QUANTIFYING THE COSTS AND BENEFITS OF ALTERNATIVE GROWTH SCENARIOS

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Location Halifax Hall, City Hall, Argyle Street, Halifax

Date April 17, 2013, 11:30 am

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PROJECT OBJECTIVES

Halifax Regional Municipality is seeking empirical data relating to the cost of municipal servicing, and of building and maintaining households, commuting times, as well as greenhouse gas emissions (GHG) and public health costs and benefits. In addition, an assessment is sought of impact on overall quality of life for HRM residents under alternate growth scenarios:

- *Current Regional Plan Growth Goals* – 25% urban, 50% suburban, 25% rural
- *Actual Observed Growth (Post Regional Plan Adoption)* – 16% urban, 56% suburban, and 28% rural
- *Hypothetical Growth Scenario A* – 40% urban, 40% suburban, 20% rural
- *Hypothetical Growth Scenario B* – 50% urban, *30% suburban, 20% rural*.

- RFP, p. 19 (*modified*)

PROJECT OUTPUTS

- PHASE 1 – Research and Problem Definition

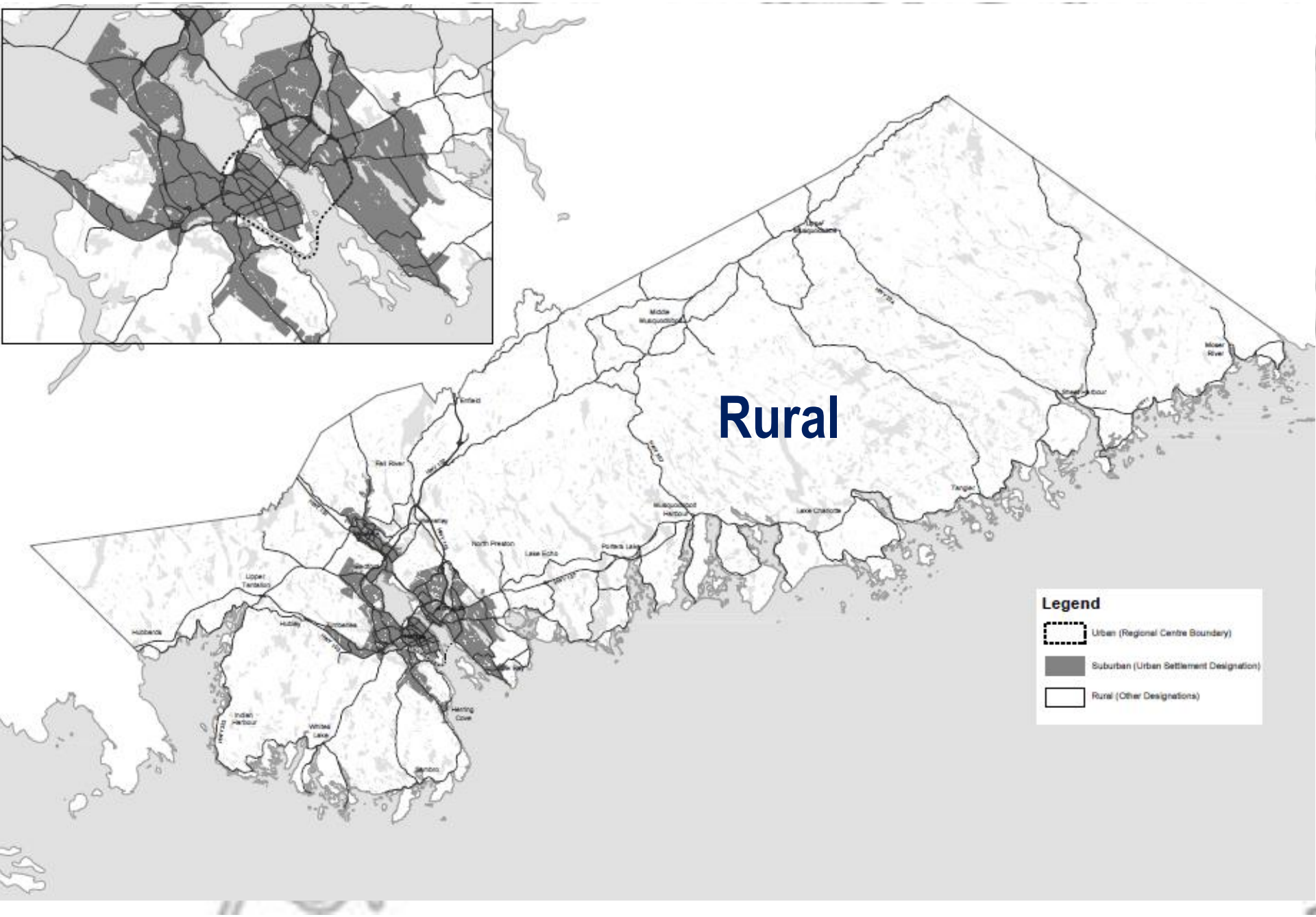
  Determine data availability and structure approach.

