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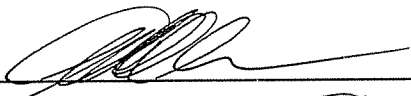
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Halifax Regional Council
Committee of the Whole
January 25, 2005

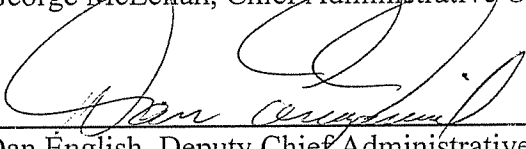
February 1, 2005

TO: Mayor Kelly and Members of Halifax Regional Council

SUBMITTED BY:



George McLellan, Chief Administrative Officer



Dan English, Deputy Chief Administrative Officer

DATE: January 14, 2005

SUBJECT: 25 Year Stormwater and Wastewater Forecast

ORIGIN

Staff's recognition of the need to forecast and prioritize wastewater and stormwater projects to maximize the environmental and safety benefits and obtain best value for dollars expended.

RECOMMENDATIONS

It is recommended that:

Regional Council endorse the Priority Rating Process as currently utilized by staff, and as defined in this report, for determining priorities related to capital projects, allocating infrastructure funding, and assigning staff resources.

BACKGROUND

One of the most critical services which HRM provides to its citizens and to its visitors is the collection, treatment and disposal of wastewater. This service is provided, or is in the process of being provided, to communities in the urban core such as Halifax, Beechville/Lakeside/Timberlea, Beaver Bank, Sackville, Bedford, Dartmouth, Cole Harbour, and Eastern Passage, and also to other generally smaller communities outside the urban core, such as Uplands Park (off Hammonds Plains Road), Springfield Lake, Fall River, Wellington Subdivision, AeroTech Park, Frame Subdivision (off Waverley Road), Middle Musquodoboit and North Preston.

HRM also provides stormwater service, primarily in the form of drainage systems in and near streets owned by HRM. In the urban core, the drainage systems are typically pipe and catch basins, while in the rural areas, open ditches and culverts are more prevalent.

HRM currently owns considerable infrastructure related to these services:

Wastewater :

- Sanitary Sewers
 - Gravity - 1000 kilometers
 - Force Main and Pressure Sewer - 60 kilometers
- Pumping Stations - 153
- Holding Tanks - 4
- Regulating Chambers - 3
- Treatment Plants - 13

Stormwater:

- Storm and Clearwater Sewers - 700 kilometers
- Catch Basins - 17,000
- Retention Facilities - 10

Combined:

- Combined Sewers - 300 kilometers

Manholes: 37,000

Staff has developed a rough estimate of the replacement value of the stormwater and wastewater infrastructure owned by HRM. That value is estimated to be about \$1 billion.

A rough breakdown of this estimate is as follows:

Wastewater Treatment Plants	\$120 million
Pumping Stations	\$130 million
Sewers and Related Infrastructure	\$750 million
Total	\$1.0 billion

DISCUSSION

Staff in EMS have been working over the last several months toward identifying the long term financial needs of HRM's stormwater and wastewater infrastructure. The forecasts produced so far are only approximate, but staff will continue to refine these estimates over time.

The work that staff has done to date has identified funding requirements in the order of \$540 million for stormwater and wastewater over the next 25 years, as follows:

Wastewater Treatment	\$105 million
Pumping Stations and Force Mains	\$30 million
Gravity Sewers/Drainage Works	\$255 million
Wet Weather Flow Control	\$100 million
Source Control/Water Resource Management	\$25 million
Infrastructure Management	\$25 million
Total	\$540 million

It must be emphasized that these are rough order-of-magnitude estimates. However, they are adequate for the purpose for which they were developed: to give staff and Council a better understanding of our long-term financial needs in stormwater and wastewater, so that we can work towards the development of a sustainable funding plan. It is very likely that these estimates will continue to increase in future as staff gathers more detailed information about HRM's infrastructure.

Of the \$540 million identified above, about \$510 million is capital, and is primarily related to work which is required to bring HRM's stormwater and wastewater infrastructure into compliance with federal and provincial legislation and regulations, or to prevent it from sliding into non-compliance. Most of the capital costs are related to expansions and upgrades of wastewater treatment plants,

rehabilitation and replacement of deteriorated infrastructure, backup power at treatment plants and pumping stations, wet weather flow control and elimination of certain plants and pumping stations.

