



INFORMATION REPORT

To: Mayor Peter Kelly and members of the District Boundary Review Committee

From: Cathy Mellett, Acting Municipal Clerk/Manager

Regarding: Population and distribution demographics required for the District Boundary Review Process

Date: December 11, 2009

Background

The 2010 District Boundary review is being conducted between census periods. The most recent census information available to HRM in commencing the Boundary Review process was from the 2006 census.

HRM has talented staff who are the key source of information regarding:

- Community and local information about HRM
- Knowledge and data regarding current building application information and “on the ground” knowledge of how growth is likely to occur and where it is most likely to occur based on existing development applications, subdivision approvals, the Regional Plan, proposed developments and other HRM specific information.

While HRM staff have access to the 2006 census information and updates from Census Canada, the updated population and distribution demographics required for the boundary review and the expertise required to produce and defend that information before the NS Utility and Review board was not available within HRM. Population and growth projections are a very specialized skill when being conducted at this level.

Staff were aware of the concern expressed by Council and others regarding the demographic and growth projects used during the “Imagine our Schools” process and were committed not to repeat those concerns through the District Boundary Review process.

Staff were also aware that there had a variety of population estimates being used by various departments within HRM in their planning processes and felt strongly that HRM needed one reliable source of population and growth projections that could be used by all Departments as well as provided as the most reliable source of data to other agencies (Elections NS, School Boards, NS Dept of Health etc)

After discussion and evaluation staff were of the opinion that the best way to achieve those outcomes and have the quality of data required for the Boundary Review application was to combine the strengths of the HRM knowledge of local conditions, growth and development with the best industry expertise available to HRM. Staff were also committed to ensuring that the resulting data was a) available without restriction to HRM and b) was useable by HRM staff and others. The approach was that HRM staff would work closely and collaboratively with the consultant to a) understand the methodology used by them by working closely with them on the projections and b) to review and approve the final projections.

That approach was the basis by which RFP for the *Population Estimates and Projections for Electoral District Review* which was let in August 2009.

HRM received four (4) responses to the RFP and evaluated three (3) of the proposals as having met the requirements (evaluation criteria and matrix attached).

Of the three proposals Environics Analytics was evaluated by the team as having the strongest capability and experience on their project team, the strongest methodology (by far) a solid work plan and competitive pricing (Environics submission is attached).

Outcome

The outcome of the RFP and the population projects being done by HRM and Environics has met and even exceeded our expectations.

Together what HRM and Environics have achieved are:

- 1) A solid and defensible figure for current (2009) population in HRM based on census Canada updates, enhanced by work by Environics, and having the population distributed/allocated to the proper parts of HRM
- 2) A solid picture of where growth is approved and projections of how population growth is most likely to occur in HRM- both in numbers and location to 2012. The 2012 projection is based on collaborative discussion and review between Environics and HRM and a clear and defensible methodology.

In addition HRM staff will have the ability to use and distribute the data across all business units and externally if we so choose.

The 2009 population figures and 2012 population projection are provided at census tract (all of HRM), Electoral Area/District (EA) level, dissemination area/neighbourhood (DA) level.

The deliverables.

What Environics has delivered to HRM are 2009 population figures and 2012 population projections distributed to the appropriate dissemination area within HRM and documentation on how the population and distribution were arrived at (the methodology). That information has

been provided in table/data form to HRM and vetted through a number of verification processes. The population and growth data can be presented in any number of ways, including but not exclusive to - population changes in current electoral districts, population changes by dissemination areas (smallest area), or in any proposed electoral areas. Each projection takes some work to prepare but the base data is now available to HRM.

Final Report & Presentation

Environics will submit their final report to HRM in December and would be available to meet with the Committee in January (depending on schedules) to go over a detailed review of the data, methodology and results of the study, and to answer any questions you may have regarding the study or data.