- PHASE 2 – Model Development and Application

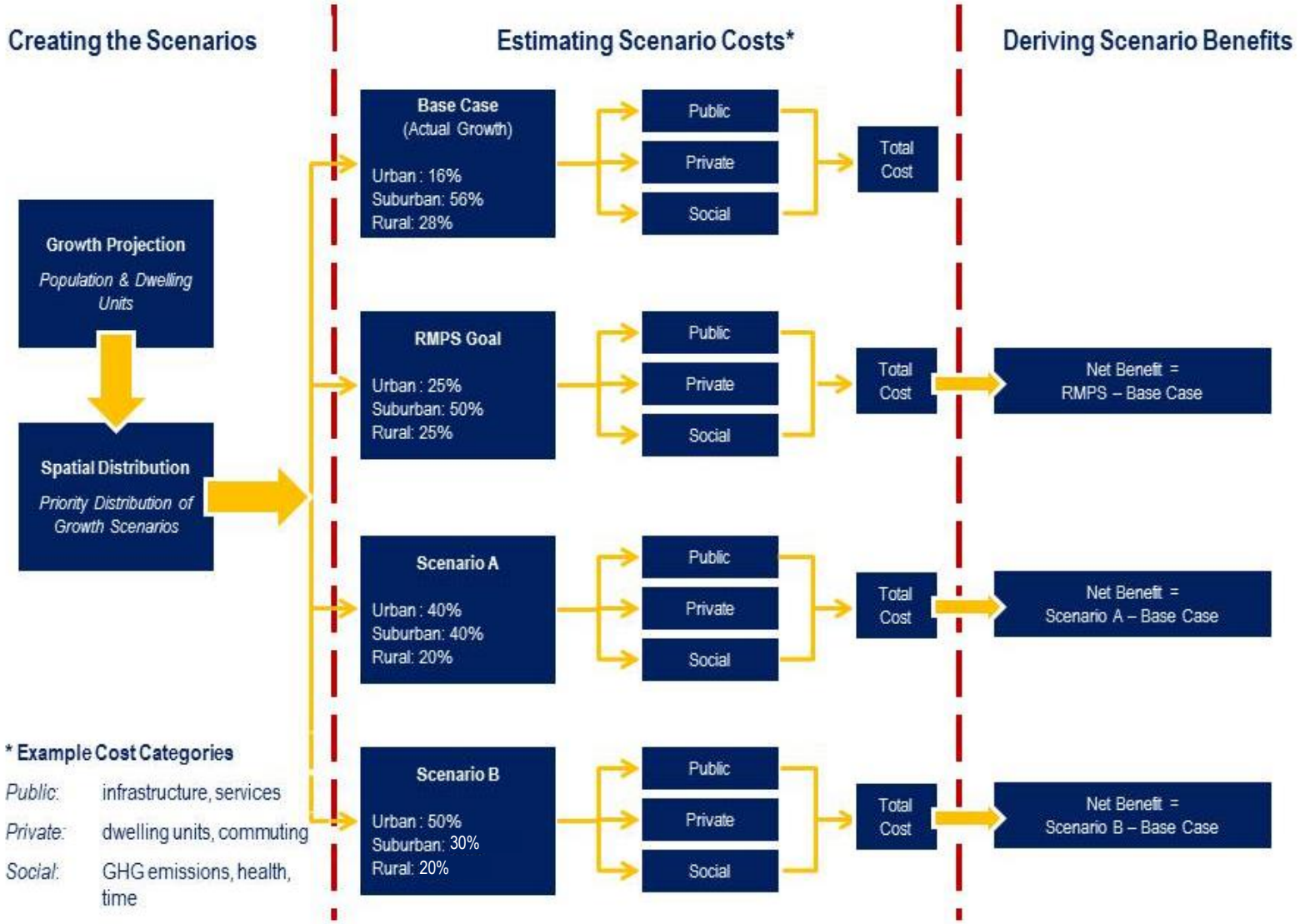
  Model costs of infrastructure development, operation, and use.

