

# final report

ENVIRONMENTAL BACKGROUNDER  
April 28, 2011



# City of Leduc

ENVIRONMENTAL SUSTAINABILITY FRAMEWORK



## EXECUTIVE SUMMARY

The City of Leduc is seeking to better understand its existing relationship with the environment and understand the different areas that contribute to its overall environmental foundation. This background report reviews the City of Leduc's existing information on waste management, water and wastewater stewardship, energy use, greenhouse gas emissions, land use, air quality, noise pollution, and light efficiency. A supplementary review was also undertaken to review what other nearby communities are doing in these areas also. The following provides key highlights for each of these areas.

### Waste Management

The City of Leduc has an existing waste management program that collects landfill waste, recyclables, and seasonal yard waste. Leduc residents generated 9105 tonnes of waste in 2009, of which, 20% was diverted from the landfill. That breaks down to 338 kg of waste per person in Leduc, which is 53kg/person more than the provincial average. The Leduc & District Regional Waste Management Facility has a lower fee for compostables that creates financial incentives for separation of generic waste from items that are compostable. The City of Leduc is currently considering adding an organics program to the waste management system. Spruce Grove, Stony Plain and Strathcona County already include organics collection in their waste management systems, and St. Albert will initiate organics collection in summer 2011.

### Water and Wastewater Stewardship

The City of Leduc's drinking water comes from the North Saskatchewan River. Water use in Leduc is consistent with provincial and national averages and the system is currently well monitored. The City of Leduc's sewage is managed by the Alberta Capital Region Wastewater Commission and is treated in Edmonton. The City of Leduc and its residents pay a flat rate for water and sewer treatment, which can make it challenging to implement water conservation incentives. However, the City is committed to water conservation and currently has a voluntary, alternate day lawn watering program, and will be using a new water metering system to encourage conservation. Stormwater in the City of Leduc is managed using traditional methods and is only starting to incorporate

emerging trends in this field at the policy level. Municipalities vary in their approach to water and wastewater stewardship. Airdrie, St. Albert, and Fort Saskatchewan have identified specific water use reduction targets, but many local municipalities are using a combination of homeowner incentives and municipal policies to promote water use reduction and alternative stormwater management.

### Energy Use

Residential energy use in Leduc was 45,000,000 kilowatt hours of electricity and 821,000 gigajoules of natural gas for heating in 2008, with both energy and heat use being largely dominated by single family housing. The majority of the City of Leduc's corporate operations energy use is related to the operation of the Leduc Recreation Centre (LRC). The City of Leduc supports energy reduction by providing a rebate program in conjunction with Climate Change Central for high efficiency washing machines, furnaces, and toilets. Local municipalities are tackling energy use reductions through corporate green building policies, converting to more efficient street lighting, encouraging and/or developing local alternative energy systems, and providing homeowner rebates. The City of Airdrie has also set hard energy use reduction targets.

### Greenhouse Gas Emissions

The City of Leduc's annual greenhouse gas (GHG) emissions were approximately 81,466 tonnes. Of that, the two most significant sources were the residential housing sector (53%) and personal transportation (39%). Based on the 2006 Statistics Canada census, 90% of Leduc's working population travel to work via a personal automobile. The City of Leduc's corporate operations contribute 10,920 tonnes of GHGs, most of which are generated by the LRC. The City of Leduc is supporting GHG reduction by participating in the C-Line transit initiative, and offers access to the provincial Light It Right program. Many municipalities, including the City of Edmonton, have set hard reduction targets and several are involved in the Federation of Canadian Municipalities Partners for Climate Protection program that also provides reduction targets.

