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Regional Watersheds Advisory Board
March 12, 2014

TO: Chair and Members of the Regional Watersheds Advisory Board

Original signed

SUBMITTED BY: ____

Jane Fraser, Director of Planning & Infrastructure

DATE: February 24, 2014

SUBJECT: **Musquodoboit Harbour Watershed Studies**

ORIGIN

June 27, 2006 — Halifax Regional Council adopted the HRM Regional Municipal Planning Strategy. Policy E-17 requires that watershed or sub-watershed studies be carried out prior to comprehensive secondary planning processes, to determine the carrying capacity of the watersheds, to meet water quality objectives to be adopted following completion of the studies.

October 30, 2007 — Halifax Regional Council endorsed in principle the Community Vision and Action Plan for Musquodoboit Harbour. Action Plan Goal I-1 is to explore options for the provision of water and sewer in the Musquodoboit Harbour village core, to protect the environment and stimulate local economic development.

LEGISLATIVE AUTHORITY

Section 229 (1)(g) of the Halifax Charter enables a Municipal Planning Strategy to require studies to be carried out prior to undertaking specified developments or developments in specified areas. This Study was initiated pursuant to Policy E-17 of the Regional Plan.

RECOMMENDATION

It is recommended that the Regional Watersheds Advisory Board recommend to the Harbour East and Marine Drive Community Council, that the Musquodoboit Harbour Watershed Study Final Report and the Musquodoboit Harbour Follow-Up Study Final Report, be accepted as background information.

BACKGROUND

In the current Regional Plan dating from 2006, Policy E-17 requires the preparation of watershed studies to determine the carrying capacity of the watershed as background for future secondary planning processes.

In September 2006, HRM issued a contract to CBCL Limited to undertake a watershed study to provide an overall evaluation of the development potential for Musquodoboit Harbour and the surrounding watershed, pursuant to Policy E-17 of the Regional Plan. The overall objectives of the study, completed in June 2007, included:

- Identify opportunities for development in a study area that includes the community of Musquodoboit Harbour, as well as the peninsula between Musquodoboit Harbour and Petpeswick Inlet; and
- Develop a site-specific plan showing all land suitable for development, with recommended densities and services required to allow these densities to be realized.

Also stemming from the Regional Plan, a Musquodoboit Harbour Community Vision was prepared by the community with the support of HRM, and was endorsed by Halifax Regional Council on October 30, 2007. Theme 6 – Infrastructure sought to explore options for water and sewer in the Musquodoboit Harbour village core to protect the environment and stimulate local economic development. Upon completion of the visioning project, a Vision Implementation Team was established as a committee of the Musquodoboit Harbour Ratepayers and Residents Association (MHRRA), recently renamed the Musquodoboit Harbour Community Association (MHCA).

Toward the end of the Community Vision process, consultants CBCL Ltd. completed the Musquodoboit Harbour Watershed Study for HRM in June 2007. That first study provided environmental, engineering and cost data for initial discussions with the MHRRA Vision Implementation Team about the feasibility of introducing piped services to the community.

Based on those discussions, HRM subsequently commissioned a Watershed Follow-Up Study in 2009, to explore further issues and opportunities in partnership with representatives of the MHRRA, and to consider the feasibility and cost of piped services in a more focused geographical area. CBCL was again retained to do this work. The objectives of the Follow-Up Study included:

- Determine assimilative capacity that could be made available by reducing inputs from known or suspected defective or malfunctioning wastewater collection and treatment systems;
- Define an optimum configuration for a small scale wastewater management system;
- Determine the feasibility and cost of providing central water supply without other services;
- Confirm the suitability of the Musquodoboit River and Little River as potential supplies of raw water for a central water system;
- Determine the impacts of possible contaminant sources on water taken from potential wells adjacent to the Musquodoboit River;

- Estimate future achievable population growth, density and distribution over a 5 to 10 year horizon in the community with on-site services, central water only or central water and wastewater services, accounting for projected commercial development; and
- Analyze existing water quality data for the Little River and assess potential sources.

The aim of this second study (CBCL, 2010) was to optimize the general concepts and costs presented in the 2007 study, integrate local knowledge and expertise, and recommend potential servicing schemes, to allow development to proceed in a manner consistent with the Community Vision.

The extended timeframe for this project arose for several reasons:

- This community provided a test case for piped servicing analysis for a Rural Growth Centre identified in the 2006 Regional Plan. This required an in-depth evaluation of several technological and financial alternatives and scenarios. The results of the analysis, in conjunction with HRM financial policy, have been important inputs to RP+5.
- In accordance with the Community Vision Action Plan, a follow-up study was commissioned to examine the feasibility and cost of servicing a smaller area than envisaged in the original study. This included several questions that arose during community consultation, and which came to light since the original study was done.
- The community requested representation on the steering committee for the follow-up study. This required internal approval and on-going coordination.
- Costing assumptions were reviewed by Halifax Water, requiring inter-agency discussions and revisions to estimates.
- Internal HRM staff discussions considered the amount and risk associated with municipal front-end financing, including analysis of anticipated development and the potential for cost-sharing with other levels of government.
- Upon completion of the final draft of the follow-up study, the community representatives requested a delay of several months to enable them to explore further options and costing in consultation with HRM staff, before the project could be signed off.