There are specific costs which are not included in the \$540 million, as follows:

1. Halifax Harbour Solutions Project (HHSP)- No funding related to the HHSP has been included as a funding plan is already in place.
2. Secondary Treatment for HHSP- It is uncertain whether the three HHSP wastewater plants at Halifax, Dartmouth and Herring Cove might require upgrading from enhanced primary to secondary treatment at some time in the future, likely due to changes in legislation. The cost is estimated to be in the order of \$80 million.
3. New Urban/Suburban Sewage Treatment Plants- Staff anticipate that possibly two new plants - one on the east side of Bedford Basin and another on the west side - might eventually be required to facilitate growth beyond the 25 year horizon. The time frame is not known with certainty, nor have staff identified sites or developed cost estimates at this time. Staff from EMS and Regional Planning have met on this issue and investigations will continue. Staff will report to Council at an appropriate future date.
4. Changes in legislation/regulation- It is possible that the Province and or the Federal Government might impose more stringent discharge limits for any or all of HRM's treatment plants, or might create higher standards for other components of our infrastructure. This potential is uncertain and so no costs have been included at this time.
5. Sewer Service extensions- HRM is often requested to extend sewer (and water) to communities which are currently not serviced. HRM is not legislated to provide sewer to unserved communities, and so staff have not included funding for this category of capital work.
6. Sewage Treatment for Rural Centres- Servicing of three rural communities - Hubbards, Porters Lake and Musquodoboit Harbour - is being considered through the Regional Planning Project. How this servicing will be funded is not yet confirmed.
7. New/upgraded trunk sewers- New trunk sewers and upgrading of existing trunk sewers are also being considered through the Regional Planning Project. How these will be funded has not yet been identified.

The capital amount of \$510 million averages about \$20 million per year over the 25 years. By way of comparison, our capital spending for similar work over the past four years has averaged \$6.3 million, from the traditional HRM funding sources - Environmental Protection Reserve, Sewer Redevelopment Reserve and General Taxes.

With one exception, all of the costs included in the \$540 million are related to the stormwater and wastewater infrastructure owned by HRM, and for which HRM has a legislated responsibility. The one exception is costs related to developing and implementing a Water Resource Management Program, which is currently being considered as part of the Regional Planning Project. An allocation of about \$10 million over the 25 years has been included at this time.

Additional detail regarding how the \$540 million estimate was developed is included in Attachment 1.

There are four main cost drivers to staff's forecast:

1. Substantial wastewater treatment plant expansions and upgrades are required to service the growth in HRM in accordance with increasingly tougher federal and provincial legislation and regulations.
2. All infrastructure has a finite life and eventually requires rehabilitation. Pipes tend to have a life cycle of approximately 50 to 100 years. For pumping station and treatment plant equipment, life cycles are more in the range of 25 to 35 years. If the average service life of our infrastructure is 50 years, and if the total replacement value is \$1 billion as estimated above, an annual re-investment in the order of \$20 million (2%) is required to maintain the HRM stormwater and wastewater system.
3. Wet weather flows (e.g. rain events) are the most serious operational problem with HRM's wastewater system. The resultant overflows are in violation of federal and provincial regulations, plus there are public health and environmental implications. Much work must be done to bring HRM into a position of compliance, involving considerable financial commitments.
4. Increasing public demand for improved protection of the environment and public health.

Stormwater and Wastewater Priority Rating Process

Why are staff recommending that Council endorse a Priority Rating Process at this time? There are a number of reasons:

1. Over the last several years, staff have been completing various consultant studies and internal investigations with respect to HRM's stormwater and wastewater systems, as shown in Attachment 2. All of this work has provided staff with a better sense of our systems - how much we own, what condition it is in, what operational problems exist, where the physical constraints are, and how some of these issues can be resolved; therefore, staff can now prioritize work to obtain the best environmental/public safety return and value for HRM expenditures.

