

Upper Bow Basin, Urban and Rural Infrastructure and Maintenance Cost Coefficients

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Summary Table of ALCES Coefficients

CAPITAL COSTS	
Minor Roads, per km	\$2,500,000
Major Roads, per km	\$11,500,000
Urban Roads, per km* <ul style="list-style-type: none"> • Minor Road • Water Services Cost • Total Cost 	\$2,500,000 \$450,000 \$2,950,000
Rural Residences (Farms and Acreages), per dwelling**	\$18,000
Urban Residences, per dwelling** <ul style="list-style-type: none"> • Including Water Services • Excluding Water Services 	\$52,300 \$11,400
Unserviced Industrial, per ha <ul style="list-style-type: none"> • Including Water Services (Storm Sewer Only) • Excluding Water Services 	\$22,400 \$10,000
Serviced Commercial, per ha <ul style="list-style-type: none"> • Including Water Services • Excluding Water Services 	\$205,000 \$21,600
OPERATING COSTS, PER YEAR	
Minor Roads, per km	\$16,500
Major Roads, per km	\$33,000
Rural Residences, per capita***	\$573
Urban Residences, per capita***	\$788
Unserviced Industrial, per ha	\$621
Serviced Commercial, per ha	\$1861
REVENUES: TAXES, PER HA PER YEAR	
Farm	\$22
Rural Residences	\$1266
Urban Residences	\$10,803
Unserviced Industrial	\$5531
Serviced Commercial	\$22,124
REVENUES: DEVELOPER FINANCED INVESTMENT	
Developer pays roughly 85% of total capital costs listed above	85%
REVENUES: USER FEES, PER HA PER YEAR	
Urban Residential	\$2441
Rural Residential	\$17
Unserviced Industrial	\$0
Serviced Commercial	\$954

*Since roads and water pipes in urban areas are approximately linearly related, the most effective way to incorporate the cost of water services is by multiplying it by road length. If this cannot be done, water services can also be added by dwelling, although this makes it hard to estimate the cost savings of more dense development.

**Per ha values are also offered below, but per dwelling values are more accurate, because most of the costs included in these categories are more related to population than landuse type.

***Unfortunately, these values are generally only offered on a per capita basis, but they could conceivably be converted into per hectare values if necessary.

The following landscape types should be treated as either serviced commercial or unserviced industrial for purposes of determining municipal expenses:

- Wind Farm and Transmission Lines
- Mine sites
- Feedlot
- Industrial sites/Recreational
- Wellsite
- Seismic
- Pipeline

The following landscape types either have a negligible effect on municipal costs and revenues, or there is too little information to provide an estimation of their effect.

- Recreation Trail OHV

Summary Thoughts

This analysis is a comparative study of three different documents (see below under “studies used”) to find the best available estimates of costs and revenues of new development from the perspective of municipalities. The above estimates are certainly not perfect, but hopefully detailed review of the assumptions underpinning these numbers will show that they are realistic for the Upper Bow Basin.

These coefficients are meant to be used for both the BAU simulation as well as for best practices. In particular, they are sufficient to estimate the capital costs of denser or “clustered” development. From a municipality’s perspective, the key change from clustered development is a reduction in the costs of constructing roads and water pipelines to connect far-flung areas. Since water pipeline length is very closely related to urban roadway length, it is possible to estimate the cost-savings of urban development using the quantity of roadway required for these communities as the driver.

Another way of showing the consequences of best practices is to measure the substitution of one landuse type for another. Because rural development has different rates of revenues and costs, an

increase in density of residential development would have consequences on a municipality's financial position, and this can be captured using the information provided here.

However, best practices which alter the costs impacts of a specific landuse without changing its landuse type are not analyzed in this report. For example, the additional costs of water conservation for a given piece of land are not quantified. If required, this can be done separately. (Note: For a discussion of a limited number of best practices, we recommend reading the CMHC report).

Definitions

1. Studies Used

Rocky View 2060: Team ISL. (2009). *Rocky View 2060: Cost of Services Study*.

<http://www.rockyview.ca/2060/facts.asp> (accessed Dec, 2011).