## Land Use

The City of Leduc currently contains over 3011 ha of land. Of that, 54% is identified as urban reserve, with the balance currently being used for commercial, residential, industrial, recreation, and utilities. The Edmonton International Airport noise exposure forecast plays a significant role in land use restriction. The City of Leduc is currently updating its Municipal Development Plan, preparing an Intermunicipal Development Plan with Leduc County, considering the Aerotropolis concept of development, and is undertaking updates to the Downtown Plan. The City of Leduc's Urban Forestry report outlines a strategy to encourage growth of its urban tree canopy. All municipalities reviewed are undertaking studies and projects to promote density and alternative design in their communities, and most provide both local and commuter transit options.

## Air Quality

The City of Leduc is included in the Alberta Capital Airshed Alliance boundary, though it is not currently a member. Air quality monitoring information is not available for the City of Leduc, as the closest monitoring station is located in south Edmonton. The Capital Airshed Partnership is undertaking several key initiatives to improve air quality, including the development of an Ozone Management Plan and an anti-idling campaign. St. Albert and the City of Edmonton have both committed to anti-idling campaigns, and the majority of municipalities are members of their local airshed association and work with that association on promoting air quality initiatives.

## Noise Pollution and Light Efficiency

Leduc has undertaken several noise related studies to understand noise impacts on its community. These studies have identified several areas where noise exposure is higher than recommended. The Edmonton International Airport has noise abatement procedures in place reduce noise exposure associated with flights in Leduc. Many municipalities have noise bylaws related to nuisance and undertake noise abatement for development on a site-by-site basis.

Leduc has several key areas of high lighting activity, including Highways 2 and 2A, the airport, urban lighting in the City of Leduc, and proximity to urban lighting in Edmonton. High light exposure can have negative impacts on the health and wellness of both people and wildlife. Strathcona County has developed a Light Efficient Community Policy to specifically address light pollution, and several other communities identify light reduction on a site-by-site basis through the development approvals process.

This information provides a baseline understanding of the existing condition of the City of Leduc in these key areas, and will contribute to the development of strategies to move the City of Leduc to a greener future.

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# 1. INTRODUCTION

The City of Leduc has recognized that environmental sustainability is key to its long term success and is taking strides to incorporate environmental sustainability into all aspects of its operations. The City of Leduc also wants to provide businesses and residents knowledge and tools to contribute to Leduc's healthy and vibrant future. In order to achieve these goals, the City of Leduc is developing the Environmental Plan - Phase 1. This document will be a strategic plan geared towards identifying and achieving environmental performance improvements in all aspects of Leduc life, operations, and culture.

The City of Leduc requires a keen understanding of its existing environmental performance. This will serve as a baseline and starting point from which to propose change, whether minor or fundamental, in the way the City of Leduc functions in key areas linked to the environment. This document, the Environment Backgrounder, will involve research on the City of Leduc from a policy and a scientific perspective. This report will also arm the City of Leduc with knowledge about itself, which will provide a starting point upon which to undertake key consultation activities with the public.

This Environment Backgrounder Report examines seven key topics of environmental sustainability that are of importance to the City of Leduc and its residents. These topics include:

- » Waste Management
- » Water and Wastewater Stewardship
- » Energy Use
- » Greenhouse Gas Emissions
- » Land Use
- » Air Quality
- » Noise Pollution and Light Efficiency

Each of the seven key topic areas will include the following discussions:

**Background** - generally introduce the topic and its relevance to Leduc and the broader perspective in terms of promoting a sustainable environment.

**Current Conditions** - this will describe the systems in place and a quantitative assessment of what is being experienced and how this compares to other communities in Alberta similar to Leduc as well as other communities in Canada and elsewhere if applicable. It is expected that there will be an extensive use of charts, graphs and tables to succinctly summarize the situations. Where feasible, a review of a time series of data will be undertaken to provide context for how the issue has evolved over time.

**Current Initiatives** - this section will summarize the plans, policies, bylaws, and other measures that relate directly to the topic being described. As well, there will be a review of general policies and programs operated by senior levels of government and other public and private sector agencies that directly relate to the topic in the context of Leduc.