- PHASE 3 – Final Assessment and Reporting

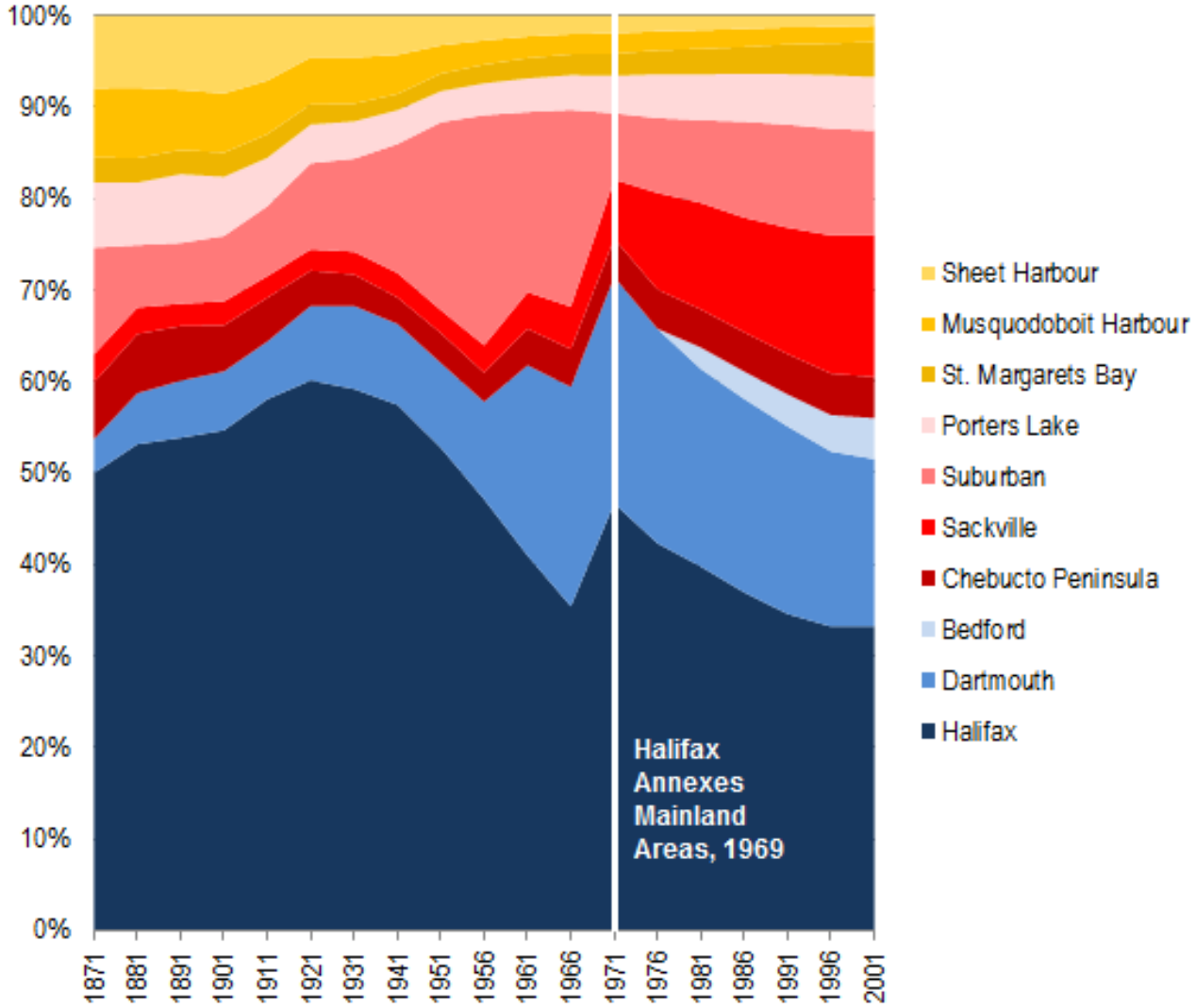
  Assess the social costs and benefits of Alternative Scenarios.