Calgary Plan-It: IBI Group. (2009). *Plan-It Calgary: The Implications of Alternative Growth Patterns on Infrastructure Costs*.

http://www.calgary.ca/docgallery/BU/planning/pdf/municipal_development_plan/plan_it/research/plan_it_calgary_cost_study_analysis_april_third.pdf (accessed Dec, 2011).

CMHC: Canada Mortgage and Housing Corporation. (2008). *Life Cycle Costing Tool for Community Infrastructure Planning: User Guide*. <http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/licycoto/index.cfm> (accessed Dec, 2011).

Transportation

1. Road Construction Costs

Road Type	ALCES Classification	Cost per KM	Source
Gravel	Minor	1.7 million	Rocky View 2060
Chip Seal	Minor	1.7 million	Rocky View 2060
Rural Paved	Minor	3.1 million	Rocky View 2060
2-Lane Urban Paved (with curb & gutter)	Minor	3.7 million	Rocky View 2060
4-Lane Urban Paved (undivided)	Major	7.2 million	Rocky View 2060
4-Lane Urban Paved (divided)	Major	7.4 million	Rocky View 2060
Skeletal Roads	Major	5 million per lane	Calgary Plan-It
Arterial Streets	Major	2.5 million per lane	Calgary Plan-It
Boulevard and Parkway Upgrades	Minor	1.5 million per lane	Calgary Plan-It
Collector	Minor	1 million per lane	Calgary Plan-It
Local	Minor	0.6 million per lane	Calgary Plan-It

Notes:

- Classification of roads into “major” or “minor” categories was done fairly arbitrarily according to the rule of thumb that major roads had four lanes or more, whereas minor roads were two lanes.

Recommendation: Assuming minor roads are 2 lanes wide, the average cost of a minor road is roughly \$2.5 million per kilometer, with a confidence interval of (\$1.2 million, \$3.7 million). Assuming major roads are 4 lanes wide, the average cost of a major road is roughly \$11.5 million with a confidence interval of (\$7.2 million, \$20 million).

2. Road Maintenance and Rehabilitation Costs

Road Type	ALCES Classification	Cost per KM per year	Source
Local Roads (High Use)	Minor	\$23,250	Rocky View 2060
Local Roads (Low Use)	Minor	\$10,030	Rocky View 2060
Arterial Roads (High Use)	Major	\$43,100	Rocky View 2060
Arterial Roads (Medium Use)	Major	\$23,250	Rocky View 2060
Arterial Roads (Low Use)	Minor	\$10,030	Rocky View 2060
Major Arterial Roads (High Use)	Major	\$45,100	Rocky View 2060
Local Roads	Minor	\$10,000	CMHC
Major Collector/Arterial Roads	Major	\$20,000	CMHC

Notes:

- “High use,” “Medium Use” and “Low Use” are our own classification. High use areas refer to urban residential and serviced commercial areas, medium use are medium density country residential areas, and low use areas refer to unserviced industrial or low-density country areas.
- The CMHC report is based primarily on data from Ontario municipalities from the year 2001. The Rocky View 2060 report does not list its assumptions underlying its cost estimate.
- The Rocky View 2060 numbers include both maintenance and rehabilitation estimates, but the CMHC estimates only the maintenance portion. Rehabilitation costs are estimated to be between 2-4 times greater than maintenance fees in the Rocky View 2060 report.

Recommendation: Since the Rocky View 2060 report includes both maintenance and rehabilitation costs and is relevant to the study area, we only use estimates from that study. Assuming roughly half of the roads are in high-use (urban) areas and half are in low-use (rural)

areas, the average maintenance cost for minor roads is $.5 * \$10,030 + .5 * \$23,250$ or roughly \$16,500 per km. Similarly, the maintenance cost for major roads is $.5 * 43,100 + .5 * 23,250$ or roughly \$33,000 per km.

3. Public Transit Construction Costs

As public transit is currently not a footprint type in the UBBCES study, it is not necessary to find a parameter for its cost per hectare in the model. However, when doing a comparison between BAU and improved development, it would be useful to include an estimate of transit costs, because improved development usually means more dense cities and higher transit use.

