

Cost of Community Services study  
for Red Deer County

**The Fiscal Implications  
of Land Use:**

**A “Cost of Community Services”  
Study for Red Deer County**

**Report 3: METHODOLOGY**



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A "Cost of Community Services" Study for Red Deer County**

**Report 3: METHODOLOGY**

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## Introduction

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The methodology used for the Cost of Community Services (COCS) study for Red Deer County is based on that developed by the American Farmland Trust in the early 1980's, one which has been replicated in one form or another over 100 times since then across the United States.

The simplicity of the methodology allows rural municipalities to engage in these studies despite potentially lacking resources or sophisticated data management structures. The methodology relies on existing financial data, which is re-sorted by researchers to allocate financial information by land use categories.

All COCS studies use a somewhat varied methodology to account for situational differences, resulting in an inability to directly compare one study to another. However, there are enough similarities that they can be considered a cohesive body of knowledge, and for that reason this methodology strives to use terminology and practices common to other COCS studies.

The methods for this study were also intentionally developed to be easily replicatable across the province of Alberta.

## Methodology development

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Development of a methodology this COCS study had four components:

- review American methodologies and contextual differences;
- design a methodology appropriate for Red Deer County;
- consult several Alberta municipalities to ensure broad applicability; and
- adapt the methods to new information as the study proceeded.

In order to understand the potential differences between the American studies and this Canadian one, research was conducted to review differences in governance structure; in particular, municipal taxation powers.

A brief review of fiscal impact analyses in general was completed to provide the necessary understanding of fiscal analysis within the municipality context. This information provided insight into the benefits of the COCS methodology for a rural community. The review of historical fiscal impact analysis and American COCS studies suggested corresponding results.

The American COCS studies and their methodologies were surveyed to: review variations in methods; identify strengths and weaknesses; gauge the most appropriate circumstances in which to conduct a COCS study; assess the potential for relative consistency between studies; and seek direction in designing an appropriately neutral fiscal analysis tool.

Based on a review of specific Albertan legislation (such as the *Municipal Government Act* and *Alberta's Regulation Matters Relating to Assessment and Taxation Regulation*), areas of concern were identified and addressed within the Canadian methodology.

Following development of all methodologies and proxies, we received external feedback from a variety of experts on the methods. Generally, the responses supported the methodological decisions and some made minor suggestions which were incorporated into the study methods where appropriate.

Based on the aggregate information collected, a conceptual Canadian methodology was created and implemented as described below.

In order to test the applicability of the methodology to other rural Alberta municipalities, a multi-municipality workshop was convened. The goals of the workshop were: 1) to introduce the Red Deer County COCS study; 2) to understand the challenges of applying the current methodology to other rural Alberta municipalities; and 3) to solicit feedback from participants on addressing a suite of significant issues faced so far in conducting the study. Ten Alberta municipalities were represented and took part in plenary and break-out group discussions. The results of the workshop were reported back to the participants in a written report, and incorporated into the study methodology.

Once the conceptual methodology was developed, the Red Deer County COCS study began in earnest. Understanding that specific data provided by Red Deer County would alter the specific procedures within the methodology, we engaged in a fluid methodology testing and development process that responded to unknown data formats and municipal organization.

## **Communication**

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Generating buy-in, and therefore establishing effective communications, at both the political and operational levels is critical.

Initial conversations took place between the Miistakis Institute and Red Deer County's Community and Planning Services Director to discuss the feasibility of the study. After receiving approval from Council, the Community and Planning Services Director met with researchers to establish the project and organize initial logistics. Miistakis Institute researchers then formally briefed Council regarding the goals and activities of the study. Department managers were likewise formally briefed to explain the study, and to inform them as to what requests they could expect from the researchers. We also sought their input regarding land use category definitions and potential issues.

Informal discussions took place with both the Community and Planning Services Director and the Assistant County Manager (responsible for the finances of the County) throughout the project, which provided valuable information and insight. The open communication style encouraged by both the County and the researchers enabled a dialogue of ideas and options throughout the study.

