanCity Insurance arm and Terasen Utility Service (formally bcgService).

In BC this means that projects are more likely to be viable in the Lower Mainland, in high growth areas of the Okanagan-Kelowna region and in the Victoria Capital Region, as well as in specific high-end ski-resort/golf resort locations that lack other options for treatment and disposal and which may require water reuse for irrigation.¹⁴

5. Finally, the level of Qualified Professional (QP) expertise and support required to manage an approval through the MSR 1999 legislation appears to indicate that remote and northern land developers (who are also generally receiving a lower return on land values) are unlikely to have access to local consultants who could feasibly explore this option for them.

The scope of the present research report focuses on the issue of municipal government response to the Provincial MSR 1999. Although WLAP held focus groups and workshops across the Province to introduce the legislation, it would appear that a number of the municipalities contacted in the run up to the questionnaire had a limited working knowledge of the Regulation (see Section 2.10). As such, we designed a questionnaire to send out to municipal engineers and planners that focused on how they would respond to a land development project that proposed on-site wastewater treatment delivered by a developer with water reuse. Their responses are supplemented by information gained from local WLAP officials in the regions that have authority over managing the MSR 1999¹⁵ and through case studies that the author has gleaned from local developments that successfully went through the MSR Registration to Discharge process.

1.5 Introduction and Questionnaire

This research project is premised on the responses to an extensive questionnaire that was completed by 17 participating communities across British Columbia. An attempt was made to provide a cross section of views and responses from larger urban centers close to the urban core area (Vancouver-Victoria) through to smaller, northern and interior communities. While a representative sample of 17 communities was acquired, a number of pre-selected innovative rural communities that are progressively dealing with septic systems problems and smaller northern and interior communities were unable to respond due to very limited staffing levels.¹⁶

The questionnaire was designed with input from Mr. Eric Bonham, P. Eng., Director of Municipal Engineering, MCAWS (retired 2004) and from Dr. Troy Vassos, P. Eng., NovaTec Consultants Inc. Each municipality in the dataset was contacted personally and provided with an overview of the project and the rationale for participating. The majority of the 35 municipalities contacted were interested in the topic and generally wished to know more about the potential impact of the MSR 1999 on urban development and planning. However, the reality of small town government meant that a number of municipalities in the end had to decline (See Appendix A – Contact List). The 17 participating

¹⁴ Or as proven by one environmental engineering firm - snow-making.

¹⁵ Officers in each regional jurisdiction in BC were contacted by phone and by e-mail. These were not scribed interviews, although a few opening questions regarding number of applications and examples of projects were queried first. The WLAP officials were very forthcoming and added valuable regional context and case study opinions.

¹⁶ For example, the Village of Anmore, B.C. (in the GVRD) was targeted for participation as a semi-rural communities close to Vancouver that has deliberately not connected to the GVRD's infrastructure having addressed the need for advanced septic systems at the household level, however they were unable to participate due to limited staff time.

municipalities are listed in Column One in Appendix C that provides an overview of all responses, with the questionnaire located in Appendix B.

The first part of the questionnaire asked participants to review a hypothetical application to subdivide a property that has been zoned for mixed residential/recreational development but which is beyond the present development “envelope” of the municipality. This was followed by a section that relates to their working experience and knowledge of the MSR 1999 or of water reuse projects in their municipality as well as municipal policy issues relating to on-site wastewater treatment, innovative technologies and water reuse. The questionnaire was prefaced by a series of land development assumptions based on a real case study and presented to municipal managers. The managers were then asked to judge how their municipality would respond to a similar site-servicing plan made by a land developer (See Appendix for example).

2. CASE STUDIES

Two case studies help define the issues facing residential land developers, and the municipalities that they are operating in, as they struggle to resolve their wastewater servicing problems by implementing on-site wastewater treatment options. Both projects are located in the Lower Mainland of British Columbia in communities that are increasingly dealing with population growth and increasing demands for new housing and services.

Caveat: As each of these private land developments are either still in municipal review or are under development we cannot presently disclose location or names.

2.1 A 100 Home Subdivision

2.1.1 Introduction to Site and Proposed Servicing Regime

The proposed residential development was originally designed as an onsite wastewater treatment project in 2000-2001 by a local land development firm. This 200-plus acre property has been the site of a number of land uses in the past with the most recent active use being a gravel pit. As such, on-site septic systems with disposal fields were not a viable option as the soils percolate too quickly.

The property has an existing zoning classification for 2-acre residential development. The developer at the time (the property has changed ownership since the research project began) proposed developing it as 90+ two-acre parcels with a tertiary wastewater treatment plant to serve the entire development. The site is surrounded by hobby farms ranging from 5 to 20+ acres with the majority being equestrian properties with easy access to riding trails and parks. Previous attempts to develop this property had failed due to a mixture of community activism and changing economics. At least one past proposal was for a golf course and some 150 homes in a series of higher density pods. However, the cost of wastewater servicing had always been a major contributing factor to land development decisions, with the golf course proponent having expected to cover the costs connecting to sewer (some 12kms away) through the commercial capacity of the golf course and clubhouse.

Water for the development has never been perceived as a problem with connection to the municipality being the accepted option. However, the developer felt that the distance to sewer connections and the cost of connecting were prohibitive. As such, an environmental engineering firm was hired to resolve the wastewater problem. They proposed that all sanitary wastewater would be collected in gravity sewers and conveyed to the water reclamation plant - a mechanical tertiary wastewater treatment plant (average day flow 113 m³/d). The resulting effluent was to meet the standards for reclaimed water use with unrestricted access as described in the Municipal Sewage Regulation (See Table 2). Operators certified to the same level as the facility were to operate and maintain the plant. The plant was to be designed with the level of equipment redundancy and effluent emergency storage required by the Municipal Sewage Regulation.

Insert Fold-out Diagram

Reclaimed water from the tertiary treatment plant was to be discharged to an existing pond on site. From the pond, overflow was directed to a new stream channel that would eventually discharge to a local water deficit salmonid-bearing creek. The new channel will be designed as a non-fish-bearing permanent stream (Environmental Augmentation). Riparian vegetation was to be planted along the new channel. The pond and stream together would have supplied additional flow and nutrients, including fish food organisms, to the Creek. It was determined that the increase in flow (attributed to treated effluent) to the Creek as conveyed by the new stream channel to the drainage ditch would not hydraulically impact existing channels further downstream.

TABLE 2
British Columbia: Waste Management Act –
Municipal Sewage Regulation¹⁷

Class	Reuse Application	Effluent Quality Requirements				
		Median FC (CFU/100ml)	BOD (mg/L)	TSS (mg/L)	pH (90%)	Turbidity (NTU)
Unrestricted public access	Urban:	≤ 2.2	<10	≤ 5	6-9	≤ 2
	Parks, playgrounds, cemeteries, golf courses, road right of ways, school grounds, residential lawns, green belts, vehicle and driveway washing, landscaping, toilet flushing, outside fire protection, street cleaning					
	Agricultural:					
	Aquaculture, food crops eaten raw, orchards and vineyards, pasture, frost protection, seed crops					
Unrestricted public access	Recreational:	≤ 2.2	<10	≤ 5	6-9	≤ 2
	Stream augmentation, impoundments for boating and fishing, snow making					
Restricted Public Access	Urban/Recreational: <ul style="list-style-type: none"> • Landscape Impoundments • Landscape Waterfalls • Snow Making (not for skiing and snowboarding) 	≤ 200	≤ 45	≤ 45	6-9	-
	Monitoring Requirements	daily (1)	weekly	daily	weekly	continuous

Note: (1) Monitoring requirements for fecal coliform for restricted public access is weekly.