DISCUSSION

The *Watershed Study - Musquodoboit Harbour – Final Report* (CBCL, June 2007) and the *Musquodoboit Harbour Follow-Up Study Report – Final Report* (CBCL, May 2010) have been reviewed by their respective steering committees in consultation with Halifax Water and community representatives as appropriate, and are deemed to have met the terms of reference.

The main findings of each study are outlined in the excerpts provided in Attachments 1 and 2 respectively. The complete studies can be found at www.halifax.ca/planHRM under "Project Updates".

In consultation with community representatives on the steering committee for the Follow-Up Study, HRM staff explored several growth scenarios and piped servicing alternatives in terms of feasibility, capital and operating cost, and potential cost recovery.

Specifically, staff requested CBCL to update Table 5.5.1 in the Follow-Up Study, to allow for inflation and include other refinements to the estimates. The results are set forth in Attachment 3, which supersedes the costs provided in Table 5.5.1 of the study report itself. Cost estimates do not include land acquisition, nor do they include costs for local pipes in new subdivisions, which would be privately financed by each developer. Operating and maintenance costs would be in addition to these numbers. All estimates are at a conceptual level only.

For any of the Options and Scenarios analyzed by the consultants, the start-up capital outlay would be too high for HRM to justify without assurance that sufficient development would follow to recuperate this outlay through Capital Cost Contributions (CCCs) and Local Improvement Charges (LICs).

The up-front investment by HRM, and the annual costs to local citizens for piped servicing, could be reduced if a funding partnership were to be arranged with the provincial or federal government.

FINANCIAL IMPLICATIONS

There are no direct financial implications arising from this report. The studies have been prepared as background information.

COMMUNITY ENGAGEMENT

For the first of the two studies, the Consultants undertook a questionnaire to gather feedback on water use goals, practices and priorities. Questions addressed desired surface water uses, surface water quality, current water supply, sources of contamination and development constraints. Space was also provided for people to provide additional information. Ten questionnaires were returned and tabulated. Results were provided in Appendix D of the first watershed study.

The second of the two studies was part of the Implementation phase of the Musquodoboit Harbour Community Vision, which was prepared with the support of HRM staff and endorsed by HRM Regional Council. The Visioning process was overseen by a Community Liaison Group designed to represent a cross-section of the community, and included stakeholder meetings, two public forums and a survey. The MHRRA assumed the responsibility for implementing the Community Vision, and held several public forums to determine implementation priorities and recruit volunteers. At the request of the MHRRA’s Infrastructure Subcommittee, staff included three local representatives on the project steering committee for the Musquodoboit Harbour Follow-Up Study, examining the feasibility and cost of piped services and treatment plants.

On December 16, 2011, staff presented a concept to Board members of the MHRRA for piped water only, on the basis that sewer and water would be too costly in the absence of external funding. The Board indicated that community residents would not be willing to accept these costs, but that it wished to explore the concept in more detail using its local knowledge.

On January 13, 2012, HRM staff met informally with MHRRA representatives. The MHRRA presented an Action Plan offering to do some detailed canvassing and further analysis using the Association's own local knowledge, volunteer base and engineering expertise. Staff agreed to assist by running some refined options through HRM modeling software. Staff attended a meeting of the Infrastructure Committee of the Musquodoboit Harbour Community Association (formerly the MHRRA) to provide an update on the outcome.

ENVIRONMENTAL IMPLICATIONS

The two studies described in this report have considered the environmental carrying capacity of the Musquodoboit Harbour watershed, and have identified issues associated with the quality of groundwater and surface water.

ALTERNATIVE

The Regional Watersheds Advisory Board could recommend that Harbour East – Marine Drive Community Council direct staff to present the cost estimates to the community for comment. This is not recommended, as staff and the Musquodoboit Harbour Community Association consider the costs to be too high in the absence of federal or provincial funding.