## Steps

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As mentioned above, the investigation of the American COCS methodology, adapting as necessary to the Alberta and Red Deer County context, resulted in a four-step process very similar to the basic American Farmland Trust approach:

1. develop land use category definitions
2. collect data from the municipality
3. allocate municipal expenditures and revenues by land use category
4. calculate and analyze COCS ratios

### Develop land use category definitions

Similarly to other COCS studies, this study sought to divide all land use within the County into a small number of broad categories. The land use categories were created through a review of literature at three scales: international (US); provincial; and local. This multi-step research process was used to ensure the land use categories were compatible with previous studies, but context-appropriate for Red Deer County.

Following a review of American COCS studies' land use definitions, a review of Alberta's *Municipal Government Act* and Alberta's *Matters Relating to Assessment and Taxation Regulation* was conducted to provide further background knowledge to distinguish between land use categories. Initially, there was some suggestion that zoning could provide the necessary land use definitions, but tax assessment codes specifically distinguish between various uses, identifies mixed uses, and are in common use across Alberta. Subsequently, an evaluation of the taxation assessment codes used in Red Deer County was conducted. Taxation assessment codes resulted in the most accurate method of identifying land use categories because this system identifies property and improvements separately, and thus accurately separates farm residences from the agricultural parcel of land.

#### *Figure 1: COCS Land Use Categories*

*Commercial:* Property actively used for business purposes other than industrial, agricultural or forestry. Assessed at the commercial category.

*Industrial:* Property actively used for wholesale production and utilities, usually goods-producing. This category includes machinery and equipment; pipelines; electric power systems; telecommunication; railways; cogeneration and food processing plants. Assessed at the industrial category.

*Residential:* Property used for dwellings, including farm houses, employee housing and rental units. Assessed at the residential category including vacant residential, exempt non-farm residence, exempt 1st farm residence, and exempt additional farm residence.

*Working Landscapes (Agriculture):* Property used or designated as agricultural or forest land. Working Landscapes include intensive farming operations involved in producing animals and crops. Assessed at the farmland category and includes exempt federal grant DND farmland, exempt federal grant RCMP farmland, exempt federal grant Bowden farmland, exempt provincial grant farmland, exempt ancillary building farm use.



In addition to referring to taxation assessment codes, land use definitions were discussed with Council, the County Manager and Assistant County Manager, Departmental Directors and program managers to ensure they were accurate reflections of Red Deer County's land uses. Most importantly, the Tax Assessor was consulted in depth regarding the land use definitions.

The resulting four broad land use categories are:

- Commercial;
- Industrial;
- Residential; and
- Working Landscapes (Agriculture)<sup>1</sup>.

*(see sidebar on previous page for details)*

Of particular note is the treatment of vacant land, which differs here from other COCS studies. The *vacant land* classification for Commercial, Industrial and Residential is included within these categories because these parcels are already serviced when their assessment classification is changed to *vacant*.

### **Collect data from the municipality**

The process of collecting the required data from the County was lengthy and necessarily adaptive. Data collection proceeded virtually until the end of the project, and required repeated refinements in practice based on information gathered.

The data collection process can be divided into two types: background information on the County, and financial data.

Background information was collected to provide an understanding of the corporate structure of the County, the decision-making process, land use divisions, zoning and assessment practices and protocols, departmental activities, special circumstances of 2004, and available Geographic Information System (GIS) support. To this end, we consulted the council orientation manual, task force reports, the Municipal Development Plan, the Land Use Bylaw, various area structure plans, old budgets and financial reports, the County web site, transportation reports, public safety incident logs, tax rolls, assessment documents, council minutes, GIS data sets, and County newsletters.