To mitigate environmental impact due to nutrient addition, the reclaimed water facility was designed to provide nitrogen and phosphorus removal in addition to the standards set for reclaimed water for unrestricted access in the Municipal Sewage Regulation (Table 2). It was recognized that there may still

¹⁷ Troy D. Vassos, 2004, *Water Reuse Standards and Verification Protocol*, Canada Mortgage and Housing Corporation, See Table 9.

have been some potential for undesirable algal growth in low gradient, poorly vegetated areas of the Creek, which occur immediately downstream of the residential development. With further dilution downstream, it is unlikely that the phosphorus loading from the reclaimed water would affect the lower reaches of the Creek or the river system into which it flowed (See Figure 1).

To mitigate environmental impacts from the dissolved copper levels in the domestic water system, it was determined that either plastic piping should be used in the development housing, or further treatment should be provided as part of the reclaimed water treatment process to remove copper from the reclaimed water before discharging to the pond. Given concerns over higher temperature water being discharged from the pond into the Creek, consideration was given to mixing the water exiting the pond with colder water pumped from the lower aquifer. Part of an open 0.5 ha space to the east of the existing pond could be used in the future for additional treatment should it become necessary based on monitoring of Creek temperatures.

Overall, the consulting Registered Biologist reported that effluent from the treatment plant had a positive impact on the discharge Creek. A point agreed with by both the Federal Department of Fisheries and Oceans (DFO) and by the Provincial Water Land and Air Protection (WLAP) officers assigned to the file. Base flows in the Creek were predicted to be enhanced through the construction of the new stream, which will be connected to the existing pond, with increased base flows improving summer rearing habitat. In addition, the new channel will provide an additional source of fish food organisms (benthic invertebrate drift).

With respect to groundwater conditions, the site is underlain by an irregular distribution of sediments of primarily glacial origin, with three separate aquifer horizons: the upper, middle and lower aquifer units. This Equestrian Residential Development site is located within a groundwater recharge zone, with groundwater flow downward and generally towards the north, predominantly within the upper aquifer, under prevailing hydraulic gradients. All wells but three within 300 m of the site are drilled, and appear to be completed within the middle aquifer, with two of the dug wells abandoned and the third dug well hydraulically-isolated from the site Creek. No measurable impacts from pond water quality are expected on the groundwater quality of the surrounding domestic wells as a result of the apparent degree of hydraulic isolation of the middle and lower aquifers from site recharge. As well, no measurable impacts from the proposed site re-development are expected on wells south of the international border, as groundwater flow beneath the site is primarily towards the north, with site recharge mostly retained within the upper aquifer.

2.1.2 The Planning Challenge

Although the original developer received a Registration to Discharge under the MSR 1999 in February of 2002 based on the Ministry's review of the Environmental Impact Study, Operating Plan and Financial Security program and submission of the Registration Form, they apparently could not convince City Hall to approve the development permits.

Planning staff first raised objection to the proposed wastewater treatment solution at the initial meeting with the developer at which all three levels of government were present, including WLAP and DFO. At this time staff noted that Municipal policy stated that land development permits would not be issued for sites that required package treatment plants for the servicing of wastewater. This policy was directly related to the local government's past experiences in having to extend sewer lines out to small trailer

park developments. These sites had been allowed to develop (circa 1960s) under earlier legislation using off-the-shelf treatment plants that failed, leaving the residents with serious sewage problems. While the engineering consultants clearly showed that the proposed wastewater treatment program was an engineered system designed specifically for this site and situation with an approved Assurance Plan under Provincial legislation, planning staff strongly believed that the local government would be ultimately responsible and be *left holding the bag*.

In discussions with planners and engineers involved with this project, there was the general perception that while a viable green solution was being proposed by the developer, *a level of security* with the concept of a privately owned and operated wastewater treatment system just did not exist. Furthermore, they wanted to know where in a suburban setting such a project had been proven out in the Province. Indeed, perception of risk continues to be one of the major barriers holding back the demonstration and implementation of innovative urban infrastructure solutions.

Planning staff also expressed concerns over what can be called the *floodgate* issue. In other words, if this project was approved and development permits issued, then a precedent was set which would allow other developers to propose similar on-site serviced developments.

Planning should follow servicing...If we said yes to this development where the services have followed the plans then "how could we say no again."

Director of Planning

These projects would in a similar vein be beyond projected growth areas of the municipality, leading to a potential *leapfrogging* of the designated urban development boundaries and in all likelihood, increased demand for other public services such as public transit, schools, libraries, water servicing, road improvements etc. In a region that is trying to advance Smart Growth, the MSR 1999 option appeared to them to create a major problem.

Taken as a single land development project, Equestrian Estates represented a green wastewater solution that did not unduly increase the demand for infrastructure services while delivering an opportunity to showcase innovative Canadian treatment technologies under a decentralized infrastructure program. As such, this project spoke to Regional government planning objectives to find green on-site solutions to infrastructure needs. But taken at the municipal context of local land development in a growing semi-rural municipality on the edge of a major city, this proposal had the potential to open the floodgates on new proposals scattered across the rural countryside.

Another option proposed by the developer was to build the treatment facility as designed and approved and turn it over to the municipality. However, this option also had long-term problems from the perspective of the municipal engineering staff, on two points:

- 1) Why take over a plant that you have not been involved in designing?
- 2) Why take on the operating and maintenance costs of a satellite plant that is far removed from all other wastewater treatment facilities in the region?

When last visited, the green wastewater solution for this site was still an option but not the preferred one, with the big-pipe connection to the municipal sewer system apparently providing a more secure risk-free option.

2.2 Residential Development and Golf Course

2.2.1 Introduction to Site and Proposed Servicing Regime

This proposed residential development and golf course covers an area of approximately 200 hectares located on an Island community that is increasingly being impacted by Lower Mainland population expansion. The developer is proposing to develop the property into over 150 residential lots, with a 20-bedroom inn, a pub/restaurant and limited commercial space and a small golf course.

About half of the site is underlain with fractured rock. Three creeks also traverse the property. The balance of the development (about 151 hectares) will be served by a gravity sanitary sewer system that will convey the wastewater to a treatment plant. The sewage from the eastern and southern parts of the serviced area will be conveyed to the treatment plant via pump stations. The balance will flow by gravity.

The development will be built over a period of several years, with the wastewater treatment plant being built in two phases. Phase 1, with a capacity of 186m³/d, will provide secondary treatment and will discharge the treated effluent through a marine outfall. Phase 2, with a total capacity of 391m³/d, will also provide secondary treatment and marine discharge. However, an advanced treatment component will be added as part of Phase 2 to allow the treatment of up to 239m³/d. for unrestricted public access.

An important and unique feature of this project is the reclaimed water component. Reclaimed water (239m³/d) will be pumped to an adjacent 47,000m³ irrigation reservoir and used for golf course irrigation in the summer months. This reservoir will also receive a portion of the runoff from the catchment area between two of the local creeks that traverse the property. Stormwater discharge works will be designed for the reservoir overflow. The advanced mode of treatment will only be used when reclaimed water is needed for golf course irrigation.