ATTACHMENTS

Attachment 1: Initial Study (2007) – Executive Summary
Attachment 2: Follow-up Study – Concluding Chapter
Attachment 3: Follow-Up Study – Updated Table 5.5.1 for 2013

A copy of this report can be obtained online at http://www.halifax.ca/commcoun/cc.html then choose the appropriate Community Council and meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

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Original signed

Report Approved by: Austin French, Manager of Regional & Community Planning 490-6717

Attachment 1: Initial Study (CBCL, 2007) – Executive Summary

Executive Summary

1.1 Introduction

Musquodoboit Harbour is an existing community within HRM, located along the eastern shore approximately 35 kilometres east of Dartmouth as shown in Figure 1.1. The existing community is comprised of residences, small businesses, a community centre, schools and a small hospital as well as businesses in an industrial park. Currently [as of 2006] there are approximately 270 residences within the community, predominantly located along Highways 7 and 347. In addition, there is strip development along the shores of the Petpeswick Inlet that account for a total of 483 residences and businesses.

The Regional MPS [as of 2006] envisions Musquodoboit Harbour developing into a Rural Commuter District Centre expected to accommodate some new growth to a total population of 7050 people by 2026. [Staff note: RP+5 Draft 4 envisages re-classifying this centre to a Rural Local Centre.] Many of the objectives of the [2006] Regional Plan such as the promotion of walkable, mixed-use communities, the reduction in number of new local streets required, the provision of services more efficiently, the increase in the number of homes on piped services, and increased access to and use of transit, are based on an increase in population densities and the provision of central services.

The objective of this study is to provide HRM with the information necessary to make some decisions with respect to future development in Musquodoboit Harbour. Specific objectives include:

- Identify opportunities for development in a study area that includes the community of Musquodoboit Harbour as well as the peninsula between Musquodoboit Harbour and Petpeswick Inlet.
- Develop a site specific plan showing all land suitable for development complete with recommended development densities and the services required to allow these densities to be realized. Potential for provision of services was based on the general work conducted and presented in the Final Report on "Options for On-site & Small Scale Wastewater Management", Land Design Engineering Services et al, March 2005.

1.2 Component Studies

Studies were completed to:

- Assess quantity and quality of groundwater resources;
- Determine receiving water quality;
- Estimate the quantity and quality of surface water (freshwater and marine), including limiting the potential of eutrophication of potential receiving waters from stormwater and sewage treatment plant effluent;
- Identify strategies for minimizing the loss of existing watershed features and attributes;
- Compile an inventory of sources of contamination;
- Recommend strategies to specifically adapt HRM's Stormwater Guidelines to meet the water quantity and quality objectives for this watershed;
- Identify natural corridors and critical habitats for terrestrial and aquatic species and recommended measures to protect them;
- Identify appropriate riparian buffers based on watershed specific sites, issues and parameters; and
- Evaluate development potential in the study area based on these assessments.

1.3 Results of Assessments

Developable lands within the study area were identified as those areas not deems as:

• No Go areas – including:

− Water bodies;
− Musquodoboit Harbour Outer Estuary Ramsar Site, including a 250m buffer zone;
− Martinique Beach Game Sanctuary;
− Martinique Beach Provincial Park;
− Watercourse, wetland and coastal buffers;
− Floodways for the major watercourses;
− Cemeteries; and
− All lands below 2.5 metres above mean sea level.

- Limited Development Areas including groundwater recharge areas and flood areas adjacent the larger waterways not covered by the riparian buffers.
- Modifications to zoning and land use mapping should be made to identify and restrict development of these areas.

There is ample developable land available in the study area on which to develop and support:

- The central service area with a total population of 7050 people. Central services are required to support a community density greater than 8 people per hectare (3.2 people per acre) and are required to achieve a reasonable development density for the Rural Commuter District Centre. In this centre, the estimated average density used for sizing of various components of the central water and wastewater systems is 40 people per hectare. Under this scenario a minimum of 176 hectares is required. There is much more area available in the sub areas A, B, C and D near the existing developed areas but as the development density drops, the cost per service for wastewater and stormwater collection and water distribution increases.
- An additional 13,500 people that could potentially be accommodated in the areas available for development outside the core area, with minimum lot sizes of 0.5 hectares. Most developable area on the peninsula is suitable for open space design / cluster developments with onsite services.

1.4 Constraints to Central Services

The most significant constrains to development of a central service area identified in the study include:

- The biggest constraint is potable water; the supply identified in the terms of reference has been pumped at a rate able to accommodate approximately 5100 people but has not been proven able to supply 7050 people.
- Water quality in the potential receiving waters, Musquodoboit Harbour and Petpeswick Inlet. Existing water quality in these water bodies is unable to support the desired uses of these waters (including swimming and other primary contact activities). There is no room to add additional pollutant loads as these will make the receiving water less able to support the desired uses. Typical stormwater from urban areas may have higher fecal coliform concentrations than from existing development. Effluent from the wastewater treatment plant may be another significant contributor.
- If assimilative capacity represents the additional pollutant loads that may be added without compromising the most stringent water quality limitations of all the desired uses of the water, and if the existing water quality exceeds these limits for some of the desired uses some of the time, then there is no assimilative capacity available. Existing fecal coliform counts during both wet and dry weather are greater than recommended for primary contact near the outlets of the rivers (requires concentrations less than 200 counts/100 mL sample) or for shellfish harvesting in most of the estuaries (requires less than 14 counts/100 mL sample). Adding additional loads from proposed development, although small, will only make matters worse.