APPENDIX A:
PROPOSAL EVALUATION CRITERIA
Population Estimate and Projection for Electoral District Review

	Weight	Gardner Pinfold	Environics	Stantec
1. Capability a. Project Team Experience b. Project Manager Experience c. Company Experience	20	13	19	17
2. Work Plan a. Past performance in being able to keep projects within their fee estimates and with the same personnel as originally indicated. b. Schedule - acceptable schedule including all required tasks. Past performances in being able to keep projects on schedule. c. Level of Effort - total proposed person hours and distribution among team members.	20	19	18	18
3. Methodology a. Understanding project objectives & associated issues b. Work Plan - thoroughness of approach to the project c. Overall quality of proposal d. Innovation	40	20	38	33
4. Cost	20	20 (\$29,373.84)	14 (\$40,377.31)	15 (\$38,959.64)
5. Total	100	72	89	83



Population Estimate and Projection for Electoral District Review

Technical proposal to Halifax Regional Municipality

August 6, 2009

Submitted by:

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In Response to
Request for Proposal RFP #09-090

2. Section 1

3. Background

The Halifax Regional Municipality (HRM) has issued a Request for Proposal (RFP) seeking a population estimate for eligible voters at the dissemination area level for June 2009 and a projection for December 2012. This population estimate and projection will allow HRM to undertake an electoral district review process in compliance with the Halifax Regional Municipality Charter under the guidance of the Nova Scotia Utility and Review Board (NSUARB).

In addition, HRM requires a final report which in addition to the estimates and projections, will provide analysis including, but not limited to the following:

Birth and death rate trends

Population migration

2006 Statistics Canada data (voting eligibility)

Other relevant information

4. Section 2

5. Experience and Qualifications

5.1. About Environics Analytics

Environics Analytics (EA) is Canada's leader in geodemographic analysis. We specialize in understanding populations at the small-area level. Population characteristics include demographics, population projections (for up to ten years for 370 variables), daytime population estimates, neighbourhood-level household segmentation, social values, behavioural characteristics and business profiles. All of this information provides a rich portrait of Canadians as they are in their neighbourhoods. Environics Analytics provides a great deal of consulting services to help clients in understanding populations, and identifying implications and strategies resulting from the analysis. Additionally, we provide software applications that allow clients to undertake these analyses themselves, should they choose. We support a large cross-section of industries including retail,

financial services, media, travel and tourism, automotive, not-for-profits and government. Our staff includes the nation's top geodemographics professionals, modelling statisticians and marketing experts.

5.2. Company Experience

Environics Analytics is particularly well-suited to delivering the requirements of this project. Team members include a veteran demographer, a geodemographer with a degree in urban planning, an expert GIS specialist and modellers who are senior industry leaders in the fields of statistics and developing population estimates and projections. We are very confident in our ability to deliver the statistical requirements of this project and have the analytical insight to complete the reporting and analysis of the data.

EA has conducted extensive analysis on the 2006 Census for its clients and presented these results to them. Our Chief Demographer, Dr. Doug Norris, was formerly the Director General for Social and Demographic Statistics with Statistics Canada (responsible for the Census). He has conducted a series of web seminars analyzing the results of the 2006 Census (available on our website) as well as other topical presentations customized for clients and in "webinar" format. EA is called upon regularly for demographic analysis and business or public policy implications.

As part of our data services, we create annual Demographic Estimates and Projections (DEP) which provide current year and five-years-prior estimates and annual projections for ten years forward for about 370 variables at the dissemination area level.

Created by an innovative methodology and supplemented by government estimates, economic data like building permits and immigration statistics, DEP features authoritative estimates for a multitude of variables. EA relies on the best practices of econometric forecasting based on the work of our partner The Centre for Spatial Economics along with demographic forecasting and geospatial estimates and projections overseen by our Chief Demographer, Dr. Doug Norris and our Chief Methodologist, Dr. Tony Lea together with Senior Demographic Methodologist, Robert Dominico and Research Analyst, Peter Miron. The methodology and practices for creating our DEP are similar to the approach that EA would use to create the population estimates and projections for HRM and are outlined in the methodology section of this document.

EA has been called upon by audiences as diverse as the Ontario Growth Secretariat, the City of Mississauga, Canadian Blood Services, the federal government and many others to provide extensive data analysis, interpretation and guidance on population characteristics and trends.

EA's experience and reputation is second to none in the industry. Some relevant pieces of work are described below.

Ontario Growth Secretariat (Tanzeel Merchant, 416-325-7269)

EA has worked with the OGS on a number of projects. Most relevant to HRM is the work done on defining the built boundary for Ontario's Greater Golden Horseshoe Growth Plan. EA received parcel-level data which, using advanced GIS techniques and other in-house data sources, allowed us to create the boundary which is critical in measuring Growth Plan objectives. The process involved synthesizing input from the OGS and municipalities.