The treatment plant is fully enclosed and will be provided with an odour control system. The treatment plant will be located within the golf course and the closest residential home will be at least 125 metres away.

The terminus of the marine outfall is at 30 metres below mean sea level and, according to the environmental assessment; the effluent will be trapped at a depth of 19 m (i.e., it will not surface). The impact assessment has not identified any major environmental issues relating to the proposed wastewater treatment and disposal system. Recommendations for surface water sampling from the local creeks monitoring are provided.

2.2.2 The Planning Challenge

The green planning challenge on this island community was at a totally different level of discussion from the beginning of the process for a number of reasons. Not the least of which is the fact that being

an Island community it does not have does not have connection to an urban sewer system. Secondly, water is recognized as a scarce resource on the gulf islands, creating an environment where innovation, water conservation and even reuse are almost considered the norm.

In this case, problems with outbreak, due to the rocky conditions of the site, plagued conventional septic system and disposal field logic. Communal disposal fields were also looked at as an option but considered too costly and disruptive to the benchland areas that are being designed as a golf course. A number of options, including a decentralized system, were proposed but in the end a centralized treatment plant with water reuse for the drier summer months and an ocean outfall during winter were approved.

A second consideration was the question of how to supply sufficient levels of water to the golf course in the summer months to provide irrigation for at least the greens and tee boxes. The solution was immediately available in the form of effluent from the housing, which needed to be treated and disposed of in any case.

In this scenario, the housing estate's treated effluent is the golf course's precious water resource.

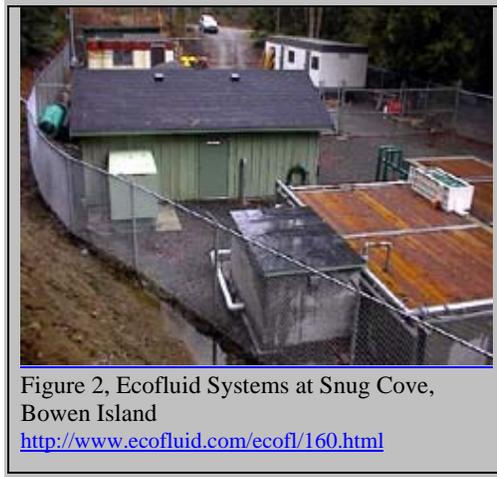


Figure 2, Ecofluid Systems at Snug Cove, Bowen Island
<http://www.ecofluid.com/ecofl/160.html>

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A number of scenarios, including a distributed/decentralized model with water reuse, met with acceptance. However, the rocky nature of the site does not allow the placing of over 100 individual units in ground. The developer's fallback position, a centralized wastewater treatment plant provided by Ecofluid Systems Inc., was a viable alternative for the community as the known commodity being in service in the region. (See Figure 2 above). Where in the previous case study the municipal government needed proof that innovative systems could work in place of GVRD sewer, on Gulf Island they already had a local working example, greatly reducing the risk factor. Finally, the land developer already has a strong track record of providing potable water as a private water utility in the area being serviced, helping to increase the Island municipality's level of security.

2.3 Comparisons and Lessons Learned

Typically at least two levels of governmental approvals are required at the project approvals stage. Discussions and negotiations with the Province regarding the discharge to the environment were relatively streamlined through the MSR process, even though this was the first project with a registered discharge under the Regulation. From initiating the first feasibility study and meetings with the Ministry to registration the process took about eight months. As this was the first project under the MSR, the Ministry requested an in-depth review all supporting documents.

In contrast, Municipal Departments of Engineering and Planning raised persistent questions regarding the project, citing concerns over financial liability, operations and maintenance and ownership, impacts on municipal planning projections and concerns that if approved it will open up a new market for land development. Some planners expressed the opinion that the MSR 1999 could effectively reduce their

ability to plan extensions of wastewater servicing as a means of managing urban growth. The senior manager of the Municipal Engineering Branch in the Ministry of Community, Aboriginal and Women's Services, expressed this same opinion.¹⁸ If developers can apply under the MSR to register discharges, and as such provide wastewater services for properties beyond existing or projected urban boundaries, then the implicit planning control of timing the delivery of municipal wastewater services to correspond with approved urban growth has been threatened. To quote one urban planner:

...These green technologies represent a major paradigm shift from how we have traditionally planned infrastructure for our municipalities.

In both case studies the local developers faced considerable community challenges, needing to build public support for their development proposal as well as for their wastewater treatment solutions for the sites. Community concerns were addressed at well-attended public meetings, and for the most part the wastewater treatment solutions being proposed were not the paramount, or even secondary, issue raised by the public.

In both case studies the developer put in place an Assurance Plan that met WLAP's standards of approval as required in the MSR 1999. However, the Gulf Island developer had a number of practical variables supporting his position, which included:

- the inability to connect to existing municipal sewer lines.
- the municipality's experience and working knowledge of the treatment technology being recommended.
- practical experience in managing a water utility.

Clearly, the municipal staff reviewing the 100 Lot project never developed the level of security with the Assurance Plan and the operations and maintenance elements of the proposed treatment plant required to allow them to fully support the project. A second problem that the 100-lot developer could not foresee was the municipality's long-term servicing program that required bringing the sewer line south towards the development to service a community that was on failing septic system disposal fields. Finally, planning staff acknowledged that they feared setting a precedent that would open the floodgates to similar proposals. In contrast on the Gulf Island, new developments will in all probability require advanced on-site systems in order to proceed.

¹⁸ Personal communications Mr. Eric Bonham, P. Eng., Director of Municipal Engineering, MCAWS, Victoria. Although Mr. Bonham, now retired, was a strong advocate for innovative and decentralized infrastructure he recognized that Planners could interpret the MSR 1999 as a means of jumping urban planning boundaries that are commonly controlled and dictated by the planning of sewer and water extensions.

3. QUESTIONNAIRE RESULTS AND DISCUSSION

In this section of the report we look at the attitudes and responses of municipal engineers and planners to a sample application by a developer under the MSR 1999, asking them to respond to the application as if it was being brought forward for approval in their jurisdiction. The questionnaire is available for review in Appendix B.

3.1 Question 1

In question 1 we asked: From an Engineering perspective what are the three major complications or issues that would be raised by this project in your municipality? (See Table 3)

Although the responses requested a qualitative response the replies can be quantified, with the majority of respondents in order of magnitude recognizing the following issues as needing to be clearly addressed:

TABLE 3
Major Municipal Engineering Concerns over MSR 1999,

Primary Concerns	Frequency	Comments
Assurance Plan & Liability	14	Issue of private sector bankruptcy
Operations & Management	13	Continuity of ownership
Effects on Urban Planning	4	Issues include urban containment
Effluent Monitoring	3	Ability to respond to changing standards
Technology Record	3	Who defines accepted technology, track record issue
Inter-Jurisdictional Issues	3	Appears to be conflict within Provincial Ministries
Local Environmental Concerns	2	Soils and cold climate issues
Need for Local Legislation	2	Covenants on properties
Confusion Public/Private	2	
Facility to Municipal Standards	2	

The twin concerns of liability and operations and management clearly speak to the municipal engineering communities ongoing need to ensure that risk is mitigated prior to the construction and operation of a privately owned wastewater treatment facility. In the Canadian context this is a realistic and accepted level of concern, one which the present MSR 1999 legislation does not appear to be overcoming and responding adequately to based on these well thought out responses. Decision makers from both Whistler and Campbell River stated that they would need to have separate municipal covenants against each property to ensure that perpetual service would be guaranteed and that connection to municipal sewers would not be demanded at some point in the future.