**Gaps in Knowledge** - this section will review the key gaps in information for the topic areas that would better describe the topic and that should be addressed in future iterations of the Environment Backgrounder report. It is expected that collecting this type of data is out of the scope of our work at this point.

The Environment Backgrounder Report describes each of these key topics at a broad level. Each of these key topics is summarized in terms of its key baseline conditions. Further, where applicable, three spheres of influence are reviewed. These include:

**Leduc and its own operations** - the City of Leduc has the most control over its own operations, which provides strong opportunity to influence change in these areas. This includes waste from its facilities, procurement practices, and water and energy use in community facilities and resultant GHG emissions.

**Leduc influencing the community** - the City of Leduc can exert some control over the community through policy development, investment, and development patterns to change the way community environmental issues are perceived and managed.

**Leduc working with senior government agencies and outside partners** - there are some areas where the City of Leduc has little direct control, but can act as an advocate to the Provincial and Federal governments. There are also areas where the City can partner with outside organizations, such as the existing partnership with Climate Change Central, to provide information and services in a coordinated manner.

This Environment Backgrounder Report, combined with future supplements identifying best practices in other municipalities and a consultation-to-date summary, will provide the City of Leduc a strong basis upon which to develop the Environmental Plan - Phase 1.

## 2. WASTE MANAGEMENT

Solid waste is increasingly being viewed as a valuable resource. By diverting paper, cardboard, plastic, and other materials from the landfill, the City of Leduc is already reclaiming resources which can then be turned into new products. Programs such as recycling and composting reduce disposal costs, save precious landfill space, and may also generate revenue through the sale of raw materials.

Responsible solid waste management reduces environmental pollution including GHG emissions, landfill leachate, and community litter. According to the United Nations, the waste sector contributes 3-5% of global man-made GHG emissions, almost equivalent to the current levels of emissions from international aviation and shipping. Locally, waste that is not managed can create health issues by attracting pests, affecting wildlife, and contaminating water supplies and soil.

It is important to recognize that waste is created at all stages of a product's lifecycle, from manufacturing through to consumer end use and disposal. In Alberta, it is estimated that 50% of solid waste is from industrial, commercial and institutional sectors (ICI), 26% is from construction and demolition and 24% is from residential activity. Within the industrial sector, manufacturing contributes significantly to the waste stream, and there are numerous opportunities to use by-products (ie. waste products) as inputs or sources for creating new products.

The province of Alberta's current waste strategy, *Too Good To Waste*, cites conservation as an important component of solid waste management. Waste reduction "at the source"<sup>1</sup> can be less costly and more effective than end of line recycling and diversion efforts. In addition to diversion rates, the City of Leduc measures reduction and conservation achievements by monitoring total waste and waste per capita over time.

### 2.1 Current Conditions

The following activities are currently being undertaken in Leduc to manage waste;

#### Waste Management System

The City of Leduc currently collects and manages:

##### Landfill Waste

- » Weekly curbside waste collection for approximately 6500 residential units, which includes a four black bag limit. Unlimited tags can be purchased by homeowners for an additional cost. Households provide their own receptacles or bags.
- » Multi-family residents, institutions, and businesses may either have their waste picked privately or may drop it off at the Leduc & District Regional Waste Management Facility.

##### Recyclables

- » Weekly family residential blue bag curbside collection of recyclables for the same 6500 residential units (corrugated cardboard, paper, newspaper & magazines, boxboard & mixed cardboard, beverage containers, glass, hard plastic #1-7, and cans). There is no limit on the number of blue bags that will be picked up.
- » Public Recycling Depot, which is available to single family residents, multi-family residents, and ICI users.
- » Year round recycling at the Leduc & District Regional Waste Management Facility for household waste and hazardous waste.
- » Annual one day Toxic Round Up for household hazardous waste and e-waste.

<sup>1</sup> Reducing waste "at the source" refers to avoiding waste at the time of purchase or manufacture rather than at the end of a material's useful life. For example choosing to create or buy products with less packaging.