The requisite financial data consisted primarily of the audited 2004 financial actuals. The most recent data available is, of course, the most useful, which is why when the study was initiated in early 2005, we chose to use the 2004 actuals (Red Deer County's fiscal year follows the calendar year). This meant the actuals were not available until well along in the study. Although this required using old financials and 2004 budgets as an initial basis this was not deemed to be

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<sup>1</sup> To facilitate comparison with other studies, the term "Working Landscapes" is used in this study; however, in the case of Red Deer County, this refers exclusively to agriculture as there is no other significant working landscape use (such as forestry, for example).

a significant concern, as the audited actuals were structured in the same way, allowing them to be inserted when they came available.

For 2005, Red Deer County moved to a new system for budgeting, based on "Programs." Each manager was required to re-organize the line items associated with their department's expenditures into function-defined programs, giving a picture of the cost of each program. As the approach to the COCS involved having managers divide staff time or department effort between the four land use categories (with researchers then applying those proportions to line items such as salaries, travel, office supplies, etc.), using Program Summaries initially seemed an efficient way to 'short-cut' the expenditure allocation process. It unfortunately proved problematic, as the system was not fully in place for 2004, and managers used various methods for creating Program Summaries, with few documenting their process. This made it difficult to establish a basis for dividing the 2004 *actuals* into programs. In future years, once the Program Summary system is fully in place and standardized, this will make an excellent basis for allocating department expenditures into the land use categories.

### **Allocate municipal expenditures and revenues by land use category**

Conceptually, allocating both expenditures and revenues is simple. However, the procedures involved in determining the breakdown of these accounting line items are complex. The practical objective of a COCS study is to get from a list of the financial actuals organized by accounting line item (salaries, travel, printing, etc.) to a list of the actuals organized by broad land use category (Commercial, Industrial, Residential, Working Landscapes). Not surprisingly, determining and allocating expenditures and revenues make up the largest task in the study.

We chose to use a semi-structured interview process. Directors and program managers were interviewed with the objective of understanding how each department's expenditures and revenues would divide between the four land use categories.

#### Departmental Meetings

Initial data allocation was based on discussions with the department directors and program managers from each department in a group setting. A total of six meetings were held, one with each of Community and Planning Services, Protective Services, Operations, County Managers Office, Corporate Services, and County Council (considered a *department* for this component of the study). The group setting of these discussions enabled open discourse, learning from one another, and testing of the responses. Facilitation of these meetings was loose, tending to follow the energy of the group and the discussions, while ensuring all components of the programs were discussed.

Each program manager was asked to describe their program and its staffing structure so as to provide necessary context for the allocation of dollars. We encouraged cross-department integration, noting where one department's responses were contingent on another's, and incorporating that into the final ratio calculations.

During each of the departmental meetings, we recorded the information and created summary meeting notes. These notes provided documentation of the decisions made in determining the expenditure/revenue allocations for each program. Each program manager was requested to review the meeting notes, providing clarification or corrections where necessary. This information was integrated into a final document for each department, and each program manager, Director and Councilor was asked to verify, through a signature, that the percentages were a fair and accurate representation of their program.

### Allocating expenditures

Rather than investigate every expenditure and line item within a given department and then determine a land use split for each, we chose to use *staff time* as a proxy. For each program, the proportion of staff time devoted to the four land uses was determined. Those same proportions were then applied to the majority of expenditures incurred by that department. These percentages were later converted to dollar values based on the financial actuals.

To ensure that significant extraordinary expenditures (those that should be allocated to the land uses in different proportions than routine department expenses) were not missed, staff were questioned to determine if there were exceptions. Examples might include legal costs, travel budgets, contracted services, etc. devoted primarily to servicing one land use.

As expected, documentation did not exist that would allow staff readily to allocate their time between the land use categories. We therefore relied heavily on staff's informed judgement, then questioned them regarding the bases on which they made the divisions. This allowed for testing of their process and assumptions to make sure they were both valid and consistent with those of other study participants.

To assist in this often difficult task, we first had managers break down the totality of their department's work into subdivisions that they might more easily separate according to land use category. In the case of Red Deer County, managers had already done a significant amount of this work, as their 2005 budgeting process required them to divide their budgets into 'Programs.' Although this provided a logical basis to approach this task, it was not without difficulties; actuals were not divided in this manner in the study's focal year, 2004. This required translating the proportions based on the 2005 budget to the dollar figures from the 2004 actuals.