2. Traditional HRM funding sources for stormwater and wastewater work - the Environmental Protection (EP) Reserve, the Sewer Redevelopment (SR) Reserve, and General Taxes - no longer provide adequate levels of funding. The EP Reserve has been largely directed towards the Harbour Solutions Project. The SR Reserve has been shrinking due to unforeseen emergency-type projects. Funding from General Taxes has shrunk from an average of \$3.3 million since amalgamation to an allocation in 05/06 of \$650,000. These scarce resources must be deployed to deal with municipal obligations as a top priority.
3. When investing opportunity funds staff wish to ensure HRM's regional infrastructure needs receive a higher priority than private property issues.
4. HRM is in the process of developing a Long Term Capital Plan, spearheaded by Financial Services. Using a formal Priority Rating process will ensure that the Capital Plan is consistent with the Regional Plan and Council's expectations.
5. There is an escalating and competing demand for new sewers (and water) to be provided to communities in HRM which do not currently have that service. In most circumstances, this is not a mandated responsibility of the Municipality.
6. There is an increased demand for flood protection in HRM, where it is not necessarily HRM's responsibility.

Over the last couple of years, EMS staff have been using and refining a Priority Rating Process to identify and prioritize Stormwater and Wastewater Capital Projects for Council's Budget consideration. Staff is now requesting Regional Council formally endorse this process, not only for Capital Projects, but also to assist staff in determining priorities in terms of allocating time and other resources on a day-to-day basis, and also to determine where to direct opportunity funding.

The criteria identified and used by staff under the Priority Rating Process, in order of priority, with the most important first, are as follows:

1. **Legal/Liability** - This applies to a situation where HRM determines that it has a legal obligation to complete a certain project or to carry out certain work, typically related to impact on private property or on the public, or where HRM may be exposed to liability if it does not complete the project or carry out the work. Legal Services staff are typically involved in making this judgment.

An example is when HRM may have implemented a capital works project which inadvertently causes a sewer backup onto private property. In this situation, staff would give immediate priority to identifying and implementing the solution to the problem.

2. Compliance - This refers to a project which is required to bring HRM into a position of compliance with federal and/or provincial legislation or regulations, or to prevent HRM from regressing into a position of non-compliance.

An example is the replacement of a sanitary sewer which has deteriorated structurally and will collapse if not replaced, thereby releasing wastewater into the environment, interrupting wastewater service to our customers, potentially causing damage to private property, and potentially exposing the public to a health/safety risk.

3. Operational Efficiency - This refers to a project which will result in operational improvements in HRM's stormwater or wastewater system, typically having the benefit of greater reliability, lower risk and/or reduction in operational costs.

An example is a capital project to eliminate a wastewater pumping station by installing a gravity sewer, thereby reducing the risk of wastewater overflow, precluding the need for backup power, and eliminating the operation and maintenance costs associated with the wastewater pumping station.

4. Sewer Extensions to Unserviced Communities - This category refers to situations where existing unserviced communities are desirous of receiving piped sewer (and sometimes water), usually to resolve problems related to malfunctioning onsite sewage disposal systems and/or contaminated private wells. Depending upon the severity and the extent of the problem, these may be defined as public health issues. However, HRM is not legislated to resolve such problems and so this category is not rated highly by staff.

5. Private Property Issues - This category may refer to any number of private property issues. The most common issue in the experience of staff is requests by private property owners for HRM to resolve flooding and drainage problems on private property. This category is rated lowest by staff.

This Priority Rating Process is structured to rate most highly those projects and activities related to HRM's legal and legislated obligations with respect to the stormwater and wastewater systems which it owns and for which it is responsible. Staff consider all such projects and activities to be "Base", in the vernacular of the Business Planning and Budget process.

This process places a lower priority on all other projects and activities, unless the project or activity is specifically approved by Regional Council.

Summary

The 25 year forecast presented in this report is a beginning. The estimate of \$540 million developed by staff provides an indication of the magnitude of the challenge ahead. If so directed by Regional

Council, staff will continue developing and refining costs related to stormwater and wastewater in HRM, with the intent of documenting these in a 25 Year Stormwater and Wastewater Plan. This work will be done with continued consultation with Regional Planning and the estimates will support HRM's Long Term Capital process.

BUDGET IMPLICATIONS

Financial Services have used this forecast report to develop a recommendation for an immediate step increase of \$0.05 per cubic metre in the Environmental Protection Charge, as defined in their report entitled "Environmental Protection Charge (EPC) Rate Increase".

Further, in 2005/06, Financial Services, with strong support from EMS and Regional Planning, will develop a sustainable funding plan for stormwater and wastewater in HRM for Council's consideration. The traditional funding sources: Environmental Protection Reserve, Sewer Redevelopment Reserve, Wastewater Treatment Reserve, General Taxes, along with Capital Cost Contributions, will all be reviewed for their applicability in funding future stormwater and wastewater needs, currently forecast at \$540 million for 25 years.