Another important issue raised by the municipal engineers was the perception that the MSR legislation as discussed here was not necessarily supported by Health or by Municipal affairs in Victoria. This bringing into question the *seamless ness* of the legislation between these three provincial ministries - WLAP, Ministry of Community, Aboriginal and Women's Services (MCAWS) which is responsible for municipal engineering policy issues and Health.

Part of this lack of acceptance of the MSR legislation as it pertains to the private delivery of on-site wastewater facilities has to do with the traditional role of the municipal engineering community in Canada as the gatekeeper to these *public goods and services*. The issue of confusion over the delivery of wastewater treatment services by the private sector was also mentioned as a serious problem. However, this model of wastewater or even water utility service delivery is not the only accepted one in the western economies. In France, the private sector delivery of these *utilities* has been ongoing for over 100 year. Companies such as Vivendi and Suez have built multinational enterprises on the expertise they have evolved in delivering municipal services. More recently, privatization in Great Britain has allowed Thames Water to become an international market player with, like its French competitors, a growing market presence in the American market for water services and technologies. Increasingly, American municipalities are looking to private sector firms to deliver water treatment services, a trend that is also active in Ontario.

A senior municipal engineer with extensive experience of the Regulation raised a final, and most telling response:

Impact of the proposal on the environment especially public perception as opposed to technical conclusions.

It appears that local public, and possibly political, perception outweighs the merit of technical reports that provide support for projects under the MSR 1999. So even if the engineering and environmental studies prove supportive, the perception of undue risk appears to be limiting the application of innovative wastewater solutions.

3.1 Question 2

The reactions to the proposed application presented in this scenario by the planning department covered some of the same ground as engineering but ranged into more policy related issues not addressed by the MSR 1999 nor discussions that addressed the legislation in workshops leading up to its proclamation. Specifically Planners brought forward issues addressing urban containment and taxation – the paying for municipal services. Given that extending water and sewer lines creates new market for these services under existing taxation the delivery of private sewer to such sites could reduce the expected and planned for municipal taxation base. This development would require other services, with municipalities rightly asking how are they to be paid for? One respondent suggested that tax rates must be restructured so these developments pay a premium for this lifestyle and not be subsidized.

Water and associated wastewater treatment are a primary source of revenue for municipalities. The advent of a mixed public/private system of delivery indicates that there is money to be made in the water utilities sector in Canada, a situation that will threaten already limited municipal financial revenue unless a new model of taxation is initiated.

However, the strongest worded and expressed replies to this question dealt with the potential loss of planning control. The creation of an *Ad Hoc development sequence* (Pitt Meadows), *this would be precedent setting, putting pressure (on Council) to open up areas not previously planned for, and thin*

edge of the wedge (Maple Ridge), *inconsistent with OCP* (Saanich), *in contravention of OCP* (Campbell River), *greenfield development not sustainable* (Gibsons).

In only one case did a municipality look at this in a positive light, with the City of Vernon that has a history of water reuse for irrigation dating back to 1997 asking,

Could provision be made to allow future development on adjacent properties connect to the system? How would this work?

The answer to this would unfortunately appear to be no, unless the registration to discharge with WLAP was revisited and a new process undertaken. The other to this question is that developers would be unlikely to size the original treatment plant for the purposes of expansion given the onerous assurance plan requirements, were:

security is calculated using the following formula and rounded up to the nearest \$1,000:

security = \$1400Q,

where "Q" is the maximum daily flow in m³/d.¹⁹

3.1 Question 3

In our first case study the municipality argued that on-site wastewater treatment was in violation of an existing municipal policy, that stated "Development will not be permitted on the basis of a private package sewage treatment plant" (*Municipality Subdivision and Development Control Policy*). This response by the municipality was premised on the assumption that the treatment plant and disposal mechanism being designed specifically for the site was some form of "off-the-shelf treatment system" an assumption that was directly questioned by the engineering consultants.

Does your Municipality have a comparable bylaw or policy? Yes 9/17

This response was in keeping with the responses of the slight majority of municipalities polled with 9 of 17 stating that they had similar legislation in place. In most cases the policy required connection to existing sanitary sewerage systems and in the case of the District of Mission stated *that no subdivision of rural properties which are not suitable for conventional septic tank with disposal field systems will be permitted on a fee simple basis.*²⁰ On review of the policy and in light of the questionnaire Mission did note that the concept of rural strata area subdivision utilizing shared private disposal systems has some merit in that the security, operation, maintenance and replacement could be held under a Provincial authority (MSR 1999). Other municipalities stressed the role of the Ministry of Health Regulations or Health's on going testing of small wastewater treatment systems as responses to the question, noting a recognition of the division between municipal and provincial authority, but not between Health and WLAP's MSR 1999 legislation.

¹⁹ <http://www.qp.gov.bc.ca/statreg/reg/W/WasteMgmt/schedule1>

²⁰ Earlier interpretation of the MSR 1999 regarding land ownership in fee simple vs. strata suggested that for the purposes of the Assurance Plan and operation of the plant that the site would have to be held under strata conditions, this is no longer the case.

Question 3 C/D/E asked the municipalities to express an opinion about the adequacy of their existing legislation to stop the proposed land development project and specifically if they felt that they should change their legislation to:

Question	Responses
3c Increase Barriers to MSR 1999 type Projects,	8
3d Streamline to Increase Opportunities	0
3e Status Quo sufficient	8
Also: Need more information	1

No municipality considered streamlining legislation or procedures to facilitate MSR type land development projects. Half of municipalities responding felt that existing legislation was adequate to block a subdivision approval that met MSR 1999 regulatory requirements at the municipal level. However, a surprising number suggested that they might consider reviewing their legislation to increase barriers. Only two municipalities modified their responses by adding information into the response section of 3d indicating that they may look at options to streamline subdivision applications approved for registrations to discharge under the MSR 1999 if there was a guarantee that the municipality would have, in the words of Pitt Meadows, *absolutely no obligation*, and in the words of Mission, there was no *implicit transfer of such risks (replacement, connection, maintenance) to local government*.

Once again the voice of local government is implicit:

- connection to the existing sewer systems is preferred if not demanded and
- risk to local government must be avoided.

When we review the conditions that developers need to meet under the MSR 1999 we see that these environmental risks, operations and maintenance risks and financial risks are all covered off with the Province. WALP has the authority to step in and take over management and control of a facility, in order to correct mechanical or building failures that may be occurring. Furthermore, the assurance plan requires that the full replacement cost of a facility be accessible from the day of commissioning. We must conclude then that the interpretation of MSR 1999 legislation is apparently not being clearly communicated to the Municipal level, or other factors such as control over municipal planning and ownership of buried assets are playing a role in local decision-making that had not been foreseen by the authors of the Regulation. Land planning, and specifically the timing and extension of services to new sites, is the prerogative of municipalities; it is a planning tool that controls and helps manage urban growth and the timely expansion of public services. In our case study, the developer brought forward not only a viable land development plan that fit within the community context but also infrastructure servicing for the site through a satellite wastewater treatment facility with approved disposal options. While this represented a green solution to one problem of wastewater treatment, it opened up a Pandora's Box of other complications for the municipality.