Rural
Legend
Urban (Regional Centre Boundary)
Suburban (Urban Settlement Designation)
Rural (Other Designations)

MODELLING APPROACH



SETTLEMENT IN HRM



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BENCHMARK INDICATORS

Indicator	Value	Rank Among CMAs*
Population Density in EUA (pop/km^2)	858.8	20th densest of 33
Urban Density in EUA ([pop+emp]/km^2)	1,380.0	19th densest of 33
Employment Density in CBD (emp/km^2)	25,754.4	7th densest of 33
Population Density in CBD (pop/km^2)	3,947.4	10th densest of 33
Arterial+Collector Lane-km per 1,000 Capita - EUA	3.73	14th most of 23
Median Home-Work Trip Distance (km) - CMA	6.5	15th longest of 33
Annual Fuel Usage per Capita - EUA (L/Capita)	1,234	22nd best of 33
% Commuting to Work as Driver in Own Vehicle	65.1%	4th best of 33
% Commuting to Work by Public Transit	10.1%	7th best of 33
% Commuting to Work by Active Modes (bike + walk)	11.1%	3rd best of 33
Total Transit Expenditures per Capita	$220	9th most of 31
* Halifax is the 13th largest of 33 CMAs in Canada		

PROJECT GOAL

… provide the Halifax Regional Municipality with invaluable empirical data to provide the solid support required for making decisions on the policy direction of our future growth as guided by the Regional Plan. This growth will complement the fiscal and environment[al] sustainability of the municipality, while continuing to support the economic prosperity of the overall Region.