1.5 Overcoming the Constraints

Musquodoboit Harbour is suited for development provided measures are taken to overcome constraints and to provide direction for future development:

- To confirm adequate supply from the source with the greatest potential, the Musquodoboit River aquifer, requires new test wells and pumping at the rate required to service the desired population of 7050 people, (a minimum of 3.2 million litres per day). Evidence indicates that it should be capable but it is advised that the additional testing be performed and the supply confirmed before planning on more than 5100 people.
- The only way to have zero net impact on the receiving waters is to offset the negative impacts with positive impacts elsewhere in the watershed. The proposed concept to overcome concerns with receiving water quality is to minimize the potential negative impacts from development to a reasonable level and to offset the remaining negative impacts by reducing pollutant loads from other contributors in the watersheds tributary to Musquodoboit Harbour and Petpeswick Inlet.
- This could be accomplished with different approaches than typically used in HRM, typical of Low Impact Development for stormwater management and implementing measures greater than the minimum required such as advanced levels of wastewater treatment. Although increased pollutant loadings will be minimal, the expected negative impacts move receiving water quality away from the water quality required to support the uses that stakeholders suggested they desire.
- These negative impacts may be mitigated by finding, quantifying and reducing current loads from other sources to offset or "make room for" the proposed increases in loads generated by the new development, thus producing no net degradation of quality in the receiving waters.
- It was further suggested that these measures could be broadened to the entire tributary watersheds with an objective of improving the overall water quality in the two rivers and estuaries so that eventually the water quality is acceptable for the desired uses. Such programs have been shown to be successful in other jurisdictions including:
    - Clean Annapolis River Project (CARP) organization. This is a good example of multijurisdictional watershed management initiative. A similar program could apply to the Musquodoboit River watershed. (http://www.annapolisriver.ca/projects.htm).
    - Chesapeake Bay. Details of the organization, responsible levels of government involved and their objectives and successes are presented at the attached site. (http://www.chesapeakebay.net/indicators.htm).

Impacts of development should be monitored and additional actions considered if necessary to mitigate negative impacts of development that are greater than expected.

1.6 Recommendations for Services

Services, including wastewater, stormwater and potable water are best provided as follows:

- Central service area:
    - Central wastewater collection and treatment, water supply and stormwater management are required to support the desired development densities for the community centre.
    - Service area required is in the order of 176 hectares of developable land for a development density in the central services area in the order of 40 people per hectare.
    - The area best suited for central services is the area currently developed (area adjacent Highway 7 and Highway 357) and areas closest. There is sufficient developable area to support the objective population.

• Other areas:

- Most other areas are suitable for on-site services and require standard systems of septic tanks and contours for wastewater dispersal and drilled wells with site water treatment to service either individual properties or small groups of properties. Areas most suited for cluster development serviced by a single well are the high grounds in the middle of the peninsula.
- Some areas on the outskirts of the proposed central service area are less suitable for onsite systems. These require more complex onsite wastewater systems or may be serviced by extension of the central system but at much higher costs.

1.7 Costs of Services

- To service each property with central water, wastewater collection, treatment and an outfall into Musquodoboit Harbour, as well as stormwater management including measures to promote infiltration, surface collection, storage and treatment of runoff will cost in the order of $50,000 [as of 2006]. Costs of servicing with central systems are expected to be offset for new development by reduced costs of roads and other utilities and by reduced disturbance of undeveloped areas.
- Areas outside of the central services area may be serviced with on-site systems; minimum lot size is 0.5 hectares for new development (8 people per hectare). Costs will be in the order of $21,000 to $32,000 [as of 2006]depending on soil conditions and whether or not the concentration of naturally occurring arsenic in the water exceeds allowable limits for drinking water. Some areas near the centre of the peninsula are suitable for cluster systems where development and services are clustered into group facilities.

It is expected that the market place will settle the issue of whether or not the costs are too high. This study provides the recommendations on the best ways to provide for future development and their costs.

Attachment 2: Follow-Up Study – Concluding Chapter (CBCL, 2010)

CHAPTER 6 **SUMMARY OF ASSESSMENTS**

6.1 TOR Issues

The Terms of Reference for this study identified several issues that were to be addressed in the study. Investigations completed, their findings, assessment of the findings as well as recommendations to resolve each issue were presented in previous sections of the report. Following is a presentation and a brief description of recommended measures to address each issue, reference is made to the section where more detail can be obtained where appropriate.