By example, without a sustainable funding plan, if HRM was to try to fund the \$20 million entirely from the EPC rate, the rate would have to be increased another \$0.40 per cubic meter (approximately) in addition to the \$0.05 step increase for this year, and in addition to the increases scheduled for Harbour Solutions Project. Under this scenario, the other funding sources - Sewer Redevelopment and General Taxes - could be eliminated; however, staff is not recommending this approach at this time, but rather presenting these estimates to provide Council with some sense of the magnitude of funding required to support the current forecast.

FINANCIAL MANAGEMENT POLICIES / BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation.

ALTERNATIVES

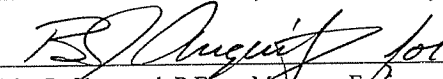
Council may choose to not support the level of funding and the priority process identified in this report. In this circumstance, HRM will continue to be in non-compliance with provincial and federal legislation and regulations with respect to its stormwater and wastewater systems and increasingly place the environment and public health at risk.

ATTACHMENTS

- Attachment 1 - Additional Detail on the Stormwater and Wastewater Forecast Estimate
- Attachment 2 - List of Consultants Studies and HRM Staff Investigations

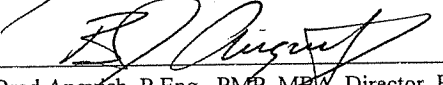
Additional copies of this report, and information on its status, can be obtained by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by:



John P. Sheppard, P.Eng., Manager, Environmental Engineering Services, 490-6958

Report Approved by:



Brad Anguish, P.Eng., PMP, MBA, Director, Environmental Management Services, 490-4825

Attachment 1
Additional Detail on the Stormwater and Wastewater Forecast Estimate

Wastewater Treatment

HRM currently owns and operates 13 wastewater treatment plants. Three new plants are also planned to be constructed under the Halifax Harbour Solutions Project.

A number of studies and investigations regarding our existing plants have been carried out over the past two years. The HRM Wastewater Treatment Plants Study, a comprehensive study of all of HRM's plants, was completed in September of 2003. Treatment plant capacities and the allocation of flows from existing communities and from future growth have been investigated in conjunction with the Regional Planning Project. A Risk Analysis of all plants has been completed by staff to assist in the prioritization of capital upgrading and expansion work. Staff has also looked at the possibility of eliminating certain plants by extending services and directing the flows to nearby, larger plants.

There is considerable work required to keep our plants in compliance with federal and provincial legislation, and to provide capacity for future growth in HRM. The cost of the work identified through the various activities noted above is approximately **\$105 million**, which includes expansion and upgrading of certain plants, related operating and maintenance costs, equipment replacement, provision of backup power at all plants, and elimination of certain plants.

The \$105 million does not include certain other possible wastewater treatment costs:

1. Staff anticipate that possibly two new plants - one on the east side of Bedford Basin and another on the west side - might be required to facilitate growth beyond the horizon of the Regional Plan. The time frame is not known, nor have staff identified sites or developed cost estimates at this time. Staff from EMS and Regional Planning have met on this issue and investigations will continue. Staff will report to Council at an appropriate future date.
2. It is uncertain whether the three HHSP wastewater plants at Halifax, Dartmouth and Herring Cove might require upgrading from enhanced primary to secondary treatment at some time in the future, likely due to changes in legislation. The cost is estimated to be in the order of \$80 million.
3. It is possible that the Province and/or the Federal Government might demand more stringent discharge limits for any or all of HRM's plants. This action is uncertain and so no costs have been included for this possibility.

Pumping Stations and Force Mains

Similar studies and investigations have been carried out with respect to HRM's pumping stations and force mains. The most significant is a study of HRM's wastewater pumping stations, completed last fall which studied in detail 44 high priority pumping stations (of the total of

153 owned by HRM), and identified rehabilitation and upgrading capital work valued at \$12 million. Staff intend to study the remaining stations in 2006/07, to identify the additional capital requirements.

Preliminary investigations have resulted in a rough estimate of another \$18 million for the stations not already studied, for a total of **\$30 million**.