- RFP, p. 19

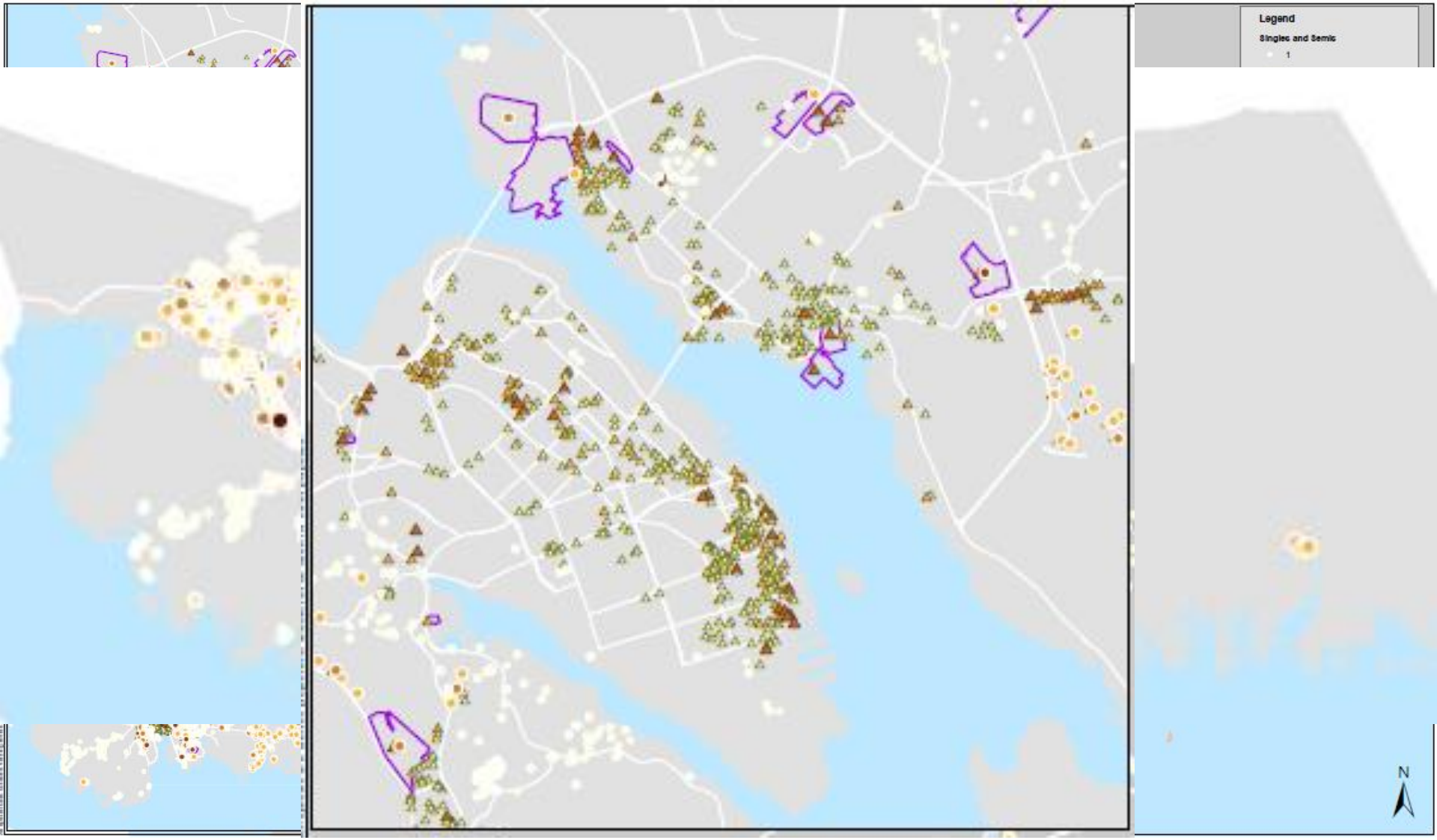
MODELING PRINCIPLES

- Distribution principles should be the same for all four scenarios
- Modify only if necessary to achieve scenario parameters (*e.g.*, if 75% of development is to be located in the Regional Centre some change is required to create necessary development opportunities)
- Outputs are primarily relevant at the Traffic Zone level

PROJECTIONS

- Based on Altus projections for HRM prepared in 2009 (High Scenario)
- Adjusted to 2011 Census population and dwelling unit numbers and extended to 2031
- Residential population distributed for each scenario using land suitability assessment in GIS
- HRM staff developed related employment estimates
- Comparisons are based on distribution of dwelling units in 2031

RESIDENTIAL DISTRIBUTION



NON-RESIDENTIAL DISTRIBUTION

- Established Approaches
  - Based on the share of employment in each traffic zone according to 2006 Census figures
  - Based on the share of non-residential building permits issued by HRM in each traffic zone.
- Future Allocation
  - Long-term trend (2001 to 2006 Census)
  - Short-term trend (building permits from 2006 Census)
  - Assumptions concerning population-employment relationship under each scenario
  - Combination of the above

MUNICIPAL SERVICE DELIVERY

Service	Agency	Key Features	Other	Funding
Water	Halifax Water	1,307 km of mains	100% metered	$0.413 per m^3
Wastewater	Halifax Water	~1,000 km sanitary/300 km combined sewers	83% connected, 100% treated	$1.169 per m^3
Stormwater	Halifax Water	~700 km storm/300 km combined		Wastewater charge
Transportation	HRM	1,778.4 km HRM	4,347.1 km total	General revenue
Transit	Metro Transit	300 buses on 57 routes with 15 terminals	Ferry, Access-a-Bus, MetroX, etc.	Fares, Gas Tax, Transit Tax
Solid Waste Management	HRM	Otter Lake Landfill, composting & recycling	8 collection areas	Tipping fees, General revenue
Fire and Emergency	HRM	57 stations: 17 professional	40 volunteer	General revenue
Police	HRP/RCMP	3 HRP stations/6 RCMP		General revenue
Community Facilities and Parks	HRM	Extensive and varied	Facilities are community managed	User Fees, General revenue
Libraries	HPL	13 branch libraries	Central library under construction	General revenue

OTHER SERVICE DELIVERY

Service	Agency	Key Features	Other	Funding
Provincial				
Highways	NSTIR	All 100 series highways	Burnside Connector, Highway 113	General revenue
Harbour Bridges	Halifax Harbour Bridges	100,000 crossings/day	Potential third crossing	Tolls
Schools	HRSB/CSAP	144 schools/52,001 students	83% capacity	General revenue/Municipal contribution
Private				
Electricity	NS Power	Follows development	Regulated pricing	User fees
Communications	Aliant/Eastlink	Follows development		User fees
Natural Gas	Heritage Gas	Market driven	Regulated pricing, environmental benefits	User fees