**Yard Waste**

- » Six week spring and fall residential curbside yard waste collection with no volume limit. Yard waste is collected in clear plastic bags.
- » Compost transfer station for yard waste available to both businesses and the public
- » Annual Christmas tree collection

The Leduc & District Regional Waste Management Facility (LDRWMF) is located approximately 2 km east of the City. It operates the following facilities:

- » A landfill
- » A recycling depot (blue bag items, appliances, scrap metal, tires, etc.)
- » A composting facility (currently accepting yard waste, scheduled to collect food scraps beginning in 2012)
- » Household hazardous waste drop off
- » A "take it or leave it" area

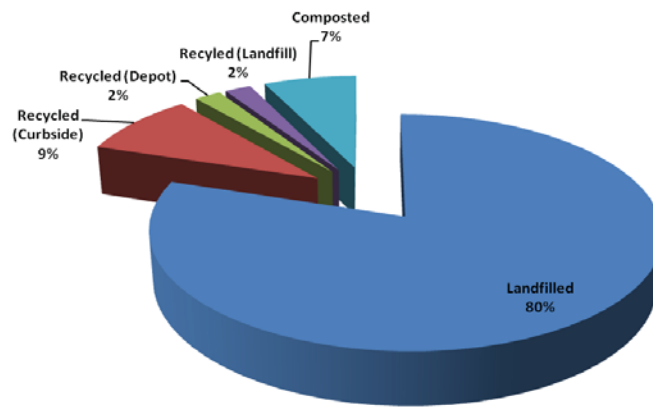
Each household pays \$21.00 per month (2011) for residential waste pick up with an additional charge of \$1 per bag over the 4 bag limit. Conservative estimates suggest that the planned organics program may increase fees when implemented, but likely by a small amount as cost savings will be realized with the implementation of a new automated collection service.

*Disposal rates at the LDRWMF*

\$49/tonne	Waste (Residential)
\$54/tonne	Waste (Commercial)
\$28/tonne	Compostables (Municipal)
\$34/tonne	Compostables (Commercial)

There is no charge for use of the City recycling depot or the Compost Transfer Station. Additionally, some materials (eg. tires, electronics, paint) are covered under extended producer responsibility (EPR) programs in Alberta, so there is no charge for disposal of these items.

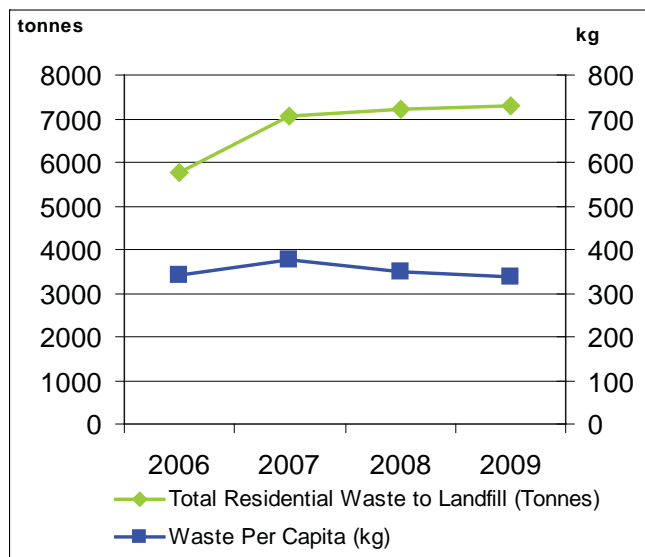
In 2009, Leduc residents generated 9105 tonnes of residential waste, 20% of which was diverted from the landfill. This translates into 338 kg/capita of residential waste sent to landfill each year; compared to the provincial average of 267 kg/capita<sup>2</sup>, which is down from 378kg/capita in 2007. The waste per capita number for each municipality was taken from their existing environmental documents, including environmental reports and any waste management studies conducted in their municipality. Leduc has committed to review this number in more detail considering how waste is allocated and identified at the LDRWMF.