Determine the assimilative capacity that could be made available by reducing inputs from known or suspected defective or malfunctioning wastewater collection and treatment systems:

Existing water quality is such that there is little if any assimilative capacity in the receiving waters. Potential reductions in pollutant loads are defined by the level of pollutants generated by existing sources and sources that will exist in the proposed development as well the proposed level of treatment associated with the proposed development. Management of wastewater treatment and stormwater to a level that is higher than the minimum required will reduce potential pollutant loads to the receiving waters. These measures should reduce pollutant loads from existing development and reduce the loads typically generated from new development. This approach should improve existing water quality and make assimilative capacity available in the Musquodoboit River and Musquodoboit harbour as well as in the Little River and Petpeswick Inlet.

Define an optimum configuration for a small scale wastewater management system

An optimum configuration for a small scale wastewater collection and treatment system is the one shown on Figure 5.1(b) and includes:

- A treatment plant located close to the Core Area with tertiary level of treatment and an outfall to the Musquodoboit River near Musquodoboit Harbour; and
- The conventional wastewater trunk sewers to collect wastewater from the proposed Core Area and adjacent areas considered for future development and discharge it to the treatment plant as the first phase. Future extensions to Phase 1 (Phases 2a, 2b and 3) would include servicing properties outside of the Core Area where there is a concern with malfunctioning on-site wastewater treatment systems.

Determine the feasibility and cost of providing central water supply without other services

As discussed in section 5.3.6, it is feasible to provide central water supply, treatment and transmission mains to a community serviced with on-site wastewater treatment systems, provided:

- New developments are designed with low water use fixtures and appliances and existing properties are retrofitted in the same manner; and
- It is understood that the costs per service for distribution systems in the new sub-divisions will be significantly larger than in areas serviced with central wastewater systems as a result of larger properties sizes required for on-site wastewater treatment systems. Distribution system costs presented in the 2007 report were in the order of $27,000 per service to service the entire existing community with most properties smaller than currently required for on-site wastewater treatment systems. The estimated probable costs of the water system components presented in Table 5.5.1 will generally be the same with or without the sanitary and storm systems shown in the table.

Confirm the suitability of the Musquodoboit River and Little River as potential supplies of raw water for a central water system

Table 4.2.1(a) indicates that the 1 in 100 year 1 day low flow in the Musquodoboit River is less than 20 percent of the estimated maximum day demand for 7050 people, the population in the high growth scenario. The Musquodoboit River is considered able to supply the demand without input from the Little River. The Little River would not be able to satisfy the community's water demands. The treatment system presented in section 5.3.4 is able to treat the river water with the potential contaminants identified at the levels measured and produce potable water for the community.

Determine the impacts of possible contaminant sources on water taken from potential wells adjacent the Musquodoboit River

Water from an existing well near the site where production wells to service the community would be located was removed and then samples taken and analysed for a range of possible contaminants typically generated from potential sources identified in the vicinity of the wells, as discussed in section 4.2.3. Concentrations of most of the potential contaminants were in ranges that are treatable; the exceptions were bromate and potential radionuclides.

Additional investigations of the potential outwash aquifer are recommended to confirm that measured raw water quality and quantity are sustainable as a supply for a central water treatment and distribution system. Additional investigations should be completed before proceeding with wells in the outwash aquifer.

Estimate future achievable population growth, density and distribution over a 5 to 10 year horizon in the community with on-site services, central water only or central water and wastewater services, accounting for projected commercial development

If development in Musquodoboit Harbor continues as it has in the past ten years the expected increase in population will be in the order of 240 additional people. As discussed in Section 3.1, a range of growth scenarios were considered where there might be 1100 to 1755 additional people.

To achieve a community centre with significant development within a 5to 10 minute walk to a central transit stop requires development within a radius of 500 to 1000 metres of the centre. Within this walking distance there would be 60 to 250 hectares of developable land. Potential areas were identified in Figure 3.3.

Minimum lot sizes for on-site wastewater treatment systems define the largest lot size required. Table 3.2 indicates that with a development density of 4 persons/ hectare that might be achieved with on-site wastewater treatment systems, the available area might accommodate the low growth scenario or 500 additional people in the community. A similar limitation is placed on development if only central water is provided as the lot size for on-site wastewater treatment still dictates the achievable development density. A density of 40 people per hectare is required to achieve the high growth scenario of an additional 5050 people within a radius of 500 to 1000 metres of the centre of the community, all of the land identified as Options 1, 2, and 3a&b on Figure 3.3 would be required. To achieve a development density of 40 people per hectare, central wastewater, stormwater and water services are required.

Analyse existing water quality data for the Little River and assess potential pollutant sources

As presented in section 4.1.1, the most likely sources of pollutants in the Little River and in the upper reaches of Petpeswick Inlets are:

- Effluent discharges from the Twin Oaks Wastewater treatment Facility, although it appears to meet its effluent discharge requirements. Effluent discharges are routinely monitored and the results are recorded; and
- Partially treated septic tank effluent from failing on-site wastewater treatment systems, particularly during wet weather. The exact locations of the offending systems have not been determined; a sanitary survey would be required to identify these sources.