Finally, each program manager made recommendations for the allocation of expenditures and revenues. Rationales included allocating resources using the program manager's judgement, staff time allocated to the issue, and using records of activities or logs.

The program managers were also asked to support these allocations with examples and justification for two reasons: first, to clarify the activity and rationale for the researchers so we could probe the issue further if necessary; and second, to provide support for the final

numbers. These discussions involved not only the program manager responsible for the program, but also relied upon discussion between program managers and peer verification when necessary.

Other proxies for allocating between land uses were occasionally used, including: the number of utility payees (based on land use); the number of employees within a department; or for 'support' departments using the allocations from the 'supported' departments. Miscellaneous expenditures were allocated based on staff time unless there was a superior means of breaking these items into land use categories.

### Allocating revenues

The same process as described above was used for allocating revenues. Generally, Directors were consulted regarding revenues because they had the most informed perspective on this issue. The Directors were able to provide allocation ratios based on discussions in the departmental meetings. In some cases, further discussions outside of these meetings were required to allocate all revenues, but the same process was followed including providing examples and justification. Proxies (e.g., road methodology) and analysis of records (e.g. subdivision off-site levies) were used to provide specific percentages.

Using the allocation of expenditures as a guide is a particularly important part of this stage. Decisions that were made on the expenditure side of the analysis needed to have a corresponding decision on the revenue side. Therefore, allocation of revenues, in many instances, was quite easy. The revenue provided for a specific activity was assigned the same percentages as the expenditures for that activity. For example, the grant received by Red Deer County for the development of their Geographic Information System (GIS) directly supported the services provided by GIS. In this case, land use percentages for both GIS expenditures and GIS revenues were the same.

## **Calculate and analyze COCS ratios**

### Data Model

Once all the data was collected and allocated, we developed a data model. This data model reflected Red Deer County's municipal structure and the process used to allocate expenditures and revenues. Each program activity's allocated percentages were applied to the 2004 financials.

The interactions between departments were complex and resulted in a three stage calculation. The first stage involved calculating all data available to create the fallback percentages (see *Fallback Percentages*, below). The second stage involved inputting the fallback percentages into program activities that either had *no data* or were *inappropriate* to allocate directly to land uses. Once this data was entered, a summary value for each program was created. This summary value was used for the program activities that were *supportive* of other departments. The final

stage was the amalgamation of all data, and the calculation of total expenditures, revenues and the ratios for each land use. This calculation was conducted for the two baseline scenarios: with education revenues and expenditures included, and without.

Once the initial calculation of data was complete, testing of the data model began. Testing involved the researchers independently reviewing all calculations and notes.

### Sensitivity / Comparative Analyses

Analysis of the ratios began with investigating all values looking for anomalies. Any anomalies found were discussed with the appropriate Director and either adjustments made or rationale recorded.

The final ratios were also analyzed for possible sensitivity and/or comparison testing options. Data were analyzed to determine what was driving the results. Based on the observations of the data, key factors were developed into sensitivity or comparison tests, each conducted with education included then excluded.

## **Fallback Percentages**

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Most COCS studies in the United States have used a property tax or property value fallback percentage for those items that are not possible to allocate to land uses such as investment revenue. Despite the history of using property tax or property value fallback percentages, in the case of Red Deer County it was more appropriate to use the average county ratios.

We chose to use average county ratios as opposed to the property tax/value because using a property tax/value revenue assumes that services provided to land uses are equivalent to the revenues received from that land use. This is opposite to the findings of all COCS studies to date. The purpose of a COCS study is to determine the actual ratio between expenditures and revenues because they are unlikely to be a 1:1 ratio. Using a faulty assumption, such as this, for even 5% of the budget is inappropriate especially considering the availability of more accurate data. Using the average percentage of all existing data ensures the fallback percentages reflect more accurately the actual land use ratios in Red Deer County.