Canadian Blood Services (Tony Steed, 613-739-2576)

Environics Analytics has worked with CBS in many ways. Most relevant to this RFP, we have determined the potential for blood donations through geodemographic analysis and, using that information, allowed CBS to understand growth opportunities in markets and to optimize their donor clinic territories. We see this optimization exercise as having many parallels conceptually to the HRM's Electoral District Review's overall objectives.

City of Mississauga (Michael Cleland, 905-615-3200 ext 4606)

EA has profiled users of various Recreation and Parks facilities to give facility and program managers information on their clientele, market area, and growth potential, along with an understanding of market segments who are not using services. This work demonstrates our analytical capabilities in the municipal sector.

6. Section 3

As demonstrated in the sections that follow, the team and its collective experience all centre around using information (especially demographics) for decision-making. But each member has a unique perspective through his or her experience ranging from statistics to applied geographic methods to demography to urban and regional economic planning. These perspectives allow EA to undertake this analysis and deliver both the demographic and analytical requirements of the project.

6.1. Roles and Responsibilities

We have assembled a very high-level team of demographic and geographic experts in order to provide quality results on time and on budget. The team combines strong project management skills with extensive data analysis capabilities along with GIS knowledge and expertise.

Rupen Seoni
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Project Manager
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Rupen will be the overall project manager and main client liaison person. He will be responsible for ensuring efficient consultation with HRM staff and the relevant regulatory bodies, utilities, stakeholder groups and other levels of government. He will also be responsible for interim reporting and completion of the final deliverables. Rupen works closely with clients to ensure their research needs are met. Rupen has 15 years experience in geodemography and market analysis. Prior to joining Environics Analytics, Rupen led an analytical group at CIBC, managed quantitative research at Campbell Soup Company, and worked as a client contact lead at Compusearch and AC Nielsen. He has also done tourism related consulting work for festival organizers and the Ontario government. Rupen holds an MSc (Programme in Planning) from the University of Toronto and a BA (Administrative & Commercial Studies with French) from The University of Western Ontario.

Relevant to this project, Rupen has undertaken the following projects in the Project Manager capacity:

Canadian Blood Services Market Potential Analysis
Canadian Blood Services Territory Optimization
Ontario Growth Secretariat Greater Golden Horseshoe Growth Plan Measures
Ontario Growth Secretariat Northern Growth Plan Labour Market Study
Mississauga Parks & Recreation Community Centre Profiling & Potential Studies
Toronto Public Library Active Older Adults Population Study

Dr. Doug Norris
Senior Vice President and Chief Demographer
Demographic Analysis
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Doug will be the demographic analysis advisor for the project and will lead much of the analysis on all aspects of the project. Doug has a Ph.D. in Demography and Biostatistics from Johns Hopkins University and has 30 years experience with Statistics Canada, until December 2005 serving as Director General of Social and Demographic Statistics. He worked directly on all of the censuses since 1981 and he has an in depth knowledge and understanding of the census geography, concepts and data and how they have changed over time. He has extensive experience in working with clients in the federal, provincial and municipal governments. Doug was involved with analysis of the 2006 Census data as it became available and has developed and presented a series of nine web-based seminars on census results. He has also made numerous presentations on census results to client and professional groups, including an analysis of the new census data for the GTA.

Relevant to this project, Doug has undertaken the following projects in a Demographic Analysis Advisory role:

Ontario Growth Secretariat Greater Golden Horseshoe Growth Plan Measures
Ontario Growth Secretariat Northern Growth Plan Labour Market Study
Ontario Growth Secretariat Greater Golden Horseshoe Built Boundary Definition
YMCA of Greater Toronto Market Planning
Census 2006 Analysis Webinars (Environics Analytics)

Dr. Tony Lea
Senior Vice President and Chief Methodologist
Demographic Estimates and Projections Chief Methodologist
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Tony has a close working familiarity with all of the data and the source agencies that may be involved in this project. He will be responsible for the methodology and development of the population estimate and projection for HRM. Tony is currently responsible for the development of Environics Analytics Demographic Estimates and Projections that are produced on an annual basis. He is an expert in GIS, demographic analysis, data development and complex multi-variate analytical methodologies. Prior to joining Environics, Tony was a Senior Research Associate at the Centre for the Study of Commercial Activity at Ryerson University in Toronto where he oversaw the Centre's broad research activities. Earlier he was Managing Director, Research and Development at MapInfo Canada (formerly Compusearch). He was with Compusearch most of the time from 1982-2002. Tony holds M.A. and Ph.D. degrees from the University of Toronto in Geography. For this project, Tony will lead the development of the small area estimates and projections including determining the methodology.