The most relevant study of transit costs for BAU and “improved” development was the Calgary Plan-It report, which compared the estimated costs for a sprawled out city compared to a more built-up one. What the report found was that while transit ridership was much higher in the “improved” case, the increased costs of servicing far-flung areas and the efficiencies gained by operating in denser corridors resulted in comparable costs for each scenario. Because of the reduced LRT investment needed for a smaller city, the denser “improved” plan actually resulted in a reduction in capital costs by 10% compared to BAU. Furthermore, while total operating costs were much higher for the “improved” plan, these increased costs were offset by increased fares paid by passengers, and the net operating cost paid by municipalities was roughly comparable. What this study indicates is that the increased transit ridership in a denser city modeled on Calgary would come at no additional cost to the municipality.

Because Calgary is the biggest city with the largest transit costs in the Upper Bow region, and because largely rural areas are not normally served by transit, it is reasonable to generalize this finding to the study area. Because additional costs of transit in a denser city are roughly cancelled out by the gains in efficiency of the system, it is possible to model transit costs as a linear function of population or the number of households in urban areas.

The approximate additional capital and operating costs borne by municipalities are as follows:

Type	Cost	Source
Transit Capital Cost	\$4500-\$5100 per additional urban resident	Calculation based on Plan-It Calgary
Transit Operating Cost	\$130 per capita (urban residents)	Calculation based on Plan-It Calgary
Transit Maintenance	\$45 per capita (urban residents)	Rocky View 2060

Further extensions: For transit fees measured per vehicle service hour, please see the CMHC report. The Plan-It Calgary report also has aggregate breakdowns for the city of Calgary under two growth scenarios.

Urban and Rural Development Construction Costs

1. Introduction

Most of the reports on municipal costs break down their costs further into police, fire, ambulance, administrative, water, wastewater, school, and recreation values. Since the ALCES model works by landuse type, it is useful to aggregate these numbers to give approximate coefficients by landuse type rather than by service. For a full breakdown by service, please see the reports referenced.

To quantify these urban development costs, there are three general methods of moving ahead. The first and easiest is simply to take the per hectare development values from the Rocky View 2060 as coefficients for the model. Since the Plan-it Calgary study has already done a comparison of Calgary under two different growth models, the second option would be to use the aggregate numbers from this study, adjusted to fit the entire study area. Finally, the last method would be to draw estimates of all three studies to determine the average cost of each individual service, and then proceed to aggregate them.

Because the Rocky View 2060 estimates are relevant to the study area, are easy to use for modelling purposes, and are relatively complete, we recommend using them for coefficients. The one disadvantage to this method is that costs of development in the Calgary interior are likely not comparable to new communities in Rocky View. To ensure the accuracy of estimates, we will compare when possible the assumptions between the Rocky View study and the other two, to highlight where differences may arise.

2. Cost Estimates

Type	Lot size	Lots in Quarter Section	Capital Cost For Development of Quarter Section	Capital Cost per Hectare	Capital Cost per Hectare (Excluding Water Infrastructure)	Capital Cost per Dwelling	Capital Cost per Dwelling (Excluding Water Infrastructure)
Farm	320 acres		\$.018 million	\$275	\$275	\$18,000	\$18,000
Small Holdings	10 acres		\$.018 million	\$275	\$275	\$18,000	\$18,000
Traditional Country Residential	2 acres	40	\$1 million	\$14,700	\$10,000	\$24,000	\$16,000
Conservation Country Residential	1/2-1/3 acres	100	\$12 million	\$183,000	\$27,000	\$119,000	\$17,500
Conventional Urban Residential	1/4 acres	640	\$33.5 million	\$517,000	\$113,000	\$52,300	\$11,400
Unserviced Industrial	1 acre	125	\$1.5 million	\$22,400	\$10,000	\$12,000	\$5,200
Serviced		250	\$13.3 million	\$205,000	\$21,600	\$53,200	\$5,600

Commercial		commercial business units					
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Notes:

- Total footprint costs exclude road construction costs.
- All above values taken from Rocky View 2060 study.
- Capital Costs include costs for water infrastructure, recreation infrastructure, and emergency infrastructure.