The types of work included in these estimates are capacity upgrades, reconstruction of pumping stations, equipment replacement, force main replacement or twinning, provision of additional storage capacity or backup power, and elimination of certain stations, generally by installing new gravity sewer pipe.

Sewers and Related Infrastructure

HRM owns over 2000 kilometers of gravity sewers - sanitary, stormwater and combined. Much of this infrastructure is old, and rehabilitation and replacement is a continual requirement, and is carried out on a priority basis related primarily to the structural condition of the system.

If sewers are not rehabilitated or replaced in a timely manner, they may be in danger of collapse. In this circumstance, one or more of several problems may arise. If the sewer is in the street, the street may also collapse. The flow in the sewer will be hindered at the very least, and quite likely, fully blocked, which in turn will result in the release of stormwater or wastewater into the local environment, into homes or businesses, and/or onto local streets. Further, service to adjacent and upstream properties may be interrupted until the repair is fixed.

Sewer failures are obviously very disruptive, plus the cost to fix such problems and to replace or rehabilitate sewers on an emergency basis is very expensive, in terms of both operating and capital costs. In some circumstances, HRM may be required to pay claims for damage/business disruption. From various perspectives, it is desirable to prevent such problems by replacing pipes on a planned basis.

Sewer failures have happened in HRM on too many occasions in recent years. Some examples are Hines Road in Eastern Passage, Pleasant Street and Raymond Street in Dartmouth, Main Street in the Westphal area, the outfalls at Salter Street and the Museum of the Atlantic in Halifax, and Kane Street in Halifax. The increasing number of such incidents is a strong signal that HRM is not investing enough resources into identifying structural deficiencies in its sewer pipes, and replacing these pipes before problems occur.

Other types of work included in this category include replacement of undersized pipe, storm drainage improvements, lateral replacements within the HRM street right-of-way related to capital projects, and large system cleaning projects.

Staff have projected costs of **\$255 million** over the next 25 years for sewer infrastructure, which amounts to about \$10 million per year. As a point of comparison, over the past six years HRM has spent on average of \$3.2 million per year for this type of work.

Wet Weather Flows and Overflows

Much of HRM's separated wastewater system is subjected to high wet weather flows, which result in surcharge of the system and overflow during certain rainfall events. Of the 153 pumping stations and related facilities that HRM owns and operates, about 40 of these overflow during certain events: some rarely, others during most significant rain events. Most of the pumping stations overflow into freshwater bodies. A smaller number overflow into marine waters. HRM treatment plants suffer similar problems, with by-pass and under-treatment at most plants during heavy rainfall events.

Wet weather overflows and by-pass are becoming increasingly unacceptable, especially into freshwater environments, and staff have become more proactive in looking for solutions to these problems. There are various potential solutions: infiltration/inflow reduction, increased system capacity, provision of storage (at pumping stations, treatment plants or in the collection system itself), and disinfection of the overflow. The cost to control wet weather flows and overflows in our sanitary sewer systems is very difficult to estimate. Based on work to date, staff have developed an estimate of \$40 million.

Most of the sewers in the older areas of Halifax and Dartmouth are combined sewers. The new interceptor sewers which form part of the HHSP system are designed to overflow to Halifax Harbour when flows are in excess of four times average daily flow. No detailed work has been done at this time to estimate the cost of controlling all combined sewer overflows in HRM, but it will be very expensive. HREP had allocated a cost of \$14 million towards controlling combined sewer overflows at North West Arm (described as "environmental enhancements" by HREP). Using the same unit cost per sewershed area and applying that rate to all of the other combined sewersheds in HRM, staff have developed a rough estimate of \$60 million.

The total cost for wet weather flow control for both separate sewers and sanitary sewers is estimated to be **\$100 million**. Staff must caution again that this cost estimate is very rough and has been developed simply to get a feel for the magnitude of the cost.

Another possible approach with respect to combined sewer overflows is to separate the combined sewers into separate sanitary and stormwater sewers. Staff's estimate of the capital cost to separate the combined sewers in HRM is \$800 million, based on work done in the previous City of Halifax. This is obviously a very high cost. Also, separating combined sewers will create a scenario where the stormwater component of the flow - which in a highly urbanized area can be very polluted - will not receive any treatment at the plants currently being designed and built under the Harbour Solutions Project. The net effect of sewer separation may therefore be an overall greater negative impact on the quality of the water in Halifax Harbour.