Relevant to this project, Tony has undertaken the following projects as Demographic Estimates and Projections Methodologist:

Annual Demographic Estimates & Projections Update (Environics Analytics)
Annual Estimates & Projections Update (MapInfo & Compusearch)
Political Voter Profile Walkover (Polling Division to Dissemination Area)

Robert Dominico
Senior Methodologist
Demographic Estimates and Projections Methodologist
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Robert is the principal researcher on all population projections and will work closely with Tony Lea on the creation of the population estimate and projection for HRM. His work includes a strong relationship with Statistics Canada in terms of issues involving the

content, definition and collection of census data, creating databases and tools to access the new 2006 Census. Before joining Environics Analytics, he was a senior research analyst at MapInfo Canada and, during 12 years at Statistics Canada, he held several technical and research roles, including senior technical officer and consultant for custom tabulations, specializing in data retrieval for clients. Currently based in Prince Edward Island, he holds a bachelor's degree in mathematics and philosophy from Laurentian University.

Relevant to this project, Robert has undertaken the following projects as Demographic Estimates and Projections Methodologist:

Annual Demographic Estimates & Projections Update (Environics Analytics)

Sean Howard
Research Associate
Analytical Support
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Sean will provide analytical support for the project and ensure the accuracy of the reporting. A trained urban geographer, Sean conducts research using census demographics and geography to provide marketing solutions to client challenges. Previously, Sean worked as a GIS specialist at GeoDan and Associates and managed a number of research projects in applied geography while completing his graduate work at the University of Calgary. A former teaching assistant in advanced spatial statistics and modeling, he holds a master's degree in geographic information systems from the University of Calgary and an honours bachelor of arts degree in geographic information science and geography from Queen's University.

Relevant to this project, Sean has undertaken the following projects in the Analytical Support capacity:

Annual Demographic Estimates & Projections Update (Environics Analytics)

Jan Kestle
President, Environics Analytics
Senior Advisor
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Jan will act as advisor to the project and assume overall responsibility for quality and timeliness. Jan has a degree in Math and Physics from the University of Western Ontario and is the founder of Environics Analytics. She had an extensive career in the Ontario government, especially in the Ontario Statistical Office where she worked with all data

sources used by the Ontario government and gained an expert knowledge of the census. She then worked at Compusearch, being President of the firm from 1993 to 2000.

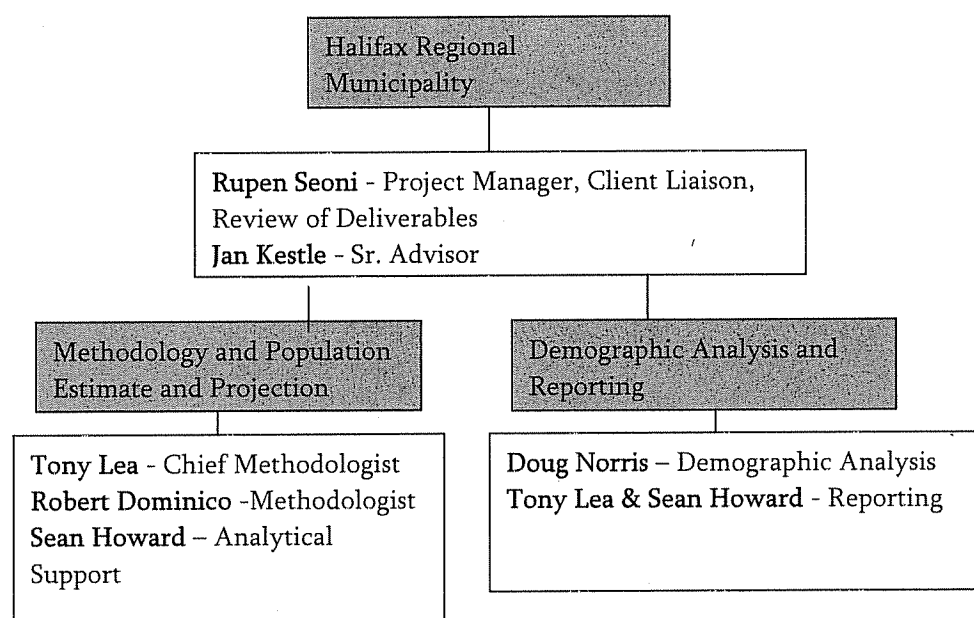
Relevant to this project, Jan has undertaken the following projects as a Senior Advisor:

Ontario Growth Secretariat Greater Golden Horseshoe Built Boundary
Ontario Growth Secretariat Greater Golden Horseshoe Growth Plan Measures
Political Voter Profile Walkover (Polling Division to Dissemination Area)
Annual Demographic Estimates & Projections Update (Environics Analytics)
Annual Estimates & Projections Update (Compusearch)

7. Section 4

Methodology and Structure

The following is our proposed organizational structure for the project:



Our proposed Responsibility Assignment Matrix is as follows:

Responsibility Assignment Matrix

Project Name: Population Estimate and Projection for HRM
Prepared by: Environics Analytics

Date: August 6, 2009						
Staff Member	Jan Kestle	Rupen Seoni	Tony Lea	Robert Dominico	Doug Norris	Sean Howard
Methodology	S	R	A	P	P	
Population Estimate and Projection	S	R	A	P	P	P
Analysis and Reporting	S	A	P		P	P
Presentation of Results		A	S		S	
Defence of Methodology	S	P	A		I	

P = Participant A = Accountable R = Review Required
 I = Input Required S = Sign-off Required

7.1. Estimated support required by EA from HRM

During the course of the project, EA will be in ongoing communication with HRM. For the initial analysis and interpretation of the data that will inform the estimate and projection, EA will require the data from HRM that is stated in the RFP.

Once the initial analysis is completed, EA will work with HRM to keep them up to date with the project and seek their approval during various stages of the project. Approvals and meetings between HRM and EA over the course of the project are outlined in the schedule of project activity.

7.2. Methodology

7.3. Our Understanding of the Project Objectives and Associated Issues

In compliance with the HRM Charter, the HRM is undertaking an electoral district review. In order for the HRM to complete the review, they are in need of a population estimate for June 2009 and a projection for December 2012. In addition, HRM requires analysis of data, specifically, population migration, birth and death rate trends, Statistics Canada data and other required information in the form of a final report, including the methodology. These estimates and the final report will be used by HRM staff as the basis for creating electoral district scenarios as part of the electoral district review.

In developing the final report, HRM requires analysis and dissemination of the population estimate and projection. The analysis should include information on birth and death rate

trends, population migration, Statistics Canada data (voting eligibility) and other relevant information required.

Environics Analytics will use the following methodology to create the population estimate and projection for HRM

Our overall approach to methodology used to estimate the number of eligible voters at the dissemination area (DA) level in the HRM will follow closely the methodology used for EA's Demographic Estimates and Projections (DEP) product. The methodology for this product has been rigorously refined and improved over the past 12 years. We are delighted that the DEP method works very well and we have been complimented by EA's many DEP clients. Environics Analytics' DEP product is updated annually and generates estimates and projections for several hundred variables at all spatial scales down to the DA level of geography across Canada. Although we will leverage the data and technological tools that we have developed for our annual DEP product, we propose to refine our approach for this study. There are two reasons for altering our approach in this case:

1. EA is in the process of developing DEP for 2010 and has initiated some new methodological components and quality control processes we would like to incorporate in this project
2. During the construction of DEP we do not have access to some of the data which HRM has and we would like to incorporate this data into our projections to improve our results (this will be discussed below)

Our regular approach is to do estimates and projections for Census Tracts (CT's) as the first stage and then use these estimates to constrain the next stage which deals directly with the ultimate goal - dissemination areas (DAs). Generally, we propose to use our regular DEP process first and then combine its estimates with other estimates based on HRM data as a second step. The reconciliation process is something we have done often in the past when we have additional information for some areas. Having these two estimates will also reveal any tensions that occur; which are very helpful to isolate as prognosticators and policy makers.