The following were differences between assumption estimates in the various reports:

- Water capital costs from the Rocky View 2060 study were significantly higher than those used in the Plan-It Calgary report. The Rocky View 2060 study assumed onsite installation of both water and wastewater pipes would cost about \$190,000 per hectare for installation in a conventional urban neighborhood, whereas the Plan-It Calgary estimated onsite installation to be \$120,000. In addition, the Plan-It Calgary report did not incorporate storm sewer or offsite treatment plant upgrades, whereas the Rocky View 2060 study did.
- Capital costs for stormwater management for the Rocky View 2060 study were much lower than those estimated by the CMHC. The Rocky View 2060 study assumed onsite installation of stormwater management systems to be about \$130,000 per hectare, whereas the CMHC assumed a value of \$246,000 per hectare.
- Many cost of services studies included education infrastructure and school bus infrastructure in their total capital expenditures, but this information was missing in the Rocky View 2060 report.
- The Rocky View 2060 report does not include higher density developments or estimate their costs.
- Unfortunately, it is quite difficult to compare estimates for other variables such as police or recreation, because these were not estimated on a per hectare basis in either the CMHC report or the Plan-It Calgary report.

3. How to Apply these Values

There are two ways of incorporating these values into the ALCES model, and one external solution.

The first solution is to make road building the driver of differences between BAU and “Improved” development costs. In the Plan-it Calgary study, over 80% of the estimated cost savings from denser development come from building fewer roads and less sewers and water mains. According to the CMHC report, the length of additional water distribution and wastewater pipes needed in a neighborhood is quite closely correlated to the total length of road inside that neighborhood.² As

² See pp.55-59 of CMHC report. The CMHC methodology is to multiply the total length of road by a cost of \$150-\$200 per metre for water distribution pipes, and between \$175 and \$220 per metre for sanitary sewer pipes. Added to this is a fixed cost of trunk pipes, which usually make up about 15% of the total water

a consequence, if urban roadway and rural roadway can be distinguished, the change in the length of urban roadway can be used as a proxy to estimate the vast majority of the total capital cost savings of “improved” development in a municipality. The residual values (including transit, emergency, recreation, etc.) could be counted on the basis of population or total urban footprint area, because these are not expected to be drastically different when population is held constant.

The second solution is to use a mixed approach where both road building and landuse choice (measured either by the population density indicator or the area of each landuse type) are important. Roads are still a driver in this case, but the capital costs of water distribution systems are measured on a per hectare basis. The advantage to this method is that it allows the other residual capital values (emergency, transit, recreation, etc.) to vary as well, thereby providing a more accurate picture of total costs. The difficulty with this method is a data one: we have not found a good per hectare estimate for capital costs of denser urban development. So, while an estimation of costs for conventional urban and rural development can be found (you’ll notice that conventional urban development has a lower cost per capita than rural development), we do not have a good estimate of cost savings for higher densities.

Finally, the CMHC’s report is accompanied by a free excel file with the stated goal of determining the cost of developing a specific community. This tool also has the ability of calculating cost savings for non market goods such as carbon mitigation and traffic accident avoidance, and it has coefficients built-in for a number of municipal best-practices. Instead of tracking all of the costing variables inside ALCES, relevant variables could be extracted and incorporated into the CMHC model. Problems with this approach are that the CMHC tool was created primarily for estimating costs for a specific community rather than a large landbase, and additional time setting the parameters of the CMHC model would be required. Still, the CMHC model would allow for a much more detailed overview of costs and benefits of various types of urban development without having to invest a significant amount of time in development. While the CMHC tool is not required for most purposes, it could be considered for clients using ALCES Municipality who want a detailed estimation of municipal costs and benefits.