Service	Measure				Percentage of Trend or Rank			
	RMPS Goals	Post RMPS Trend	Scenario A	Scenario B	RMPS Goals	Post RMPS Trend	Scenario A	Scenario B
Water, Wastewater, and Stormwater								
- All improvements ($000s)	$1,602,853	$1,549,469	$1,382,235	$1,058,255	103.4%	100.0%	89.2%	68.3%
Transportation								
- Local Road Construction ($000s)	$1,698,837	$1,736,524	$1,382,557	$1,079,829	97.8%	100.0%	79.6%	62.2%
- Regional Road Improvements ($000s)	$211,680	$239,940	$198,360	$172,320	88.2%	100.0%	82.7%	71.8%
- Additional Vehicle Trip Time (hours)	31,745	33,443	30,581	29,038	94.9%	100.0%	91.4%	86.8%
- Additional Vehicle Trips Distance (km)	1,073,352	1,118,371	1,065,543	1,030,784	96.0%	100.0%	95.3%	92.2%
- Transit Use Change (from 2009)	1,009	743	2,029	2,209	135.8%	100.0%	273.1%	297.3%
- Active Transportation Change (from 2009)	9,530	9,255	9,828	9,970	103.0%	100.0%	106.2%	107.7%
Other Public Services								
Solid Waste Management								
- Municipal Solid Waste Haulage (hours)	19,585	20,655	15,363	12,606	94.8%	100.0%	74.4%	61.0%
- Private Solid Waste Haulage hours)	9,327	9,252	11,711	13,969	100.8%	100.0%	126.6%	151.0%
- Municipal Compost Haulage (hours travel)	23,663	24,251	18,988	16,268	97.6%	100.0%	78.3%	67.1%
- Private Compost Haulage (hours travel)	10,885	10,885	13,575	16,017	100.0%	100.0%	124.7%	147.2%
- Municipal Recyclables Haulage (hours travel)	19,226	20,389	15,150	12,501	94.3%	100.0%	74.3%	61.3%
- Private Recyclables Haulage (hours travel)	8,530	8,524	10,783	12,901	100.1%	100.0%	126.5%	151.3%
- Recycling Depots (hours travel)	8,076	8,221	7,369	7,149	98.2%	100.0%	89.6%	87.0%
Fire and Emergency (hours travel)	7,095	7,640	6,804	6,562	92.9%	100.0%	89.1%	85.9%
Police	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Community Facilities and Parks								
- Community Facilities (hours travel)	7,095	7,640	6,804	6,562	92.9%	100.0%	89.1%	85.9%
- Parkland Supply ($000s to address shortfalls)	$309,418.9	$199,892.5	$523,704.7	$715,858.6	154.8%	100.0%	262.0%	358.1%
Libraries								
- User Travel Distance (km to branches)	11,317	12,262	9,926	9,399	92.3%	100.0%	80.9%	76.7%
- Catchments Classified A/B/C/U	5/1/1/7	5/1/1/7	4/3/0/7	5/2/0/7	3	3	2	1
Schools								
- User Travel Time (hours to all school types)	30,127	31,653	26,546	25,697	95.2%	100.0%	83.9%	81.2%
- Elementary (% under/over capacity)	18/18	19/20	15/19	14/23	3 1	4 3	2 2	1 4
- Junior High School (% under/over capacity)	7/4	5/5	5/7	7/8	3 1	1 2	1 3	3 4
- High School (% under/over capacity)	3/2	3/3	3/2	1/2	2 1	2 4	2 1	1 1
Health Care (hours travel)	11,225	12,549	9,357	9,158	89.4%	100.0%	74.6%	73.0%
Private Utilities								
Electricity and Communications ($000s)	$21,275	$23,451	$16,533	$15,412	90.7%	100.0%	70.5%	65.7%
Natural Gas (potential DUs connected)	43,583	39,917	50,201	55,276	109.2%	100.0%	125.8%	138.5%

SCENARIO COMPARISON

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	RMPS Goals	Post RMPS Trend	Scenario A	Scenario B
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Transportation				
- Local Road Construction ($000s)	$1,698,837	$1,736,524	$1,382,557	$1,079,829
- Regional Road Improvements ($000s)	$211,680	$239,940	$198,360	$172,320
- Additional Vehicle Trip Time (hours)	31,745	33,443	30,581	29,038
- Additional Vehicle Work Trips Distance (km)	1,073,352	1,118,371	1,065,543	1,030,784
- Transit Use Change (work trips from 2009)	1,009	743	2,029	2,209
- Active Transportation Change (work trips from 2009)	9,530	9,255	9,828	9,970
Other Public Services				
Solid Waste Management				
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- Parkland Supply ($000s to address shortfalls)	$309,418.9	$199,892.5	$523,704.7	$715,858.6
	154.8%	*100.0%*	*262.0%*	*358.1%*