Methodology Steps

The following is a brief outline of the methodology as a set of detailed steps:

Preparatory Steps

1. Assemble all relevant data sets for the study area
2. Check and clean all data
3. Consider the evidence of revising our old estimates of 2009 using EA DEP 2009 estimates for CSDs for June 2009. We will consult with client and revise if necessary
4. Order and check data for CSD and then a level projection for December 2012 from Centre for Spatial Economics (C4SE) [we currently have the data for 2009]

5. Create large comprehensive database by Census Subdivision (CSD), Census Tract (CT) and Dissemination Area (DA), and document all variables
6. Build synthetic variables for influencing household growth at the CT level
7. Build synthetic variables for influencing household growth at the DA level
8. Build database of new variables provided by HRM (e.g. voting list, building permits etc.) at appropriate geographical scales
9. Create a process for estimating voting populations as a proportion of estimated population of the persons aged 18 and over

Basic CT Model

10. Build CT level “basic allocation model” to estimate households, populations and then eligible voting populations; this is based on variables in steps 5 and 6 (and not yet step 8)
11. Use this basic CT allocation model to assign households, populations, and then eligible voting populations
12. Undertake quality control processes and possibly revise the basic CT level methods (before enhancements below)

Enhanced CT Model

13. Enhance basic approach to take into account the new local data assembled (using our assessment of their quality and helpfulness) to produce revised new detailed estimates at CT level; this is done by adding these additional variables as additional considerations in the allocation model - with importance weights
14. Use the enhanced CT model designed in step 13 to estimate households, populations and voting populations for both 2009 and then 2012
15. Review for quality control and modify approach as required, and rerun

Basic DA Model

16. Use basic DA level DEP models to assign growth from final CT level assignments to DAs for households, populations, and voting populations for 2009 and 2012; this is done by sharing growth at the CT level conceptually amongst its DA off-spring
17. QC the output and revise model if necessary to improve estimates and rerun

Enhanced DA Model

18. Enhance the basic DA model that assigns CT level growth from earlier stage to DA off-spring to make use of the additional local level variables such as building permits
19. Apply this enhanced DA level model to produce enhanced estimates for 2009 and 2012
20. Check for quality control and modify approach as required

FINAL STEPS

21. Store final estimates and projections and all metadata in a database required by client
22. (Re-)write description of derivation processes in detail and flow chart

Details

This section describes some of the details needed to understand the methodology steps described above. The steps are listed in order as they are noted in the methodology above. If no detailed remarks are required then the step is not noted.

Step 1. The data that may be involved in this analysis includes all of the census data of relevance and we have all this data from 2001 and 2006 presently for all levels of census and postal geography. We also have counts of mailing addresses from Canada Post by means of the “Householder Elite” file. Another dataset that we have is the land use classification file from TeleAtlas. The TeleAtlas land use file is used to assess and score areas for possible new development. In addition we will also use the TeleAtlas road network file which is used for the creation of accessibility scores. In addition we have previous period census-based estimates of growth rates at the CSD, CT and DA levels.

Step 3. We have estimates for June 2009 of households and population by age at the CSD level and this includes the CSDs in the HRM. These were done about 1 year ago by the Centre for Spatial Economics under contract. We do have some additional data that may influence these estimates. EA will check this information to see if our current CSD estimates for this time period are sufficient or need to be revised.

Step 4. We have an agreement with the Centre for Spatial Economics in which they provide detailed estimates and projections work for EA at the CSD level. EA then uses these data and develop further estimates and projections at smaller geographical scales (we sell and distribute data from this process at all geographical scales). To estimate the December 2012 population we will need to request C4SE to do the necessary estimates for population, households and populations by single year of age. This will require several weeks. C4SE takes into account a wide range of factors in its econometric and demographic models including the state of Canada’s economy, the state of the US economy, the age distribution of the population and the labour force, the types of economic activity in the area etc. EA has used the estimates and projections of C4SE for many years and are pleased with them. They are also amenable to revision if we have additional information.