6.2 Proposed Water and Wastewater Systems

There are two issues to consider with the provision of water and wastewater systems:

- Ultimate capacity, which growth scenario should be considered for the design of central services; and
- The initial capacity of the systems and the rate of growth that will provide for a reasonable level of development but does not require large capital expenditure in the initial stages of development. Wastewater collection systems and water distribution systems are similar in size for the medium and high growth scenarios; it is recommended that these systems be designed to accommodate the high growth scenario, at a minimal cost premium. Mechanical components such as pumping stations should be sized to ultimately accommodate the high growth scenario but initially to accommodate the medium growth scenario.

Wastewater and water treatment systems should be designed in a modular fashion. Initially they should accommodate the medium growth scenario; ultimate capacity to service the high growth scenario may be provided by adding treatment units.

Attachment 3: Follow-Up Study - Updated Table 5.5.1 For 2013

Updated Table 5.5.1 for Musquodobolt Harbour - Original Estimates of Probable Costs Updated in 2013 using the Multipliers Halifax Water Used to Assess Water Only Scenario in 2011

Estimates of Probable Costs Updated		21-May-13
Cost Evaluation of Water Only Scenario by HW (7)		6-Dec-11
Data used in the Original Estimate of Probable Cost was from (6)		10-May-10
Average Annual Inflation Rate for Construction	7.5%	
Multiplier for Costs Developed in 2009 - 2010		1.245 (High Growth); 1.245 (Medium Growth); 1.245 (Low Growth); 1.245 (Water Only)