Fallback percentages were required for only two types of data: those that were *inappropriate* to allocate at all (e.g., investment, facilities, general administration, etc.), or those where there was *no data* available to determine allocation (e.g., ambulance). The fallback percentages were applied to both these types of data in the same manner. However, there were two sets of fallback percentages: *expenditure* fallback percentages and *revenue* fallback percentages.

To calculate both sets of fallback percentages, all the available data was collected and calculated by land use category. Each land use category's expenditure and revenue values (independently) were calculated as a percentage of the total expenditures and total revenues

resulting in the fallback percentage for that land use. The fallback percentages were then entered for the activities that were *inappropriate* or had *no data*.

An important point is that only *expenditure* fallback percentages were entered for *expenditure* activities that were inappropriate or had no data. And generally, only *revenue* fallback percentages were entered for *revenue* activities. However, in situations where the revenue was a direct support for the expenditure, but fallback percentages were needed for both, the *expenditure* fallback percentage was used.

## **Allocating Road-related Expenditures and Revenues**

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In determining the best way to allocate road expenditures and revenues, various road methodologies were investigated. We explored the option of using the Institute of Engineers' (ITE) Trip Generation studies from the United States under recommendation from Alberta Infrastructure and Transportation. Following this approach, we pursued using Red Deer County's traffic count data through GIS analysis. Neither of these approaches provided appropriate information for the COCS study. Ultimately, a statistical approach was created using Red Deer County-specific road use data and aggregated American national data based on trip purpose. The following section will discuss the three approaches.

### **ITE's Trip Generation Approach**

The initial road methodology version followed suggestions from the COCS study in the Town of Dunn<sup>2</sup> which used the Institute of Transportation Engineers' Trip Generation studies. Confirmation of the applicability of the Trip Generation studies was provided by Alberta Infrastructure and Transportation who stated they use these reports in place of Alberta studies. In the past, Alberta Infrastructure and Transportation had conducted their own studies, but the results were similar to the American data so they have relied upon the American values.

The Trip Generation studies have produced trip counts based on different land uses for a variety of development types. Each report provides information on the minimum, maximum and average number of trips generated by that land use at various times of the day and days of the week (as well as other information not applicable to this study). The information in these reports can be transferred to any land use based on factors such as the square footage of the building, the acreage, the number of employees or a dwelling unit. Therefore, using this information in the COCS study would only require knowing the average trip counts per land use and the acreage per land use. For example, on average residential land uses generate 9.57 vehicle trips per day per dwelling unit. To create a road methodology based on use, the entire county's land uses would have to be converted to trips generated and the percentage of trips per land use calculated.

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<sup>2</sup> Edwards, Mary, and Douglas Jackson-Smith. "An Innovative Approach to Cost of Community Service Studies in Wisconsin." *Journal of the Community Development Society* 32.2 (2001): 271-89.

This approach was tested and the results were found to be unreasonable based on the local knowledge. Referring to the Town of Dunn's report, they used the minimum number for each land use while we had used the average. We attempted this approach (understanding the unreliability of using a minimum) and still the results were not within a reasonable range.

The difficulty with this approach is that the ITE data was developed from suburban locations and would be acceptable for most rural land uses with the exception of Working Landscapes. Because the main approach used to create the trip generation numbers is by acreage, the vast area of Working Landscapes in Red Deer County caused the trips generated using this method to be unreasonably high.

Through our investigation of this method, we learned that a local company is working on devising a trip generation report for Alberta roads. This report will be released in 2006, but will *not* address the trip generation rates of Working Landscapes. However, this report, and future iterations of this report, may be worth reviewing for future COCS studies.

### **Traffic Count GIS Approach**

The second approach was to use Red Deer County's traffic count data to determine if there was a correlation between traffic counts and land use, and if so to create a road usage map using Geographic Information System software. The most recent five years of traffic count data was compiled and used to create a surface interpolation through kriging. The surface interpolation is essentially a map of the county with traffic counts associated with every parcel based on the original data.