Urban and Rural Development Maintenance Costs

1. Water Services Operating Costs

Area Type	Cost per year	Study
New Calgary Community (Water and Wastewater treatment)	\$1261 per ha	Plan-It Calgary

system length. Trunk pipes cost \$200-\$300 per metre for water distribution lines, and \$250 per metre for sanitary sewer lines. The price ranges are because higher density areas cost slightly more to equip than lower density ones, because of a bigger pipe capacity requirement. In sum, costs for all water services would be roughly \$450 per metre of road on average, or between \$392.5 per metre of road for low density communities and \$502.5 per metre of road for high density communities.

Average Water Treatment and Distribution Cost	\$300 per household	CMHC
Average Wastewater Treatment and Distribution Cost	\$250 per household	CMHC

Notes:

- As mentioned in the CMHC report, “Very little data was found relating the operating cost of water treatment facilities to different types of developments.”³
- Most municipalities recoup a significant amount of the operating expenses for water distribution, so this might not be an important variable for the purpose of measuring a municipality’s finances in some cases. Under the City of Calgary’s most recent budget, 100% of the budget for water services was funded by department revenues, and none was financed through taxes.
- Because lower density communities use more water per capita on activities such as watering the lawn, the per household cost is probably lower for these communities. Unfortunately, because data has traditionally been aggregated, it is hard to quantify exactly what the cost savings are.

2. Emergency Services Operating Costs

Service	Cost per year	Study
Fire (Rural)	\$93 per capita	Rocky View 2060
Fire (Conventional Urban)	\$118 per capita	Rocky View 2060
Fire (Calgary)	\$147 per capita	CMHC
Fire (Medium Municipality)	\$102 per capita	CMHC
Fire (Small Municipality)	\$29 per capita	CMHC
Fire Station	\$4.45 million per station	Plan-It Calgary
Police (Rural)	-\$20 per capita	Rocky View 2060
Police (Urban)	\$91 per capita	Rocky View 2060
Police (Large Municipality)	\$192 per capita	CMHC
Police (Medium Municipality)	\$173 per capita	CMHC
Police (Small Municipality)	\$101 per capita	CMHC
Ambulance (Rural)	\$46 per capita	Rocky View 2060
Ambulance (Urban)	\$11 per capita	Rocky View 2060

Notes:

- ➔ The Plan-It Calgary study estimates that the costs of police services depend on population rather than landuse or density (See p. iii of the Executive Summary).

3. Recreation Facilities Operating Costs

Service	Cost per year	Study
Recreation (Rural)	\$120 per capita	Rocky View 2060
Recreation (Urban)	\$190 per capita	Rocky View 2060

³ p. 57

Recreation (Calgary)	\$123 per capita	CMHC
Recreation (Medium-Sized Municipalities)	\$120 per capita	CMHC

4. Waste Management Operating Costs

Service	Cost per year	Study
Waste Management (Calgary)	\$48 per capita	CMHC
Waste Management (Medium-sized Municipalities)	\$59 per capita	CMHC
Waste Management (Medium-sized Municipalities)	\$71 per tone	CMHC
Waste Management (Small-sized Municipalities)	\$42 per capita	CMHC

Notes:

- ➔ Waste management costs are usually at least partially recovered through user fees.
- ➔ Basic math from the most recent City of Calgary budget indicates roughly 40-45% of waste management costs were financed through taxes, and the rest are funded through user fees and other cost recoveries.⁴

5. Administration and Other Operating Costs

Service	Cost per year	Study
Administrative Costs (Rural)	\$176 per capita	Rocky View 2060
Administrative Costs (Urban)	\$128 per capita	Rocky View 2060
Planning/Economic Development (Rural)	\$62 per capita	Rocky View 2060
Planning/Economic Development (Urban)	-\$45 per capita	Rocky View 2060
Public Health (Rural)	\$25 per capita	Rocky View 2060
Public Health (Urban)	\$10 per capita	Rocky View 2060

6. Summary – Urban Residential

Service	Cost per year	Notes
Water Treatment	\$550 per household (\$212 per capita)	Added two CMHC report numbers together
Fire	\$122 per capita	Average of the Rocky View “urban” estimate, and the CMHC “large municipality” and “medium municipality” estimates.
Police	\$152 per capita	Average of the Rocky View

⁴ See:

http://www.calgary.ca/docgallery/bu/finance/budget/2009_2011/pdf/05_uep_business_plan_and_budget.pdf, p. D3.