Component		Existing Services	High Growth Scenario: Ultimate Services	High Growth: Capital Cost (3)	High Growth: Cost/Existing Service (4)	High Growth: Cost/Ultimate Service (5)	Medium Growth Scenario: Ultimate Services	Medium Growth: Capital Cost (3)	Medium Growth: Cost/Existing Service	Medium Growth: Cost/Ultimate Service
Sanitary	Collection and Laterals									
	Phase 1	48	2397	$ 14,489,537	$ 301,865	$ 6,044	1423	$ 12,166,935	$ 253,478	$ 8,547
	Phase 2a	37	68	$ 2,674,993	$ 72,297	$ 39,146	68	$ 2,674,993	$ 72,297	$ 39,146
	Phase 2b	19	26	$ 2,438,885	$ 128,362	$ 93,476	26	$ 2,438,885	$ 128,362	$ 93,476
	Total Collection	104	2397	$ 19,603,415	$ 188,494	$ 8,177	1423	$ 17,280,814	$ 166,162	$ 12,140
	Treatment - Secondary	104	2397	$ 8,218,677	$ 79,026	$ 3,428	1316	$ 6,475,322	$ 62,263	$ 4,920
	Outfall	104	2397	$ 1,196,587	$ 11,506	$ 499	1316	$ 1,196,587	$ 11,506	$ 909
	Sub- total Sanitary - Secondary	104	2397	$ 29,018,680	$ 279,026	$ 12,104	1316	$ 24,952,723	$ 239,930	$ 18,959
	Collection and Laterals									
	Phase 1	48	2397	$ 10,491,555	$ 218,574	$ 4,376	1423	$ 8,694,240	$ 181,130	$ 6,108
	Phase 2a	37	527	$ 3,318,545	$ 89,690	$ 6,300	527	$ 3,318,545	$ 89,690	$ 6,300
	Phase 2b	19	159	$ 2,576,685	$ 135,615	$ 16,202	159	$ 2,576,685	$ 135,615	$ 16,202
	Total Collection	104	2397	$ 16,386,785	$ 157,565	$ 6,835	1423	$ 14,589,470	$ 140,283	$ 10,249
	Treatment - Tertiary	104	2397	$ 10,460,135	$ 100,578	$ 4,363	1316	$ 7,969,627	$ 76,631	$ 6,055
	Outfall	104	2397	$ 509,186	$ 4,896	$ 212	1316	$ 413,109	$ 3,972	$ 314
	Sub- total Sanitary - Tertiary	104	2397	$ 27,356,106	$ 263,039	$ 11,410	1316	$ 22,972,206	$ 220,887	$ 17,454
Storm (1)	Clearwater Sewers and Laterals									
	Phase 1	48	2397	$ 2,441,785	$ 50,871	$ 1,018	1423	$ 2,441,785	$ 50,871	$ 1,715
	Phase 2a	37	68	$ 1,552,681	$ 41,964	$ 22,722	68	$ 1,552,681	$ 41,964	$ 22,722
	Phase 2b	19	26	$ 1,040,197	$ 54,747	$ 39,868	26	$ 1,040,197	$ 54,747	$ 39,868
	Sub- total Storm	104	2397	$ 5,034,663	$ 48,410	$ 2,100	1423	$ 5,034,663	$ 48,410	$ 3,537
Water (2)										
	Wells	131	2418	$ 249,051	$ 1,901	$ 103	1444	$ 217,919	$ 1,664	$ 151
	Well Pumps	131	2418	$ 498,102	$ 3,802	$ 206	1444	$ 373,576	$ 2,852	$ 259
	Water Treatment	131	2418	$ 4,856,491	$ 37,072	$ 2,008	1444	$ 4,482,915	$ 34,221	$ 3,104
	Transmission	131	2418	$ 2,122,493	$ 16,202	$ 878	1444	$ 1,821,148	$ 13,902	$ 1,261
	Reservoir	131	2418	$ 1,551,701	$ 11,845	$ 642	1444	$ 921,291	$ 7,033	$ 638
	Water Supply and Treatment	131	2418	$ 9,277,838	$ 70,823	$ 3,836	1444	$ 7,816,850	$ 59,671	$ 5,412
	Distribution and Laterals									
	Phase 1	40	2418	$ 1,077,589	$ 26,940	$ 446	1444	$ 1,011,701	$ 25,293	$ 700
	Phase 2a	54	68	$ 1,143,090	$ 21,168	$ 16,728	68	$ 1,143,090	$ 21,168	$ 16,728
	Phase 2b	16	26	$ 362,054	$ 22,628	$ 13,877	26	$ 362,054	$ 22,628	$ 13,877
	Phase 3	21	21	$ 885,313	$ 42,158	$ 42,158	21	$ 827,219	$ 39,391	$ 39,391
	Total Distribution	131	2418	$ 3,468,046	$ 26,474	$ 1,434	1444	$ 3,344,064	$ 25,527	$ 2,315
	Sub- total Water	131	2418	$ 12,745,885	$ 97,297	$ 5,270	1444	$ 11,160,914	$ 85,198	$ 7,727
Total Servicing Costs - Secondary STP				$ 46,799,228	$ 424,733	$ 19,474		$ 41,148,300	$ 373,538	$ 30,223
Total Servicing Costs - Tertiary STP				$ 45,136,654	$ 408,747	$ 18,781		$ 39,167,783	$ 354,495	$ 28,718
Other Costs for Tertiary STP Option										
Engineering Fees - % of Construction Cost		10%		$ 4,513,665	$ 40,875	$ 1,878		$ 3,916,778	$ 35,449	$ 2,872
Net HST		4.286%		$ 2,128,013	$ 19,271	$ 885		$ 1,846,604	$ 16,713	$ 1,354
Interest and Overhead		2.35%		$ 1,166,783	$ 10,566	$ 485		$ 1,012,487	$ 9,164	$ 742
Estimated Probable Cost of Project				$ 52,945,115	$ 479,458	$ 22,029		$ 45,943,653	$ 415,821	$ 33,686
Budget for Project Completed in 2013				**$ 52,950,000**	$ 480,000	$ 22,000		**$ 45,940,000**	$ 420,000	$ 33,700