The intent was to establish a relationship between land use and road usage using these averages. Ultimately, this analysis could not account for the trip purpose, and instead only accounted for traffic that was *passing by* each land use. This provided an unsuitable basis for attributing service demands to land uses.

### **Statistical Approach**

The final method, and the one we chose, uses Alberta transportation data specific to Red Deer County classified according to trip purpose.

For each trip purpose there is a corresponding number of vehicle kilometres travelled (VKT), based on Alberta data. The VKT were apportioned to the American trip purpose categories using two national American transportation studies. These categories were then assigned to one of the four land use categories defined in this COCS project. Each land use category's percentage of VKT represents its usage for the road methodology. The United States conducts a significant amount of research related to transportation which Canada does not and so it is used for this study. Furthermore, the two American studies used for designing the road methodology are national studies involving vast amounts of data from across the United States consolidated into averages.

The 2004 Alberta Highways data pertaining only to Red Deer County roads was used to identify total vehicle kilometres traveled by type of vehicle. The type of vehicle categories were split into personal use and business use.

The personal use mileage was then split into land use categories using the American 2001 National Household Transportation Study. The data provided by the National Household Transportation Study divides travel into categories based on the trip purpose. We classified the trip purposes into land use categories. Some of these categories were split between two land uses to account for the origin and destination of travel. For example, a trip to the store for milk was classified as 50% residential purpose and 50% commercial purpose. This was to account for the resident's need for roads to access the store and the store's need for roads to attract customers. In addition, for some trip purposes we were only able to categorize them as "work related". To divide the work-related trips into commercial, industrial and working landscapes land uses, Red Deer County's 2001 census data related to employment by industry was applied to the work-related figures. The sum of these vehicle usage values provided the personal use percentage.

In discussions with the Operations Director, it became clear that the county considers there to be two classifications of roads: general and rural. In instances where only rural roads needed to be accounted for (e.g., gravel road maintenance), only the personal use travel percentages were used because this eliminates the use of roads for transportation of commercial and industrial goods and was consistent with the feedback from the interviews.

The business use percentage was determined using the American 2002 Vehicle Inventory and Use Survey which divides all vehicle kilometres traveled into trip purposes. We classified each trip purpose into land use categories. In this situation, land use classification was straightforward.

The personal and business use travel percentages were combined and account for road usage by land use category. Both the process and the results were tested against the local knowledge at Red Deer County.

## **Red Deer County Adaptation**

### Extraordinary Circumstances

The contextual situation of Red Deer County (see *Report 2: Main Report; Unique Contributors to Red Deer County's COCS Study Results*) led senior management to question the validity of using a 50%/50% split between origin and destination of the personal use trips.

The statistical approach amalgamates data from municipalities across the spectrum in terms of land use character, and largely ameliorates the effects of adjacent municipalities on each other.



However, there are two features of Red Deer County that have an extraordinary impact on road use, and require special attention. These are the effects of:

1. a large urban population centre (City of Red Deer) which provides commercial services and employment for County residents on a land base which is not part of Red Deer County;
2. one of Canada’s highest volume trans-provincial highways (Queen Elizabeth II Highway or Highway 2) passes directly through Red Deer County, providing access to highway-adjacent businesses (a significant portion of Red Deer County’s commercial and industrial land base), but does so on a roadway for which the County has no maintenance responsibility.

These effects lead to five extraordinary situations that need to be addressed in the road expenditure allocation methodology. Below is a summary of each situation and the methodological approach chosen to address it (see Table 1).