		“urban” estimate, and the CMHC “large municipality” and “medium municipality” estimates.
Ambulance	\$11 per capita	Rocky View 2060 estimate
Recreation	\$144 per capita	Average of the Rocky View “urban” estimate, and the CMHC “large municipality” and “medium municipality” estimates.
Waste Management	\$54 per capita	Average of estimates for Calgary and for Medium-Sized Communities
Other	\$93 per capita	Sum of items on “Administration and Other Operating Costs” Table
TOTAL	\$788 per capita	

7. Summary – Rural Residential (Farm and Acreage)

Service	Cost per year	Notes
Fire	\$61 per capita	Average of Rocky View “rural” and CMHC “small municipality” estimates
Police	\$41 per capita	Average of Rocky View “rural” and CMHC “small municipality” estimates
Ambulance	\$46 per capita	Rocky View 2060 estimate
Recreation	\$120 per capita	Rocky View 2060 estimate
Waste Management	\$42 per capita	CMHC (Small Communities)
Other	\$263 per capita	Sum of items on “Administration and Other Operating Costs” Table
TOTAL	\$573 per capita	

8. Summary – Unserviced Industrial

Service	Cost per year	Notes
Fire	\$61 per unit	Average of Rocky View “rural” and CMHC “small municipality” estimates
Ambulance	\$46 per unit	Rocky View 2060 estimate
Other	\$215 per unit	Sum of items on “Administration and Other Operating Costs” Table except for public health.
TOTAL	\$322 per unit	
TOTAL	\$621 per ha (Assuming 125 units per quarter section)	

9. Summary – Serviced Commercial

Service	Cost per year	Notes
Water Treatment	\$550 per household (\$212 per capita) Assume same cost per capita as per unit (same assumption as Rocky View 2060 report)	Added two CMHC report numbers together
Fire	\$122 per unit	Average of the Rocky View “urban” estimate, and the CMHC “large municipality” and “medium municipality” estimates.
Ambulance	\$11 per unit	Rocky View 2060 estimate
Waste Management	\$54 per unit	Average of estimates for Calgary and for Medium-Sized Communities
Other	\$83 per unit	Sum of items on “Administration and Other Operating Costs” Table except for public health.
TOTAL	\$482 per unit	
TOTAL	\$1861 per ha (assuming 250 units per quarter section)	

Revenues

1. Property Taxes

Property Type	Average Assessment	Tax Rate	Taxes per Unit	Taxes per Ha	Study
Farm	\$400,000 \$75,000	.27% .46%	\$1093 \$344	\$22	Rocky View 2060
Small Holding	\$600,000	.27%	\$1640	\$25	Rocky View 2060
Traditional Country Residential	\$750,000	.27%	\$2050	\$1266	Rocky View 2060
Conservation Country Residential	\$650,000	.27%	\$1777	\$2744	Rocky View 2060
Conventional Urban	\$400,000	.27%	\$1093	\$10,803	Rocky View 2060
Unserviced Industrial	\$625,000	.46%	\$2865	\$5531	Rocky View 2060
Serviced Commercial	\$1,250,000	.46%	\$5730	\$22,124	Rocky View 2060

Calgary Residential Property Tax Rate		.31%			City of Calgary Website ⁵
Calgary Farm Land Tax Rate		1.27%			City of Calgary Website
Calgary Non-Residential Property Tax Rate		.99%			City of Calgary Website

2. Developer Financed Investment

Even if there are large costs to new developments (calculated above), the Rocky View 2060 report makes it clear that municipalities are not responsible for paying all of these costs:

“the developer is typically responsible for the majority of the capital infrastructure requirements associated with new development, either directly -- or indirectly through some form of development recovery mechanism such as off-site levies. Developer responsibilities range from roughly 80% to 90% once utility and road levies have been fully recovered. (pp. 15-16)

We were unable to find a direct estimate for the total fees recovered by the city of Calgary, however, they too recover much of the costs for infrastructure. (Note: a subsection of fees is available at http://www.calgary.ca/DocGallery/BU/dba/urban_development/assessment_rates.pdf, but actual assessed rates will vary).