Component		Low Growth Scenario: Ultimate Services	Low Growth: Capital Cost (3)	Low Growth: Cost/Existing Service	Low Growth: Cost/Ultimate Service	Water Only Scenario - added June 6, 2011: Ultimate Services	Water Only: Capital Cost (3)	Water Only: Cost/Existing Service	Water Only: Cost/Ultimate Service
Sanitary	Collection and Laterals								
	Phase 1	428	$ 8,802,718	$ 183,390	$ 20,577	663	$ -	$ -	$ -
	Phase 2a	68	$ 2,674,993	$ 72,297	$ 39,146	68	$ -	$ -	$ -
	Phase 2b	26	$ 2,438,885	$ 128,362	$ 93,476	26	$ -	$ -	$ -
	Total Collection	428	$ 13,916,596	$ 133,813	$ 32,532	758	$ -	$ -	$ -
	Treatment - Secondary	320	$ 4,607,440	$ 44,302	$ 14,378	758	$ -	$ -	$ -
	Outfall	320	$ 970,807	$ 9,335	$ 3,030	758	$ -	$ -	$ -
	Sub- total Sanitary - Secondary	320	$ 19,494,844	$ 187,450	$ 60,836	758	$ -	$ -	$ -
	Collection and Laterals								
	Phase 1	428	$ 6,619,482	$ 137,906	$ 15,474	663	$ -	$ -	$ -
	Phase 2a	527	$ 3,400,611	$ 91,908	$ 6,455	68	$ -	$ -	$ -
	Phase 2b	159	$ 2,587,572	$ 136,188	$ 16,271	26	$ -	$ -	$ -
	Total Collection	428	$ 12,607,665	$ 121,228	$ 29,472	758	$ -	$ -	$ -
	Treatment - Tertiary	320	$ 5,603,644	$ 53,881	$ 17,487	758	$ -	$ -	$ -
	Outfall	320	$ 375,104	$ 3,607	$ 1,171	758	$ -	$ -	$ -
	Sub- total Sanitary - Tertiary	320	$ 18,586,413	$ 178,716	$ 58,001	758	$ -	$ -	$ -
Storm (1)	Clearwater Sewers and Laterals								
	Phase 1	428	$ 2,441,785	$ 50,871	$ 5,708	663	$ -	$ -	$ -
	Phase 2a	68	$ 1,552,681	$ 41,964	$ 22,722	68	$ -	$ -	$ -
	Phase 2b	26	$ 1,040,197	$ 54,747	$ 39,868	26	$ -	$ -	$ -
	Sub- total Storm	428	$ 5,034,663	$ 48,410	$ 11,769	758	$ -	$ -	$ -
Water (2)									
	Wells	449	$ 186,788	$ 1,426	$ 416	758	$ 186,788	$ 1,426	$ 247
	Well Pumps	449	$ 249,051	$ 1,901	$ 555	758	$ 249,051	$ 1,901	$ 329
	Water Treatment	449	$ 3,611,237	$ 27,567	$ 8,047	758	$ 3,860,288	$ 29,468	$ 5,096
	Transmission	449	$ 1,432,370	$ 10,934	$ 3,192	758	$ 1,821,148	$ 13,902	$ 2,404
	Reservoir	449	$ 276,872	$ 2,114	$ 617	758	$ 555,085	$ 4,237	$ 733
	Water Supply and Treatment	449	$ 5,756,319	$ 43,941	$ 12,826	758	$ 6,672,360	$ 50,934	$ 8,808
	Distribution and Laterals								
	Phase 1	449	$ 884,111	$ 22,103	$ 1,970	68	$ 1,589,378	$ 39,734	$ 23,259
	Phase 2a	68	$ 1,143,090	$ 21,168	$ 16,728	26	$ 947,208	$ 17,541	$ 36,304
	Phase 2b	26	$ 362,054	$ 22,628	$ 13,877	758	$ 1,143,090	$ 71,443	$ 1,509
	Phase 3	21	$ 714,725	$ 34,035	$ 34,035	758	$ 362,054	$ 17,241	$ 478
	Total Distribution	449	$ 3,103,980	$ 23,695	$ 6,916	758	$ 4,041,730	$ 30,853	$ 5,335
	Sub- total Water	449	$ 8,860,298	$ 67,636	$ 19,743	758	$ 10,714,090	$ 81,787	$ 14,143
Total Servicing Costs - Secondary STP			$ 33,389,805	$ 303,497	$ 92,348		$ 10,714,090	$ 81,787	$ 14,143
Total Servicing Costs - Tertiary STP			$ 32,481,374	$ 294,762	$ 89,513		$ 10,714,090	$ 81,787	$ 14,143
Other Costs for Tertiary STP Option									
Engineering Fees - % of Construction Cost			$ 3,248,137	$ 29,476	$ 8,951		$ 1,071,409	$ 8,179	$ 1,414
Net HST			$ 1,531,367	$ 13,897	$ 4,220		$ 505,126	$ 3,856	$ 667
Interest and Overhead			$ 839,644	$ 7,620	$ 2,314		$ 276,959	$ 2,114	$ 366
Estimated Probable Cost of Project			$ 38,100,522	$ 345,754	$ 104,998		$ 12,567,585	$ 95,936	$ 16,590
Budget for Project Completed in 2013			**$ 38,100,000**	$ 350,000	$ 105,000		**$ 12,570,000**	$ 100,000	$ 16,600

Note:
(1) HRM Policy suggests that areas serviced with central wastewater collection and treatment should also be serviced with central stormwater drainage systems.
(2) HRM Regional Plan suggests that areas serviced with central wastewater collection and treatment should also be serviced with central water
(3) Capital costs are for the components necessary to provide the systems shown on Figures 5, 6, and 7.
(4) Cost per existing service is the estimated capital costs for each component divided by the number of existing services that will be served by the systems shown on Figures 5, 6, and 7, or the cost per service if no future development occurs.
(5) Cost per ultimate service is the estimated capital costs for each component divided by the number of services that will be directly served by the systems shown on Figures 5, 6, and 7. It does not include the costs of servicing currently unserviced lands.
(6) Cost estimates were generated for this study in late 2009 and early 2010 based on historical records of costs for similar projects. They are opinions of probable costs for construction at that time.
(7) In early June 2011 an estimate was prepared for a concept of providing only central water to the Core Area. Unit rates used in the original study were used in the estimate. Halifax Water produced an independant cost estimate based on their experience with similar works in December 2011.