As one municipality replied:

A question for you: Do you believe that municipalities should have the authority to regulate development within their boundaries, particularly those areas that may be suitable for innovative sustainable water supply and waste disposal practices and to define those areas that are not?...

and as another Municipal Director noted:

...planning should follow servicing.

3.1 Question 4

Based on the responses to questions 1 through 3 we were surprised to find that 7 of the 17 municipalities queried would, under qualified conditions, support a land development application that had a registration to discharge under the MSR 1999 and met similar conditions as those described in the case study. These seven positive responses represent a break in the discussion up to this point in time, with exception that their qualifications generally stress the need for the Province under WLAP to take responsibility for the risk involved (Assurance Plan) or that further studies be commissioned to meet the municipalities concerns. These seven communities (Vernon, Whistler, Prince Rupert, Mission, Langley, Maple Ridge and Richmond) also raised concerns over Fisheries approval re: discharges, or the nature of the specific project.

Another four communities also did not outright reject the concept out-of-hand. In these cases (Prince George, Squamish, Pitt Meadows, and Gibsons) noted that a number of hurdles would have to be passed to acquire development permits, but that servicing under the MSR 1999 would not necessarily discount the project or that Council could grant a variance where the project was outside of the existing serviced development zone.

These leaves us with only 5 communities that rejected the proposed land development as presented (Chilliwack, Courtnet, Campbell River, Saanich, and Kelowna) with one not responding to the question. The majority of these communities stated that the proposal was not consistent with the OCP, with designated sewer area policies or not viable as being outside the urban containment area. Kelowna's response to this issue seems to be a considerable variance to that of Vernon, given that both share similar water management problems, these being the dry semi-desert region of the Interior and increasing urban populations. Kelowna has been a leader in water conservation programs, while Vernon has been actively reusing treated effluent for irrigation for decades. Reviewing Kelowna's responses we see that they are consistent with a concern over urban sprawl, a need to connect urban development to sewer services and a concern over liability, operations and management. The rapid growth of Kelowna, and the modern state of their treatment facilities, probably indicates that they have sized their facilities for the expected growth and would see little need for satellite type systems even if they took over operation and ownership. Vernon also appears to have had more direct experience with private sector delivery of wastewater facilities with the Predator Ridge golf course treatment plant having been built and paid for by the developer and then turned over to the city upon completion.²¹

²¹ see: <http://www.vernon.ca/services/utilities/reclamation/> for more information on Vernon and water reclamation

3.1 Question 5

Based on our case studies we knew that liability, operations and management were anticipated to be ongoing issues that municipalities felt were not being adequately addressed by the MSR. To address these issues we asked municipal engineers if they would entertain taking on ownership of the treatment facility once the developer had built and paid for the plant, thus reducing the risk.

Once again, replies stressed risk mitigation as well as fiscal responsibility. Two municipalities willing to take over the facility if offered to them are Vernon, which has already managed a similar takeover from the developer of Predator Ridge Golf Course, and the City of Prince Rupert. However, the vast majority of the municipalities, 12 of 17, responded in the negative (unless 100% of costs recoverable). The three engineering departments that recognized a potential opportunity for their municipality (Gibsons, Central Kootenay and Langley) added the condition that it would be a policy decision and that design and construction would have to be done in association with them. Other municipalities noted the higher costs of operating satellite facilities and limited staff as qualifiers to their answers.

3.1 Question 6

As part of our research program we wanted to know how familiar the respondents were with the MSR 1999 and the frequency with which developers have made applications or even enquiries under the Regulation. Of our 17 respondents only four (Chilliwack, Langley, Kelowna, and Central Kootenay) had received applications under the MSR for wastewater treatment facilities. The Chilliwack proponent found that connecting to municipal sewer was more cost effective and dropped the application. The Kelowna application actually preceded the MSR 1999, while in Langley the Registration to Discharge was issued in February of 2002. However, the original developer has not acted it upon. Of these, only two examples of water reuse were listed:

- Predator Ridge WWTP that discharges into MacKay Reservoir for reuse as irrigation and
- Langley, which provided reuse water for stream augmentation.

Given the infrequency with which the regulation has been used in municipalities it was not surprising that many staff had only passing knowledge or recent knowledge of the legislation. A number of senior engineers noted that they had reviewed draft copies going back to 1997, but an equal number noted they had only recently (now) become aware of it.

Finally, we asked if the municipal staff might now be deciding to develop a policy framework with which to deal with potential applications under the Regulation, assuming that they felt that existing municipal legislation was inadequate. Here we found that six (6) municipalities had decided to start reviewing their policy to ensure that they were ready to deal with an application, while another was unsure if they should proceed.

3.1 Question 7

The questionnaire also explored the attitude of municipal staff to recommend that developers look at alternatives to conventional septic systems under the MSR 1999.

In this case a number of different responses occurred, but the majority of engineers just assumed that conventional septic systems would be cheaper and better than an alternative engineered system. This is not necessarily the case, especially if one factors in environmental sustainability factors such as water reuse and the frequency with which septic systems and disposal fields fail due to poor maintenance. Others noted that multiple approvals for septic systems under Health would be easier to get through the application process than going through the MSR process!

Five municipalities recognized the value of reviewing alternative systems under the MSR that offered the best long-term solution to wastewater issues from a technical and an environmental standpoint (Vernon). Whistler, although stating No on principle if the developer was proposing septic systems, felt that if the developer could not connect due to specific reasons, they would allow them to pursue alternative approaches.

3.1 Question 8

The idea of developing higher density sustainable communities that are off-the-grid, with their own water, wastewater, water reuse treatment and conservation technologies as well as energy technologies, are being proposed for communities across North America. The South East False Creek community plan in Vancouver is one that is attracting considerable attention.²² However, for sustainable communities of this nature to be developed, legislative changes to OCPs, legislation covering servicing and even parking stall requirements will have to be reviewed to create a sustainable legislative framework for the community to build upon. Given the considerable barriers to implementation that the MSR 1999 has faced over its first five years of existence we expected a very weak response to Question 8. In this case 5 communities expressed a willingness to explore the design of an off-the-grid community, these being Richmond, Vernon, Central Kootenay, Whistler and Gibsons. Whistler noted that they are *very interested in considering sustainable applications, particularly off-the-grid approaches to municipal servicing as demonstration projects for sustainable communities.*

3.1 Question 9

In regards to bonusing for green buildings that conserved water and limited wastewater flows, six of our participating communities—Vernon, Squamish, Kelowna, Langley Township, Central Kootenay and Gibsons—provided outright support for the proposition. Whistler, Chilliwack and Prince George provided conditional support for such an idea at least in principle. Whistler noted that bonusing as described here would not be viable in their Resort Community, but might be viable in other communities. One smaller community felt that the administrative costs would not be worth the benefits, again bringing into play the role of scale when interpreting the impact of this new legislation on smaller municipalities.

3.1 Question 10

The final question stepped away from the MSR 1999 to ask municipal participants if they had engaged in a Demand side management (DSM) approach to reducing water consumption through the education

²² See: <http://www.city.vancouver.bc.ca/commsvcs/southeast/>

of their resident about “Smart Water” use around their homes and work places. In 14 of 17 cases the municipalities were actively communicating Smart-Water ideas and suggestions to their water users or were in the process of developing or moving water smart programs through Council. In Prince George this includes a school program. In Richmond, Project Wet provides an educational model for DSM that has been well designed and accepted by the public. In Vernon, Kelowna and Maple Ridge, water metering allows household consumers to directly link water use to billing rates, generally seen as the most efficient way to reduce consumption. In Vernon this is coupled with a successful rebate program for water conserving toilets.