**Table 1: Extraordinary road-expenditure allocation situations**

Situation	Description	Methodological Approach
RDC residential to CRD com/ind/work	RDC residents accessing CRD services and worksites	Costs allocated strictly to Residential land use (see below)
RDC residential to RDC com/ind/work (both QE2 and non-QE2)	RDC residents accessing RDC services and worksites located along QE2 and elsewhere	Cost allocated on 50/50 – Residential / Other – basis (see below)
CRD residential to RDC com/ind/work (nonQE2)	CRD residents accessing RDC services and worksites <u>not</u> located along the QE2	Assumed to be statistically insignificant
CRD residential to RDC com/ind/work (QE2)	CRD residents accessing RDC services and worksites located along QE2	No issue as there is no impact on RDC road expenditures
NR to RDC com/ind/work (QE2)	Residents from outside the region accessing services located along QE2	No issue as there is no impact on RDC road expenditures

RDC – Red Deer County

CRD – City of Red Deer

QE2 – Queen Elizabeth II Highway (Highway 2)

NR – non-residents of region

#### Weighting Factor for Red Deer County

The table above shows two instances where the effect of the City of Red Deer and the Queen Elizabeth II Highway (Highway 2) require a modification of the basic approach described earlier:

1. RDC residents accessing CRD services and worksites; and

2. RDC residents accessing RDC services and worksites located along QE2 and elsewhere.

As mentioned earlier, a fundamental tenet of our approach is that trips (and their associated road maintenance costs) from Residential land use to the other land uses are split evenly. Therefore, in each of these cases, 50% of the costs are allocated to the Residential land use (the trip origin). It is the remaining 50% that needs further analysis.

In the first case, Red Deer County residents are accessing City of Red Deer services and work sites. In this case, it would not be appropriate to allocate the remaining 50% to any other Red Deer County land use, as the destination is not within Red Deer County land base (i.e., no Red Deer County land use generates the demand). For this reason, from a Red Deer County road maintenance cost perspective, the use is attributable in its entirety to the Residential land use.

In the second case, Red Deer County residents are accessing commercial and industrial businesses and places of employment throughout the County, principally on County roads. In these cases, basic 50/50 split would still apply.

Looking at both cases, the challenge is to determine what proportion of Residential trips accessing Commercial, Industrial or Working Landscape services terminate within the County, and what proportion terminate within the City of Red Deer. This calculation gives the proportions by which the remaining 50% of each trip is split.

To calculate this factor, the proportion of businesses in operation in Red Deer County vs. those in operation in the City of Red Deer was used. Datum for these statistics were provided by the City of Red Deer (through an estimate of annual business growth since the last business tax statistics were available in 1997) and an inventory of Red Deer County businesses. This was deemed to be a reasonable approximation of the proportion of Residential trips accessing businesses and work sites in Red Deer County vs. those accessing services in the City of Red Deer.

**Table 2: Red Deer County vs. City of Red Deer businesses**

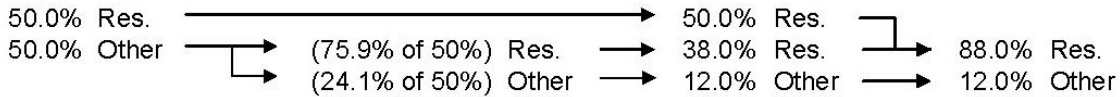
Jurisdiction	Number of Businesses	% of Total Businesses
City of Red Deer	2600	75.9%
Red Deer County	825	24.1%
Total	3425	100.0%

Therefore, for all trip types originating from the Red Deer County Residential land use, the use allocation is apportioned in the following way:

- the first 50% is allocated to Residential (trip origin); and
- the remaining 50% (Other; trip destination) is divided based on the proportions of the region's businesses.

To allocate the remaining 50%:

- trips terminating within City of Red Deer (75.9%) are entirely attributable to Residential, and are added to the initial 50%, for a total of 88.0%; and
- trips terminating in Red Deer County (24.1%) are attributable to the relevant other land use, at a proportion of 12.0% (see Figure 1).