OVERALL COSTS AND REVENUES

Scenario	($millions)			
	Cumulative Costs to 2031	Savings Relative to Trend	Estimated Municipal Revenues	Benefits Relative to Trend
RMPS Goals	$30,405	$670	$1,381	$14
Post RMPS Trend	$31,075	$0	$1,367	$0
Scenario A	$29,345	$1,730	$1,254	-$113
Scenario B	$28,009	$3,066	$1,164	-$203

	Best		2nd Best		3rd Best		Worst

EMISSIONS BY SCENARIO

Emissions*	RMPS Goals	Post RMPS Trend	Scenario A	Scenario B
GHGs (t CO_2e)	1,115,540	1,150,292	1,091,213	1,070,362
% of Trend	*97.0%*	*100.0%*	*94.9%*	*93.1%*
Sulfur Oxides (SOx)	426.45	439.74	417.15	409.18
% of Trend	*97.0%*	*100.0%*	*94.9%*	*93.1%*
Nitrogen Oxides (NOx)	13.47	13.89	13.17	12.92
% of Trend	*97.0%*	*100.0%*	*94.9%*	*93.1%*
Volatile Organic Compounds (VOCs)	566.21	583.85	553.86	543.28
% of Trend	*97.0%*	*100.0%*	*94.9%*	*93.1%*
Total Particulate Matter (TPM)	54.55	56.25	53.36	52.34
%Trend	*97.0%*	*100.0%*	*94.9%*	*93.1%*

* Transportation sector only

OTHER IMPACTS AND BENEFITS

- Assessment of GHG and Pollution Impacts
  - Reductions commensurate with reduction in commuting
  - Sectors other than transportation are not significantly influenced by residential distribution
- Safer Environment
  - Reduced high speed driving
  - Better access to police, fire, emergency, and health services
- More Efficient Economy
  - Income required for taxes and other expenses, and time required for commuting and other purposes is freed for productive purposes

HEALTH IMPACT ASSESSMENT

- HIA provides a framework for considering important impacts that cannot be monetized in a cost-benefit analysis
- Methodology assesses the impact of policy or action on physical and mental health (including personal well-being/quality of life)
- While some health criteria are quantifiable, others require subjective assessment
- Factors related to residential distribution scenarios were analysed for each service

HEALTH IMPACT ASSESSMENT

Factor	Question	RMPS Goals	Post RMPS Trend	Scenario A	Scenario B
Time Availability	Does the scenario increase or decrease the discretionary time available to citizens for productive activity, recreation/leisure, or social interaction?	+	-	++	+++
Alternative Transportation	Does the scenario promote the use of transit, and/or active transportation modes?	+	-	++	++
Physical Activity	Does the scenario encourage or discourage physical exercise either by promoting the provision and use of alternative transportation modes or by enhancing access to facilities specifically provided for exercise (*i.e.*, parks and open spaces, arenas, gymnasia, *etc.*)?	+	-	++/-	++/-
GHG/Pollutant Emissions	Does the scenario increase or decrease the output of GHGs and/or other pollutant emissions?	+	-	++	+++
Environmental Conservation/ Management	Does the scenario increase or decrease the area of land left in its natural state by virtue of the extent of construction involved? *and/or* Does the form of development potentially increase or decrease impacts on the quality of land and water?	+/-	+/-	+/-	+/-
Public Safety	Does the scenario enhance or diminish public safety in fact or perception?	+	-	++	+++
Housing Affordability	Does the scenario facilitate or hinder the provision of housing types that are more affordable and/or reduce the costs associated with ownership and operation of housing accommodation?	+/-	+/-	+/-	+/-
Social Equity	Does the scenario promote social equity by enhancing the access of disadvantaged groups (*e.g.*, the poor, youth, the elderly, physically and mentally challenged) to needed services or by reducing the costs of such access?	+	-	++	++
Social Interaction	Does the scenario promote or inhibit interaction among citizens?	+/-	+/-	+/-	+/-
Public Safety	Does the scenario enhance or diminish public safety in fact or perception?	+	-	++	+++

THANK YOU

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