<sup>2</sup> City of Leduc Residential Solid Waste Management Study, Advanced Enviro

City of Leduc Landfilled and Recycled Residential Waste (2009)<sup>3</sup>

	Annual residential landfill waste/capita	Diversion rate	Food Scraps Organics Program
Leduc	338 kg	20%	planned
St. Albert	184 kg	41%	planned
Edmonton	284 kg	60%	yes
Calgary	186 kg	23%	no
Okotoks	256 kg	40%	no
Strathcona County	108 kg/900kg including ICI	65%	yes
Alberta (average)	267 kg	25%	na



Over time, Leduc’s total waste is increasing due to population growth, but the per capita waste generation has fallen from 378 kg/person in 2007 to 338 kg/person in 2009. In Alberta, the residential sector is achieving a 25% rate of waste diversion, and the non-residential sector is currently achieving a diversion rate of 10%<sup>4</sup>. Data for Leduc’s ICI sector was not readily available; however, using Provincial averages, it is estimated that:

- » 90% of corrugated cardboard and
- » 33% of other materials the City Recycling Depot are commercial
- » 20% of materials at compost transfer station are commercial

Emissions from solid waste vary greatly depending on waste composition. The Environmental Protection Agency estimates that that 3.1 tonnes of CO<sub>2</sub> equivalent are produced from landfilling 1 tonne of mixed municipal solid waste. In Western Canada, approximately 1.38 tonnes of CO<sub>2</sub> are produced from every 1 tonne of organics sent to landfill<sup>5</sup>.

## 2.2 Current Initiatives

As one of its seven environmental principles<sup>6</sup>, the City of Leduc has “committed to reducing the quantity of materials entering the landfill through innovative initiatives and policies”. This sets the policy tone to support changes to the way waste is managed in Leduc.

<sup>3</sup> City of Leduc Residential Solid Waste Management Study, Advanced Enviro

<sup>4</sup> [http://www.strathcona.ab.ca/local\\_government/Councillors/Ward\\_4/practicing-green.aspx](http://www.strathcona.ab.ca/local_government/Councillors/Ward_4/practicing-green.aspx)

<sup>5</sup> Climate Smart and Alberta Environment (2006)

<sup>6</sup> Leduc Environmental Advisory Board principles approved by Council

### Organics Program

Food waste constitutes a significant component of waste management as over half of the food produced today is either lost, wasted or discarded as a result of inefficiency in the food production and supply chain. The City of Leduc currently provides a yard waste program and captures 7% of the potential organics waste stream. The City is planning an expanded organics program that will include curbside food scraps pick up. This program will coincide with the LDRWMF beginning to accept food scraps for composting. Weekly pick up using an automated cart collection system has been suggested, but final decisions for the roll-out of this program are not yet determined. Administration and Council have been working towards a final solution, and have discussed proposed diversion targets.

### Provincial Programs

The province of Alberta has a number of Extended Producer Responsibility (EPR) programs in place whereby an advanced disposal fee is instituted at either the wholesale or retail level to support end of life recycling efforts, including:

- » tire recycling - this program now includes industrial and off road tires
- » beverage containers
- » used oil, containers and filters
- » electronics
- » paint
- » pesticide containers

The above noted EPR programs are managed by Delegated Administrative Organizations which take the administrative burden of the program from government and places that responsibility with key stakeholders directly involved in the industry. In conjunction with these EPR programs, the Alberta Management Authority has drafted bylaws (including advance disposal fees) and regulations to govern the recycling of electronics, tires, and paint.