Staff is conducting a Wastewater Management Study of the sewershed of the Halifax Wastewater Treatment Plant this coming year. One of the deliverables will be recommendations related to how best to manage wet weather flows in that sewershed, including whether sewer separation is a desirable approach.

Stormwater Quality/Source Control

Another **\$25 million** has been identified to fund HRM's Source Control Program and Water Resource Management Strategy.

The Source Control Program in HRM is now well established. There are five staff in place - two permanent and three term. Program expenses such as salaries, advertising, education, sampling and testing, and other related activities, are estimated to continue at \$500,000 per year over the 25 years.

HRM's efforts at regulating stormwater quality and protecting our water resources is limited and inconsistent. One critical problem which has a significant impact on our water resources is erosion and sedimentation. HRM's role in developing and implementing a Water Resource Management Program is currently being considered as part of the Regional Planning Project. An allocation of about \$10 million over the 25 years has been included at this time, including operation and maintenance of stormwater management facilities which may be required as part of the overall program.

Infrastructure Management

Staff have identified another **\$25 million** for Infrastructure Management to assist HRM in knowing what infrastructure it has, where it is located, how old it is, what condition it is in, the flows in the system, and how much available capacity remains. In order to know this information, staff require the following:

- Modelling of all major components of our stormwater and wastewater systems, for use in identifying operational upgrades and to support growth opportunities
- Additional resources to rate the condition of our sewers, and prioritize system rehabilitation requirements
- Continued program of gathering record information on our sewers, including development of a database related to sewers in easements and rights-of-way
- Permanent flow measurement at our pumping stations and treatment plants, and at key locations in our gravity system
- An enhanced and updated Supervisory Control And Data Acquisition (SCADA) system. This system is used for remote, automated system control and data collection.
- Asset management software tools

HRM is lagging behind other municipalities in this area. It is essential to know what we own, its physical condition and its operating capabilities, in order to be able to manage the system in a safe and cost effective manner.

Capacity for Growth and Development

The \$540 million forecast includes wastewater treatment plant upgrades and expansions related to Regional Planning and to growth generally in HRM over the next 25 years or so. This is predicated on certain growth projections and wastewater flows, and these will be monitored so that future treatment capacity needs are identified and planned in a timely fashion. No decision has been made at this time with respect to how the cost of treatment plant expansions and upgrades related to Regional Planning will be funded, whether by HRM, or by future users of the system through the Capital Cost Contribution Policy, or according to some other formula.

Financial Services will be taking the lead on bringing this issue back to Regional Council, with support from Regional Planning and from Environmental Management Services.

A limited amount of new trunk sewer, or upgrading of existing trunk sewers, is included in the Regional Planning Infrastructure Plan, estimated value of \$5 million. This work has not been included in the forecast amount of \$540 million.

Demands for New Sewer Infrastructure - Not Included

No funding has been included for new sewers which are often requested by property owners on unserved streets and communities in HRM. The driver is usually failure of onsite wastewater disposal systems and/or contamination of private wells, both of which are regulated by the Province. Sometimes, services are requested by property owners simply so they are able to have what is perceived as a higher level of service.

There is no legislated obligation on the part of HRM to provide sewer service to those who do not have it, and so this program is seen by staff to be a lower priority than projects and initiatives related to systems owned by HRM, which are HRM's legislated obligation.

There are currently seven streets and communities of varying sizes where there has been an expression of interest to HRM in having sewer provided, and sometimes water too, where a funding plan is not yet in place. Estimates of capital cost to provide sewer service to these communities have been developed in consultants' studies, or by staff (some are very preliminary estimates). A rough total cost for sewer only is estimated to be in the order of \$30 million, for the communities of Fernleigh Subdivision and Glenmount/Millview, both off Bedford Highway; Herring Cove; Musquodoboit Harbour; Sheet Harbour; West Chezzetcook; and Station Road in Hubbards.

These services can be funded through Local Improvement Charges by the property owners receiving the service. HRM will continue to support these projects by co-ordinating the petition process, developing and designing the servicing plan, community liaison, developing the by-law for Regional Council approval, project management and cost recovery.

Three rural communities, currently unserved, have been identified through the Regional Planning Project as possible growth centers, and so would require water and sewer servicing. These are Hubbards, Porters Lake and Musquodoboit Harbour. How the servicing is to be funded in these communities has not yet been defined, and no costs are included in the \$540 million for servicing for these communities.