Step 6. As part of our elaborate DEP process, undertaken annually by EA, we create a large number of helpful synthetic variables that are used as independent variables in assigning growth. There are three kinds of special types of variables EA creates: 1. densities of household and population relative to possibly usable land ; 2. mathematical potentials; and 3. gradients. The densities that we use are for CTs and DAs and for household and populations for the period before the point where growth is to be estimated or projected. The potentials are computed variables that measure closeness to a quantity of points or people in a specific geographical framework. We create many versions of these variables with different distance decays inside them. The gradients are vectors that measure trajectories of past growth in household or household density at very small geographical scales. For gradients our method makes use of the population and household

density of a region relative to its neighbours as well as the rate of change in the population density across the area (hence, gradient). We create many potential variables including these:

- population
- households
- recent past growth in population
- recent past growth in households
- automobile transportation (highway) access
- major public (high speed) access
- business potential based on existing business locations – done at the 2-digit SIC level

All of these synthetic variables are used alongside other routine (non-synthetic) variables within a framework that creates a type of “attraction score for growth” for each competing area.

Steps 7: EA constructs densities, potentials and gradients for all DAs as a set and then all CTs as a set. In each case the building blocks are used for their respective levels of geography (DA based potentials and the like are used for modelling the DA level and CT based potentials and the like are used to model the CT level).

Step 9. In step 9 EA will undertake a process for estimating voting populations as a proportion of estimated population of the persons aged 18 and over. The key variables to take into account here are the following two:

- the ages of the population (this is addressed directly using EAG's existing approach)
- Canadian citizenship

The other issue raised in the RFP is the estimate of populations in seniors' residences (a subset of collective dwellings) that would not be included in Stats Canada's age based population counts. EA deals with collective residents as a group. For this project we can use seniors' residence data that we have in-house to do a reasonable job of estimating the age distribution of the typical residents. But almost all of these populations are citizens and 18 years old or older and the amount of error involved is minimal compared to other sources of error - including the problems that Stats Canada had in being consistent in classifying old senior's residences versus small apartments for seniors (collectives versus non collectives).

We believe that we have enough data and expertise in-house to allow us to deal with all these issues in a sound and defensible manner. EA now believes that the best approach to deal with eligible voters is to estimate them directly by estimating the number of non-eligible persons of voting age within each small area DA or CT and to simply subtract these numbers of any estimated or projections that explicitly or implicitly include them.

Step 10. The remaining steps we reference to “basic” projection models referring to the fact that these are the models that we use annually in producing our DEP product

(hundreds of estimated and projected variables). For the current project we propose to use our basic approach as a first step and then use an enhanced version of our basic approach as our second step. In this way we will produce two numbers as estimates. The first estimate is based on general data that doesn't include local level HRM provided ingredients. The second number is enhanced to also include these ingredients. The enhancement will be to include the additional ingredients that HRM will provide to use as additional growth attraction factors within our method and weight these factors and then rerun the model. The factors are the variables listed on page 17 and 18 of the request for proposals. These variables are: the voters list variables (3.2.1.item 2), residential civic address points, (3.2.1 item 4), building permit variables (3.2.1. item 5), subdivision approvals variables (3.2.1 item 6) , development projects (3.2.1. item 7). EA has the other extra data that was noted in the RFP.

Step 11. Using the basic CT level projection model is effectively running a rather large set of SQL programs that have been previously written. The programs are run sequentially with formalized stops for quality control checks so any possible error or failures are caught before they cause conflicts in the later stages of the estimation. Amongst the various programs that have been written are a set of special programs that “rake” and “sprinkle” a data matrix. The process of raking is a process of iterative proportional fitting (IPF) of data so that ends up adding up to the columns and rows sums as required from a parent or a special control process. Such programs are widely used in demographic estimation. The process of sprinkling is a process of taking data that is originally estimated in non-integer form and making it integer, under the constraint that it must add up to the row and perhaps columns control totals.

Step 12. EA has developed a large set of procedures for ensuring quality control of estimate and projection data during our annual development processes. The first set of routines checks to see that all necessary constraints are observed (e.g. sums not exceeded), no numbers are negative, no numbers are missing, etc. The second set of processes is used to check to see whether the results are “reasonable” or logical. Reasonability checks often focus on whether the current trend in the data is consistent with past trends in the data. For this purpose we often create color maps to observe the trends. These maps are very cleverly designed so that we can see many different trends all at once. Recently we have added an additional feature to our quality control process, which is developing a sophisticated map that has Google Earth based aerial photography as the base layer and on top of this base layer is imposed a translucent coloured overlay layer indicating the amount of growth that's being allocated to certain polygons of CTs or DA's on the ground. These maps allow one to see if the amount of growth being assigned to a CT or DA is possible in excess of the amount of space that appears to be available for new dwellings or apartment building. It also points out whether perhaps a CT or DA may have lots of space to grow and should be investigated to see why the growth was not directed there. This quality control process is more labour intensive and takes longer but it is a great improvement on the past quality control processes which often indicted problems without hinting at solving them.