3.2 Conclusions

The present system of sewer planning, whereby municipal governments’ request the extension of sewer pipelines to meet the needs of individual land development projects ranging from a house to hundreds of acres, has been described by one senior GVRD infrastructure planner as *death by a thousand cuts*.²³ Meeting the needs of the GVRD’s growing urban population has required considerable expansion of the boundaries of the GVRD wastewater collection system (See GVRD LWMP).²⁴ The GVRD planner concluded that *the MSR should be a viable alternative to these extensions allowing for onsite treatment and disposal*, noting that the LWMP required that an assurance plan be in place that meets the requirements of the MSR 1999, prior to any innovative treatment system being installed in the GVRD.²⁵ In theory, innovative, engineered on-site systems that can provide water reuse or discharge treated residential effluent to water deficit streams may actually represent augmentation to the local environment, assuming that they meet the conditions of the MSR as pertains to the parameters for their discharges (BOD, TSS, etc). However, from the findings of this study it is the obligation of the proponents of these systems to ensure that:

no liability is carried by the local municipality for maintenance, operations, replacement or future connection.

Given that the perception of immediate risk to the environment and to health and long-term risk to the municipalities’ finances are at the center of many of the responses that we have documented in this study, the barriers to the MSR 1999 appear today to be as high as they were in 1995 when CMHC first addressed this issue.

The responses of the 17 participating municipalities have been reviewed and added to information on barriers from other sustainable planning initiatives in Table 4. Barriers fall into five categories, but clearly overlap and are interdependent. Financial barriers include both risk factors as well as limited budgets that reduce the amount of time and energy staff can put into research versus responding to immediate problems arising. One way to reduce the impact of financial risk is through progressive or green legislation. This requires champions on City Council who can support the efforts of municipal staff. Regardless of the logic or value of green infrastructure, permitting and construction codes already

²³ Toivo Allas: Policy and Planning, Innovative Systems, Greater Vancouver Regional District, March 31, 2003

²⁴ The Greater Vancouver Regional District, Liquid Waste Management Plan, can be viewed at: http://www.gvrd.bc.ca/sewerage/lwmp_feb2001/lwmp_plan_feb2001.pdf

²⁵ GVRD, LWMP, February 2001, Policy 29 – Assurance Plans, page 50.

exist. Changing codes, policies and getting overlapping legislative authorities and regulations to work seamlessly is both time consuming and problematic. Finally, educational barriers exist on numerous levels. Given the time constraints faced by most municipal staff, who may only be asked to review one wastewater treatment application in a year, the ability to have access to a Centre of Excellence on Sustainable Technologies would greatly improve their ability to make well-informed decisions. However, no facility of this nature presently exists in Canada.

TABLE 4
Common Barriers to Green Infrastructure²⁶

Financial Barriers	Legislative & Political Barriers	Permitting & Code Barriers	Construction & Building Barriers	Educational Barriers
<ol style="list-style-type: none"> 1. Fiscal impact unknown 2. Higher upfront costs – Entire plant may need to be constructed prior to residential development 3. Reuse water may be too costly given subsidized municipal water rates 4. Lack of Incentives 5. Lenders Risk & Security 	<ol style="list-style-type: none"> 1. Lack of Political Will to support Sustainability 2. Local vs. Regional impact Inter-jurisdictional Conflicts 3. Caution/Risk Avoidance on using "new" technology versus accepted "old" ways 4. Lack of Policies to Encourage Green Building Investment Municipal Bonusing 	<ol style="list-style-type: none"> 1. Code issues & Permitting Requirements. 2. Lack of Guidelines for Green Building 3. Variances to Building Code may be required 4. Rigidity of permitting 	<ol style="list-style-type: none"> 1. Liability issues 2. Safety concerns 3. Competition – bottom line issues in competitive land development 4. Availability and/or knowledge of products and services at competitive rates 5. Time issues to work through new approaches and Regulations 	<ol style="list-style-type: none"> 1. Lack of City Staff, Time & Funding for R&D 2. Different Knowledge Levels Architects, Engineers, Builders and Trades & the Public as end-users of green buildings 3. Community Fears especially related to Water & Environmental Issues 4. Inter-governmental. Agency Problems lack of <i>Seamlessness</i> between Departments and Regulations 5. Lack of third party, impartial Board or Centre of Expertise to go to for advice

²⁶ A variety of barriers to green building were originally identified by the Green Building Dialogue/Workshop and the meetings with the Green Building Work Group in San Jose. Solutions to these barriers were identified as part of the recommendations prepared by the Green Building Work Group. The author has supplemented these through research and case studies in British Columbia.

The questionnaire has allowed us to gain a greater understanding of municipal legislative barriers that may exist to the application of the MSR 1999 to residential development projects. Secondly, based on the often well thought-out and argued positions of municipal managers we are in a stronger position to make recommendations regarding revisions to the MSR 1999 while building a stronger understanding of the applicability and acceptance of green technologies in wastewater treatment at the municipal level.

3.3 Recommendations

Planning and infrastructure outcomes under the MSR 1999 represent in the words of one municipal planner a *paradigm shift, in the way we think about the delivery of municipal services*. Coupled with the delivery and development of new technologies, the MSR 1999 demands that a new dialogue be opened to discuss and question existing ways of planning and servicing our urban developments and the means by which to more effectively provide cost efficient infrastructure services. Crucial regulatory changes being proposed at senior levels of government, especially those discussed in this report on the BC Municipal Sewage Regulation, need to be clearly communicated and envisioned through workshops and briefing sessions that explore scenario building and critical deconstruction of potential outcomes.

Risk, the perception of risk and risk avoidance are common themes associated with innovative or alternative wastewater treatment at the municipal level of government. This issue of risk reduction needs to be addressed either through legislation which allows municipal engineers and planners to take on environmentally sustainable technology based projects or through improved third party verification of these technologies that would provide support to these decision makers. To some extent, municipal governments in BC are being asked to demonstrate new technologies and approaches to infrastructure servicing without the type of third party decision-making support that they require. Even though the MSR 1999 specifically includes the requirements for private companies to comply with the Assurance Plan this information is not commonly understood and is open to interpretation. On the private or corporate side of the equation, few land development firms are cognizant of the MSR 1999 options relating to the onsite servicing of properties or of the opportunities to reuse water for environmental and social benefits.

Again, it would appear that many of the target audiences for the MSR 1999 legislation as pertains to on-site servicing and for water reuse have not been reached, nor have the benefits for reduced infrastructure servicing and environmental benefits been adequately demonstrated. Educational programs directed at both municipal and corporate organizations may help make onsite wastewater and water reuse feasible for targeted markets where new infrastructure is required and where water resources are limited. The British Columbia MSR 1999 represents a strong foundation documents upon which to develop unique and innovative solutions for treating and potentially reusing wastewater in residential areas, however, it has not yet been adequately accepted nor applied to have made an impact upon the traditional *big-pipe* solution.