## 2.3 Gaps in Knowledge

The proportions of residential versus ICI waste are not documented in some cases. For example, it was assumed that that 20% of material collected at the compost transfer station was from commercial businesses, but there had not been studies undertaken to date to support that analysis. In addition, waste volumes in general for Leduc were based on 2006 - 2009 data provided by the Leduc & District Regional Waste Management Authority, rather than a detailed assessment. A waste survey including ICI users, residential users, and multi-family developments, as well as a comprehensive waste audit would provide greater detail to support future actions.

## 3. WATER AND WASTEWATER

Water is critical to all forms of life. Being good water stewards is necessary in order to protect watersheds, ecosystems and human health. In general, water issues can involve:

- » Watershed protection/ source water protection
- » Drinking water quality and consumption, and distribution amongst various uses
- » Sewage collection, treatment, and discharge
- » Stormwater quality

There are many known issues in Alberta around water supply, which include water quantity, water quality, industrial use, groundwater recharge, and others. As cities grow and industrial activities expand, there will be even greater pressure on this scarce natural resource. Adding complexity to the issue is the fact that water supplies are threatened by climate change. In particular, factors associated with changing climate

are increasing the intensity of storm events, which can challenge both natural and man-made stormwater systems. Reducing water consumption, finding ways to effectively manage stormwater runoff, and balancing the various demands for water amongst important human and natural processes will be critical as water resources become increasingly strained.

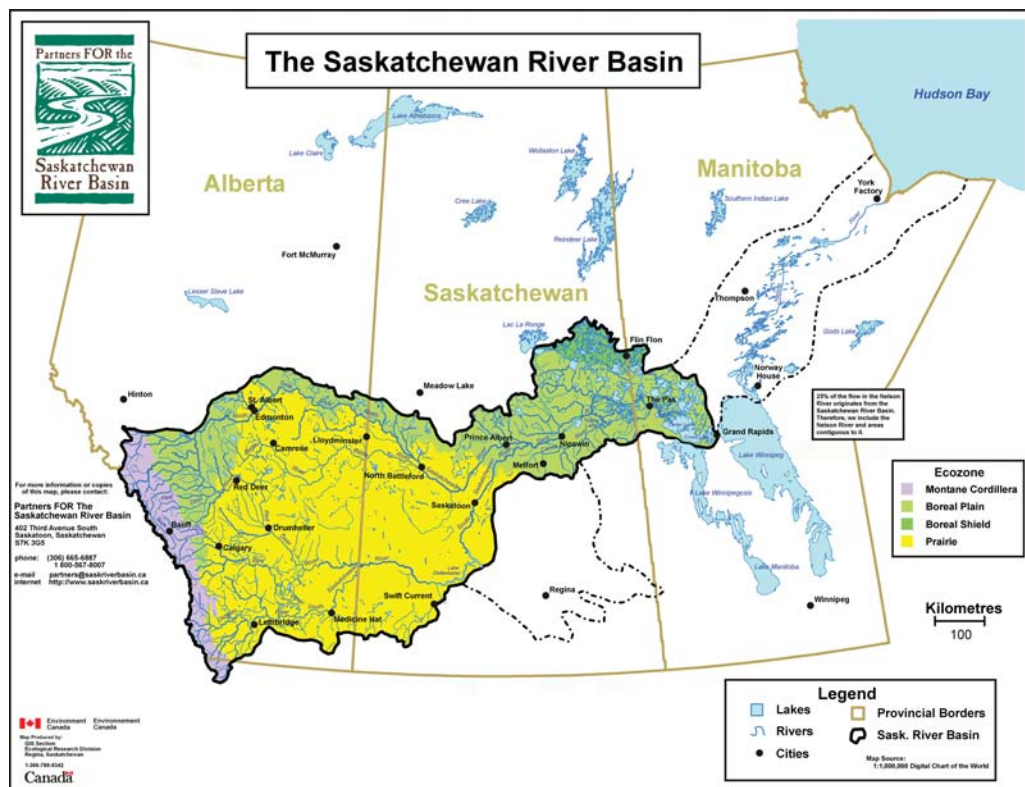
### 3.1 Current Conditions

The following identifies the current condition of water and wastewater management in the City of Leduc.