Step 13. The additional ingredient data will be added as additional variables in the existing model to affect what drives growth. Weights will be assigned to these additional variables (as they have been with the basic variables) that will control the amount of influence these variables will have. Of course some experimentation will be required here to reflect that part of estimation and projection is in fact “art”.

Step 15. The quality control task for this key first model will make use of all traditional annual quality control tasks but it will also spend a good deal of time with aerial photographic maps from Google Earth and other suppliers to undertake visual assessment of available space for new housing subdivisions and apartment buildings.

Step 16. The basic model at the DA level focuses on sharing growth (or decline) that has already been assigned to the CT parent. So the focus is on issues like 18% of the new households or population being assigned to a particular dissemination area as opposed to 12% in the previous run.

Step 21. Metadata is required to make the construction process fully documented. Metadata refers to all of the information required to know exactly what data was used (source, database name, field names, transformations used, etc) and the ability to reconstruct or rebuild the key output variables that were produced.

Step 22. At the end of the construction process EA will draft a document in sufficient detail to allow trained persons to approximately reproduce the data. The term approximate is used because of the judgment decisions that are required in some of the final stages. The document will be delivered as part of the deliverables.

8. Section 5

9. Work Plan

Step 1: Meeting with HRM to clarify objectives

The first step will be a preliminary meeting with HRM staff to discuss the proposed approach in more detail. Included would be a discussion of the data and any issues related to calculations, the estimates and further discuss a schedule for meetings and updates.

Step 2: Analysis of demographic trends

Our chief demographer, Doug Norris, will provide analysis and extrapolate the demographic trends from a series of data sets. This analysis will inform and support the

development of the estimate and projection for HRM. Of note, the data that will be used as part of this initial analysis include, but are not limited to:

- Statistics Canada Census (2006, 2001, 1996)
- Tabulations provided by HRM
- Statistics Canada population estimates
- Statistics Canada population projections
- Births and Deaths
- Estimates of internal migration
- Immigration data
- Environics Analytics Demographic Estimates and Projections

Step 3: Population estimate and projection

As noted in the methodology section of this document, EA will undertake a process of creating the population estimate and projection for the Halifax Regional Municipality. The following is a list of the steps required to complete the data set for HRM:

- Preparatory steps
- Basic CT model development
- Enhancement of CT model
- Basic DA model development
- Enhancement of DA model
- Final steps, including review and quality control
- Consultation and review of estimate and projection with HRM

Step 4: Final report and analysis

Doug Norris will interpret the data from the estimate and projection and will provide insight and analysis as part of the final report that will be drafted and delivered to HRM. As part of the final report, there will be analysis conducted and reported on but not limited to the following:

- Birth and death rate trends
- Population migration
- 2006 Statistics Canada data (voting eligibility)
- Other relevant information

Step 5: Draft submission

A draft submission including the estimate and projection and draft report will be made available to HRM on or before the 15th of October 2009.

Step 6: Final submission and presentation of results to HRM

Upon completion of the report, Environics Analytics will submit a final version of the estimate and projection as well as the final report to HRM on or before the 15th of December 2009. Following this final submission, EA will meet with HRM on site to provide a presentation of the final report and the estimate and projection. At that time, EA will brief staff members on the findings of the estimate and projection and provide consultation and insight into the results.

Step 7: NSUARB hearings

As a final phase to the project, Environics Analytics will provide consultative support to HRM leading up to and during the NSUARB hearings. In addition, Environics Analytics will be available to defend the methodology of the estimate and projection and will be able to answer questions pertaining to the final report.

Section 6: Schedule of project activity

The following bar chart outlines the significant milestones and the estimated meetings with HRM for the review process.

Authorization

Jan Kestle

President, Environics Analytics

Date _____