## Road Impact

One major consideration regarding the road methodology devised is that there is no factor accounting for the impacts of different vehicle types. For example, the greater impact of a semi-trailer truck on a gravel road compared to a small passenger car. This decision was reached for several reasons. The Operations Director as well as other Red Deer County staff indicated that there is no quantitative data on the impact of different vehicles, and that disagreement exists on which vehicles have the greatest impact (small fast vehicles spraying gravel vs. large slow vehicles causing compaction). Finally, considering the use of data from the United States, it would be inappropriate to add an impact factor which would suggest a fine degree of accuracy when this method relies on averages.

## Miscellaneous Considerations

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### Power and Pipe

At the outset of this study, discussions with Council and other members of Red Deer County often touched on the unique influence of “Power and Pipe”<sup>3</sup> taxation in Alberta. Power and Pipe land uses are included in the industrial land use category and contribute significantly to its considerably low ratio. To determine how much of this result is attributable to Power and Pipe revenues, a sensitivity analysis was conducted by removing all Power and Pipe revenues.

### Open Space

In many of the American COCS studies, the category including agriculture and forestry also includes open space and parks. This is not the case in Red Deer County’s COCS study. Reference to open space or parks in Red Deer County is for recreation-based sites where the goal is to meet the recreational needs of the local residents similar to a local playground. All the regional parks or open space sites are owned by the province, and therefore are not included in the study. Expenditures and revenues related to these recreation sites are classified as residential.

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<sup>3</sup> “Power and Pipe” refers to linear features subject to municipal taxations, including pipelines, power lines, and cable lines.

## **Provincial Funding**

All revenues used by Red Deer County in 2004 were included in the COCS study, including provincial transfers and grants. The goal of a COCS study is to assess the total county expenditures and revenues for each land use category not just the revenues provided through taxation and fees. The ratios reflect Red Deer County's financial situation in 2004 and we believe they must incorporate the portion provided by the province.

## **Election**

The target year, 2004, saw a municipal election in Red Deer County. All activities related to the 2004 election were allocated to the residential land use category as it is the residents who demand the democratic system of elections, and it is as residents that people are registered for voting purposes.

## **Protective Services**

The program activities within Protective Services proved to be a challenge for allocation between land uses. In all three program areas (Patrol, Fire Services and Ambulance/Disaster Services), records were not detailed enough to relate easily to land uses.

In the case of Patrol, discussions with the Protective Services staff members suggested that it would be appropriate to use the road methodology as a proxy for traffic enforcement, and education and prevention. The assumption here was that these two activities are proportional to road usage. For Fire Services, a considerable amount of data exists regarding fire type and location. All the fire districts were contacted and their records analyzed. Unfortunately, in many cases only the legal addresses were available which are often unspecific, especially in cases where a farm house (Residential) and a farm operation (Working Landscapes) share the same legal description. In situations where the data were lacking, the average fire occurrence percentages were used as a proxy. As well, some fire incidents were related to vehicles and so the road methodology was used as a proxy. Ambulance and Disaster Services was the program area with the greatest lack of data. There was no geographical information available so the fallback percentages were used.

## **Supportive Program Activities**

Some activities, such as *Human Resources* and *Information Technology*, support the corporate functioning of the County instead of directly providing a service to the land uses. In some of these cases, the allocation of the activity's expenditures between the land uses was based on an amalgamation of the land use proportions for each department served by that activity. Each department's contribution to that calculation would be weighted by the number of employees, number of computers, etc.

## Sampling

In scenarios when allocating all data records was unmanageable (i.e., development fees and fines), a sampling technique was used for cost efficiency. Less emphasis was placed on having a statistically valid sample than on ensuring the sample was representative of the four land use categories. A minimum sample size of 30 was used for each land use category (stratified sample) unless there were not enough records to reach that minimum within a specific land use category. The stratified sample was identified using systematic random sampling. This meant that the total number of records was divided by the sample size required ( $P-p = n$ ) and then the resulting number was used to sample every  $n$ th number starting with a randomly chosen number. Using this method meant that each land use category was represented by a reasonable number of samples which were randomly selected. The use of systematic random sampling did not bias the results because discussions with staff indicated no reason to suspect records had any cyclical pattern.