Appendix A
Questionnaire Contact List

Contact List**1 Abbotsford City Hall**

32315 South Fraser Way
Abbotsford B.C.
V2T 1W7

2 Anmore, Village of

2697 Sunnyside Road
Anmore, BC V3H 3C8

3 Belcarra, Village of,

4084 Bedwell Bay Road
Belcarra BC V3H 4P8

4. Campbell River, District of

Engineering Services Department
301 St. Ann's Road
Campbell River, B.C. V9W 1G4

5. Central Saanich, District of

District of Central Saanich, 1903 Mount Newton Cross Road, Saanichton, BC V8M 2A9
Contacts: Nirmal Bhattacharya, P. Eng., Head:
Engineering and Public Works: Department

6 Chilliwack, City of

Chilliwack Engineering & Operations Department 8550 Young Road
Chilliwack BC V2P 8A4

7 Courtenay, City of

830 Cliffe Avenue
Courtenay, B.C.
V9N 2J7

8 Delta, the Corporation of

4500 Clarence Taylor Crescent
Delta, BC Canada
V4K 3E2

9 Esquimalt, The Corporation of the Township of

Municipal Hall, 1229
Esquimalt Road, Esquimalt, B.C. V9A 3P1.
The Development Services Department

10 Fort St. John, City of

10631 100th. Street,
Fort St. John, British Columbia
V1J 3Z5

11 Gibsons, Town of

Gibsons Town Hall
474 South Fletcher Road, Gibsons

12 Kamloops, City of

City of Kamloops
7 Victoria Street West
Kamloops BC V2C 1A2

13 Kelowna, City of

1435 Water Street
Kelowna, B.C. Canada, V1Y 1J4
Phone: (250) 763-6011
Planning and Development Services Department

14 Lake Country, District of

Municipal Office
10150 Bottom Wood Lake Road
Lake Country, BC V4V 2M1

15 Langford, District of

2nd Floor, 877 Goldstream Avenue, Victoria, British Columbia, Canada, V9B 2X8.
Contact: Michael Baxter, Municipal Engineer

16 Maple Ridge, District of

11995 Haney Place
Maple Ridge, BC V2X 6A9

17 Metchosin, District of

Municipal Hall
4450 Happy Valley Road
Victoria, BC V9C 3Z3

18 Mission, District of

8645 Stave Lake Street, Box 20
Mission, B.C. V2v 419 604-820-3700

19 Nelson, City of

City Hall, 502 Vernon St.
Nelson, B.C. V1L 5P4

20 North Cowichan, The District of

Box 278 7030 Trans Canada Hwy
North Cowichan, BC, V9L 3X4

21 Osoyoos, Town of

P.O. Box 3010,
Osoyoos, B.C. V0H 1V0

22 Pitt Meadows, District of

12007 Harris Road
Pitt Meadows, BC V3Y 2B5

23 Powell River, Corporation of the District of

6910 Duncan Street
Powell River, BC V8A 1V4

24 Prince George, City of

1100 Patricia Boulevard
Prince George, BC V2L 3V9

25 Prince Rupert, City of

424 3rd Ave West
Prince Rupert, BC V8J 1L7

26 Richmond, City of

6911 No. 3 Road
Richmond, BC
V6Y 2C1 Canada

27 Saanich, District of

770 Vernon Ave
Victoria, BC V8X 2W7

28 Sooke, District of,

2205 Otter Point Road,
Sooke, British Columbia, V0S 1N0

29 Squamish, District of,

37955 - 2nd Avenue P.O. Box 310
Squamish, B.C. V0N 3G0

30 Summerland, District of

13211 Henry Ave
Mail Box 159

31 Tumbler Ridge, District of

305 Founders St, P.O. Box 100,
Tumbler Ridge,
British Columbia, Canada VOC 2W0

32 Vernon, City of

3400-30th Street,
Vernon BC V1T 5E6

33 Whistler, Resort Municipality of

4325 Blackcomb Way,
Whistler, BC, V0N 1B4

Regional Districts

Capital Regional District Partner in Project

524 Yates Street Victoria, BC V8W 2S6

Victoria, BC

Mike Williams, P.Eng. General Manager, Environmental Services

250-360-3092

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Greater Vancouver Regional District

4330 Kingsway,

Burnaby, B.C. V5H 4G8

APPENDIX B
COPY OF QUESTIONNAIRE

QUESTIONNAIRE

Municipal Government Attitudes and Perceptions of British Columbia's Municipal Sewage Regulation, 1999

an

**A-C-T PROGRAM
RESEARCH STUDY
FUNDED JOINTLY BY**

FEDERATION OF CANADIAN MUNICIPALITIES

AND

VANCITY CREDIT UNION



*ACT Program
The Federation of Canadian
Municipalities*



*Community Partnership Program -
Community Project Grant*

With support from the



February, 2003

QUESTIONNAIRE
Municipal Government Attitudes and Perceptions of
British Columbia's Municipal Sewage Regulation, 1999

Preamble: The *Federation of Canadian Municipalities* and *VanCity Credit Union* have provided financial support for this project, with in-kind assistance provided by the *BC Ministry of Community, Aboriginal and Women's Services*. NovaTec Consultants Inc. is undertaking the research with the results to be published in the ACT Program Research Series.

Rational: Since the [The Municipal Sewage Regulation \(MSR\)](#),²⁷ came into effect on July 15, 1999 there have been very few discharges "registered" for private sector residential projects. It has been suggested that this lack of application of the MSR may be due municipal regulatory barriers combined with a lack of knowledge of the MSR in the development community. *How well informed is your Municipality on the MSR?*

The questionnaire is based on the authors' experiences in navigating the first registration to discharge for a residential project through the MSR and municipal processes. They found that two levels of governmental approvals were required. Discussions and negotiations with the Province were relatively streamlined, even though this was the first project under the MSR. The process took eight months from start to Registration.

In contrast, the Municipal Departments of Engineering and Planning have raised persistent questions, citing concerns over financial liability, ownership, operations and maintenance, impacts on municipal planning projections and concerns that if approved this project will set a precedent, opening up a new market for land development. Planners have expressed the opinion that the MSR reduces their ability to manage urban growth. To quote one planner... *these green technologies represent a major paradigm shift from how we have traditionally planned infrastructure for our municipalities.*

Why Participate: We are asking you to participate:

1. So that a stronger understanding of how municipalities are dealing with the MSR can be developed, an information base that will be shared with municipalities.
2. So that we can determine what impact, if any, the MSR is having on policy, planning and infrastructure development at the municipal level.
3. So that we can determine if a workshop needs to be designed to assist municipalities and/or the development industry to better understand the application of the MSR.
4. So that other Canadian provinces that are looking to develop similar legislation can benefit from the BC experience; and finally,
5. We feel that the questionnaire will increase your knowledge and understanding of the MSR and the potential impact it may have on development in your community.

The first part of the questionnaire asks you to review a hypothetical application to subdivide a property zoned for residential development. Part 2 pertains to your knowledge and experience with the MSR.

²⁷ See page 7 for more information on the MSR; the text is also hyper linked to WLAP information pages.

MUNICIPALITY/REGIONAL DISTRICT: _____

NAME & POSITION OF PARTICIPANT COMPLETING QUESTIONNAIRE:

It is assumed that the questionnaire will require input from both engineering and planning.