As a result, most of the investment for new developments is not actually paid by municipalities. However, as mentioned in the Rocky View 2060 report, municipalities still do face some costs, primarily due to uncertainties faced as development begins:

Financial costs and risks to the municipality are primarily associated with tax financed infrastructure (emergency services, recreation facilities) and the municipal frontending of infrastructure, insofar as recoveries might be at risk if development proceeds more slowly than expected or alternative or lower-cost infrastructure solutions become available, “orphaning” frontended obligations. In the longer term, infrastructure initially funded by developers directly or through levies may also affect municipal finances when subsequent replacement and rehabilitation costs must be funded.” (p. 16)

⁵http://www.calgary.ca/portal/server.pt/gateway/PTARGS_o_o_784_203_o_43/http%3B/content.calgary.ca/CCA/City+Hall/Business+Units/Finance+and+Supply/Property+Tax/Tax+Bill+and+Tax+Rate+Calculation/CURRENT+Property+Tax+Rates.htm

In other words, municipalities take a risk when investing in new communities before the total costs of development have been paid by developers and these risks can have financial consequences. Unfortunately, the costs of these risks are hard to quantify.

A consequence of these fees is that gross expenditures and net expenditures for development are often very different. In this review, low-density suburban neighborhoods almost always come out as the most expensive option for a municipality. However, because municipalities charge high fees for development and assessed property values on average are high in suburbia, municipalities often make most or all of this money back. As a result, dense urban neighborhoods can be a bigger drag on a city’s finances than suburban neighborhoods even if their total price tag is cheaper, because cities are not as able to recoup expenses through development fees or taxes.

When considering the total costs and benefits of development, it is a good idea to consider both gross and net costs, as each tells a different story. At the moment, the simplest way to do this is to track gross costs in ALCES, and then credit 85% of capital expenditures (as estimated above in the Rocky View 2060 report) to find net capital expenditures.

3. User Fees

Many public services provided by municipalities are also paid for by users rather than through general tax revenue. Individuals notably pay for water services and waste services. According to the City of Calgary’s most recent *Approved Business Plans and Budgets* (years 2009-2011), the operating costs for water services are completely offset by user fees, and roughly 65% of the operating costs for waste management were offset by user fees. Applying these numbers to estimates of total costs for water and waste management yields the following:

Property Type	Water User Fee (per capita)	Waste User Fee (per capita)	Total Usage Fee (per capita)	Total Usage Fee (per ha)
Urban Residential	\$212	\$35	\$247	\$2441
Rural Residential	NA	\$27	\$27	\$17 (assume 40 units per quarter section)
Unserviced Industrial	NA	NA	\$0	\$0
Serviced Commercial	\$212	\$35	\$247	\$954

Miscellaneous Notes

1. Transmission Lines and Wind Power Facilities

Alberta deregulated its electricity industry in 1995, and by 2001 Calgary’s municipal utility (Enmax) became a corporation which competed against others to supply power to individual

households.⁶ While the City of Calgary still wholly owns Enmax, and the electric industry is still regulated, our understanding is that the City of Calgary does not subsidize either operating costs or investments in the supply of electric power. As a consequence, it costs nothing for a municipality to put up a transmission line or building a wind farm, except for those expenses listed under “unserved industrial” such as emergency services and administrative fees.⁷ None of the studies referenced for estimates of municipal service costs listed costs of transmission lines for this reason.

The fact that transmission lines cost nothing to municipalities does not mean that they don’t have a cost. However, unlike water, waste water and storm water pipes, the cost of these services is wholly paid by individuals in their electricity bills.

⁶ See: <http://www.enmax.com/Corporation/About+Enmax/default.htm>

⁷ NOTE: While I am pretty sure this is the case, the government may still subsidize certain types of activities, such as the building of transmission lines in remote areas which are not otherwise profitable to operate in. I do not know enough of the details of the electric industry to know if this is the case, but I expect the overall impact on the budget of both the provincial and municipal governments to be small.