#### Watershed

The City of Leduc’s drinking water comes from the North Saskatchewan River with the intake for water being located in Edmonton. The North Saskatchewan Watershed is part of the larger Saskatchewan River Basin which extends through South-Central Alberta to Central Manitoba. The Saskatchewan River Basin is illustrated in the following figure:

Saskatchewan River Basin



While Leduc makes up a very small part of the overall Saskatchewan River Basin, it is important to recognize that how the community manages stormwater and effluent, draws water, and protects vital ecological processes will have a significant impact on water quality for Leduc and others in the watershed.

### Drinking Water

The City of Leduc obtains its water from the Capital Region Southwest - Water Services Commission (CRSWSC). This water is sourced from the North Saskatchewan River. The CRSWSC provides water to Camrose County, Leduc County, Towns of Beaumont and Calmar, Villages of New Sarepta and Hay Lakes. This water is supplied by EPCOR from two major water treatment plants located in the City of Edmonton (source: <http://www.leduc-county.com/crswsc.html>). The CRSWSC is responsible for the distribution infrastructure (pipes, pumps) for water.

The water that Leduc uses is of very high quality. EPCOR indicates that tap water in 2009 met all applicable standards for water quality. In order to ensure good drinking water, raw water goes through an intensive treatment process which includes:

**Clarification** - screens remove large pieces of debris; alum is added to weigh down dirt to the bottom of a clarifier where it forms sludge, which is subsequently removed; activated carbon is added to help remove taste and odour.

**Disinfection/Filtration** - chlorine is added to disinfect water against bacteria and viruses; water passes through sand filters as well as a series of ultraviolet lights that provide additional disinfection; fluoride and caustic soda are added along with ammonia which combines with chlorine to form chloramine which is a long-lasting disinfectant that keeps water safe.

In terms of water use, the City of Leduc's approximate gross daily water consumption was 308L/capita for 2010. This is consistent with Alberta and Canada averages.

In order to reduce the impacts of leaks, the City of Leduc has a strong leak monitoring program and takes an active role in ensuring the system is regularly reviewed. There are no known leakage issues, and overall, the system is in good repair. A new water metering program has also been developed. The new system can better determine where leaks are present and notifies homeowners of the leaks when they are identified.

### Sewage

Leduc is a member of the Alberta Capital Region Wastewater Commission which coordinates the collection, treatment and discharge of sewage. All effluent from the City of Leduc is treated at the Gold Bar Wastewater Treatment Plant (WWTP) in Edmonton. For 2008 and 2009, the Gold Bar WWTP met all key standards for Total Suspended Solids, Biochemical Oxygen Demand, Ammonia, Total Phosphorus, and E.Coli. Monthly criteria have been established in the Approval to Operate issued by Alberta Environment. Table 1 Wastewater Treatment summarizes this criteria.

Table 1 - Wastewater Treatment

Parameter	Limit
CBOD5	20 mg/L monthly arithmetic mean
TSS	20 mg/L monthly arithmetic mean of daily composite samples
Total Phosphorus (Effective December 1, 2008)	1 mg/L monthly arithmetic mean of daily composite samples
Ammonia-Nitrogen (December 1 to May 31)	10 mg/L monthly arithmetic mean of daily composite samples
Ammonia-Nitrogen (June 1 to November 31)	5 mg/L monthly arithmetic mean of daily composite samples
E. coli counts	200 counts per 100 mL/ monthly geometric mean of daily grab samples
pH	6.5-9.5 pH unit

A key issue is ensuring that the existing wastewater collection system is maintained to prevent the penetration of storm and ground water runoff, which, if left uncontrolled, can have a significant impact on wastewater treatment.