Name: _____, Position/Dept: _____,

Name: _____, Position/Dept: _____,

PART 1: PROJECT SPECIFIC QUESTIONS

Project Specific Assumptions

1. A developer is proposing to build 100 homes on a 244acre site that has been zoned for 1acre lots. The closest serviced "urban area" is 8 kilometers away, with the land between the urban area and the development site being in the Agricultural Land Reserve (ALR).
2. The remainder of the site will be dedicated for riding trails, public parks, roads and services as well as for an equestrian park with associated facilities.
3. The site is incapable of being serviced using traditional septic systems with onsite disposal.
4. The project will set new standards for environmental sustainability, combining water conservation with stormwater management and an equestrian waste management program.
5. Potable water from the municipal system will be supplied to the site by the developer.
6. It is not financially feasible to extend municipal sewer to the site due to the distance involved and the threat of increasing demands for land use changes on the ALR lands.
7. The technology selected for the tertiary wastewater treatment plant is similar to that shown in the schematic. The discharge is being used to make up a water deficit in a salmon stream a plan that has met with Department of Fisheries and Oceans and Water Land and Air Protection (WLAP) approval. The plan proposed by the developer has met with Ministry approval and the Discharge has been Registered.
8. The Developer has kept the municipality up-to-date on the MSR procedure, has held Open Houses with the public and is now applying for a subdivision approval.

Questions:

1. From an Engineering perspective what are the three major complications or issues that would be raised by this project in your municipality? (This may include points that are related to policy, O&M, liability or technology or other issues.)

A) _____

B) _____

C) _____

2. From a Planning and Policy perspective what are the three major complications or issues that would be raised by this project in your municipality? (This may include points that are related to policy, O&M, liability or technology or other issues.)

- A) _____

- B) _____

- C) _____

3. In our case study the municipality argued that the proposed wastewater treatment program was at variance with the following policy:

Development will not be permitted on the basis of a private package sewage treatment plant. (Municipality Subdivision and Development Control Policy)

Does your Municipality have a comparable bylaw or policy?

Yes _____ or No _____

3a. If Yes, Could you provide the wording and reference to the exact clause (s)?

3b Would the wastewater solution proposed by this development be at _____ variance with any other types of municipal policies or bylaws in your _____ municipality?

If Yes, Could you provide the wording and reference to the exact clause (s)?

3c. Do you feel that your municipalities' bylaw or policy statement is an appropriate or sufficient legislative tool by which to stop the development of this project if the municipality so desired?

3d. Based on the information available would your municipality contemplate:
(Please check box)

i) Approving new policies that increase barriers to the application of the MSR 1999 for new residential projects?

ii) Removing existing policies or creating new policies that helped streamline the application of the MSR 1999 for local development?

iii) Status quo is sufficient to meet any impact of the MSR 1999 on residential development projects in the municipality.

4. Given your knowledge of the MSR 1999 would your municipality support a development permit for the project as described if WLAP Registered the Discharge?

Yes _____ or No _____

5. Assuming that your municipality approved the development permit and the project went ahead as planned with wastewater treatment services being built to approved design specifications - Would your municipality be interested in taking over ownership of this system and operating it as a municipal treatment plant? 28

Yes _____ or No _____

PART 2: MSR 1999 RELATED QUESTIONS:

6. To the best of your knowledge have there been any applications for Registration to Discharge made in your municipality for residential projects under the MSR?

Yes _____ or No _____

Comment: _____

6a. If Yes, did these include water reuse options?

²⁸ If your municipality is in the Okanagan Basin assume that the municipality is willing to allow a private developer to apply for a discharge under the MSR, but that the Municipality has agreed to own and operate the facility once it is built. Schedule 5 - Geographical Areas Requiring Advanced Treatment notes that in the Okanagan Basin *discharges from treatment facilities not owned by a municipality are prohibited.*

Yes _____ or No _____

Comment: _____

6b. When the first development application was made under the MSR 1999 were you prepared to deal with it?

Yes _____ or No _____ or N/A _____

6c. When did you become familiar with the potential impacts of the MSR on landdevelopment? (For example, the Ministry ran workshops in some communities.)

6d. Assuming that your municipality has not yet been faced with a development permit under the MSR 1999 has your municipality developed, or are you planning to develop, a set policy response to this issue?

Yes _____ or No _____ Planning to _____

7. If a developer was looking to open up a new subdivision in your municipality using conventional septic systems would you recommend that they consider an application under the MSR 1999?

Yes _____ or No _____

Please Expand: _____

8. Would your municipality entertain the development of a new subdivision to be developed “off the grid” if it maximized water reuse based on advanced treatment with disinfection to unrestricted water reuse levels as outlined in the MSR 1999?

Yes _____ or No _____

Comment: _____

9. **Bonusing** Some cities provide density bonuses to developers for building green roofs, which help to reduce the Heat Island Effect and save energy. Do you feel that residential projects that reduce the demand on municipal sewage treatment while offering water reuse should be rewarded through some form of municipal bonusing.

Yes _____ or No _____

Please Expand: _____

10. Has your municipality developed a Demand-Side Management approach that stresses educating the public in regards to water conservation, leak prevention, water reuse? Example: Kamloop’s WaterSmart Program at:

<http://perc.ca/PEN/2002-05-06/s-derdall.html>

Yes _____ or No _____

Examples: _____

Thank you for participating!

Would your municipality participate in a workshop relating to the impact of the MSR on municipal policies and land development?

Yes _____ or No _____

Please feel free to contact us by e-mail for more information or clarification:

Please Return Questionnaire via e-mail, fax or mail to:

gfinn@sustainable-communities.com

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Phone: 604-873-9262
Fax: 604-873-2353

BACKGROUND INFORMATION

The MSR in Review: [The Municipal Sewage Regulation \(MSR\)](#), which became effective on July 15, 1999, provides authorization with standards and requirements for the discharge or reuse of treated sewage effluent. Part of the process of complying with the regulation includes completing an [environmental impact study](#) and an [operating plan](#) prior to submitting a [registration form](#). For residential developments where the discharger is not a government agency or municipality, the discharger must also comply with the applicable financial security requirements of the MSR.

The MSR was supposed to reduce the time required for registration of a discharge to a three-month Ministry review period, compared to the previous permitting system that averaged two years for approvals. Based on our experience with the registration process, we believe that legislative and perceptual barriers are hindering the application of the MSR legislation to residential land development projects. These barriers include the section of the Regulation itself pertaining to financial security requirements (which places an onerous burden on developers) as well as at the municipal level, where experience with the Regulation may be limited and impacts on planning unknown.

The MSR 1999 set new province-wide standards regulating the ownership, construction, management, and security requirements for the private sector delivery of wastewater treatment facilities, as well as setting standards for discharges and water reuse. It was established to:

1. Replace the requirement for site-specific permits under the Waste Management Act with an authorization under a performance-based regulation that reduces the time for receiving the authorization from about two years to 3 months;
2. Update discharge standards and security requirements to ensure that there is improved protection of the receiving environment; and
3. Encourage the use of innovative technologies to provide an alternative for the "big-pipe", improved source control, water conservation, water reuse and reduced discharge of treated effluent to the receiving environment.

The Regulation requires that qualified professionals (QPs) undertake the design, O&M Plan, environmental impact assessment and oversee the construction, commissioning and operation of the plant. Furthermore, the Regulation requires that the systems be supported by a stringent financial security plan with 100% replacement funding. As such, the MSR sets the standards required for the private sector delivery of wastewater treatment services. Working within this legislation, private firms can deliver sewage treatment infrastructure as a means of servicing new housing in the market place. In reality, few land development companies have attempted to navigate the legislation.

APPENDIX C

QUESTIONNAIRE RESPONSES

See Separate Attached Microsoft Access Files