ATTACHMENT 2

LIST OF CONSULTANTS STUDIES AND HRM STAFF INVESTIGATIONS STORMWATER AND WASTEWATER - 2000 TO 2004

Compiled by Environmental Engineering Services - January 2005

NAME	COMPLETED BY
Infiltration/Inflow Projects: Final Implementation Plan: Humber Park	Consultant
Bacterial Source Tracing (BST) - A Review	Consultant
Baseline Sampling Program	HRM Staff
Bedford Sackville Trunk Sewer - Draft Hydraulic Model	Consultant
Bedford Sackville Trunk Sewer Study	Consultant
Bedford West Planning Area Sanitary Sewer Servicing Concepts	Consultant
Belmont Ave. Infrastructure Assessment Program	Consultant
Belmont Subdivision STP Study	Consultant
Cranberry Lake Water Sampling	Consultant
Dartmouth Cove Sewersheds	Consultant
Elimination of Seven PS's	Consultant
Ellenvale Wastewater Management Strategy	Consultant
First Lake Drive Flow Monitoring	Consultant
Flow Monitoring	Consultant
Freshwater Brook Sewer Inspection	Consultant
Herring Cove Water and Sewer Services - Pre-design study, Final Report	Consultant
HRM Pumping Stations & Force mains Study Priority Pumping Station Reports	Consultant
HRM Pumping Stations & Related Facilities - Remedial Works Priority List - Final Report	Consultant
HRM Wastewater Treatment Upgrade Study	Consultant
HRM Water Resource Management Study	Consultant
Hydrotechnical Assessment of Ellenvale Run	Consultant
Idlewyde Storm Sewer	Consultant
II Reduction Program Beaver Crescent Sanitary Sewer System	Consultant
Infiltration/Inflow Projects - Humber Park	Consultant
Infiltration/Inflow Projects - Lockview/MacPherson Road	Consultant
Infiltration/Inflow Projects - Port Wallace	Consultant
Infiltration/Inflow Projects - Springfield Lake	Consultant
Infiltration/Inflow Projects - Walker Street	Consultant
Infiltration/Inflow Projects: Final Implementation Plan: Lockview-MacPherson Road	Consultant
Infiltration/Inflow Projects: Final Implementation Plan: Port Wallace	Consultant
Infiltration/Inflow Projects: Final Implementation Plan: Springfield Lake	Consultant
Infiltration/Inflow Reduction-Investigation and Implementation - Jaybe Drive	HRM Staff
Infiltration/Inflow Reduction Program Belmont Ave. STP Sanitary Sewer System	Consultant
Infiltration/Inflow Reduction Program Caldwell Road - Sanitary Sewer System	Consultant
Infiltration/Inflow Reduction Program Sackville Sewer System Sub-Sewer Shed 6 & 7	Consultant
Lake and Stream Sampling	Consultant
Local Improvement Charge Projects	Consultant
-Beaver Bank	
-Millview	
-Prince's Lodge	
-Armshore	
-Herring Cove	

Maynard Lake Smoke Testing	Consultant
McIntosh Run Sanitary Trunk Sewer Study	Consultant
Millwood Hydraulics Structures Detailed Design Phase 1, Final Report	Consultant
North Preston STP Upgrade	Consultant
Plymouth Road Sewage Pump Station - Wet Well Evaluation	Consultant
Procedure for Correcting Sewer Cross-Connections	Consultant
Procedure for First Response - Sanitary Sewer Emergencies	Consultant
Pumping Station Elimination Analysis	HRM Staff
Quigley's Corner Pumping Station Sewershed Wastewater Management Study	Consultant
Sanitary Sewer Flow Monitoring Study Sewershed Tributary to Heritage Hills	HRM Staff
Shubenacadie Canal Drainage Investigation	Consultant
Shubenacadie Canal Lock #1	Consultant
Six Sewersheds Wastewater Management Study	Consultant
Stormwater and Wastewater Infrastructure Database Project	HRM Staff
Uplands Park Sanitary Sewer Study	HRM Staff
Wastewater Pumping Stations & Forcemains Study	Consultant
Wastewater Treatment Plant Capacity Analysis	HRM Staff
Wastewater Treatment Plant Risk Analysis	HRM Staff
Water Resource Management Study	Consultant
Westphal/Woodlawn Infrastructure Mapping	Consultant