## Stormwater

Stormwater is defined by the precipitation that falls to the ground. While most stormwater falls to the ground and infiltrates into the soil, a significant portion ends up flowing over hard surfaces until it can infiltrate soil or enters a storm sewer system to be discharged to a creek or other water body. These hard surfaces can include pavement, rooftops, and other man-made changes to the physical environment. While it flows over hard surfaces, the stormwater collects spilled oil, detergents, solvents, salt, pet wastes, and other contaminants. In agricultural areas, runoff from fields can cause major impacts on water quality in watersheds.

In subdivisions constructed prior to 1980, stormwater is often left untreated before it enters back into the natural environment. Managing stormwater effectively has many benefits primarily in terms of protecting water quality in the watershed thus helping natural processes, and reducing risk of damage to property and people during large storms. In Alberta, municipalities are required to ensure that stormwater is collected and discharged into existing receiving streams at pre-development rates. In addition, stormwater management retention and detention ponds are designed to accommodate storms of 1:100 year return or the highest intensity rainfall on record.

Locally, the Telford House Park wetland cannot manage all the stormwater effectively. As such, there has been a reduction in quality, depth and clarity of Telford Lake according to analysis undertaken for the Telford Lake Master Plan. It is also noted that the outfall for Telford Lake generates sediment, which leads to poorer quality in Telford Lake. It is recommended in the Telford Lake Master Plan that best practices be used to manage stormwater in that area. This would include the expansion and addition of wetlands, including an interpretive wetland.

In general, Leduc employs a traditional wetland and wetpond approach to stormwater management. While some reference is made to innovations like Low Impact Development techniques, these interventions are not currently being implemented or mandated in current operations.

## Snow Storage Facility and Management

The City of Leduc has conducted assessments regarding the environmental impact of the former Snow Storage Facility that is a part of the Leduc Recreation Centre parking lot addition in order to assess potential soil and groundwater issues. An early report by Golder Associates in 2008 identified that soil and groundwater had been impacted by road salt associated with the snow dump operation. An additional investigation was conducted and determined that approximately 80,000 m<sup>3</sup> of soil to approximately 4 m deep was contaminated with salt. Groundwater showed exceedences in iron, manganese, and cyanide that required additional study but were attributable to naturally occurring conditions. There are also exceedences identified in sulphate, chloride, and salt associated with the former snow dump operation. It was anticipated that the potential for migration to the west and north would be limited, but additional study would be needed. A follow-up report was conducted in 2010, which recommended continued groundwater monitoring and sampling at this location.

A new permanent Snow Storage Facility has been developed and meets all standards of modern storage requirements in order to ensure it does not negatively impact the environment. Two temporary facilities are also used in cases of unusually high snowfall. Another snow storage facility is being planned for the west side of the City.

In order to reduce negative impact on the environment, the City of Leduc also employs a salt reduction policy in their winter road maintenance program. They limit salt application to collector and arterial roads and plow routes. This includes major roadways and the downtown area. The rest

of the City of Leduc, including most of residential areas, uses only road crush consisting only of rock without chemical additives. The result of this policy is a reduction in salt use, which reduces potential soil and groundwater pollution.

### 3.2 Current Initiatives

The City of Leduc and its residents (via user fees) pay a flat per cubic metre rate for water and sewer treatment, which can make it challenging to implement water conservation incentives. Some communities have implemented a varied rate schedule for residential customers based on usage. However, the City is committed to water conservation and currently has a voluntary, alternate day lawn watering program, and will be using a new water metering system to encourage conservation. The Alberta Urban of Municipalities Association has recommended that all Alberta municipalities have a water conservation and efficiency plan by the end of 2011. Leduc does not currently have such a plan in place.

## 4. ENERGY USE

Energy sustainability is the foundation to a community's well-being. Ensuring that a community has access to a stable, reliable and affordable energy supply is critical to supporting the economic vibrancy and the social fabric of community.

Traditional sources of energy, primarily fossil fuel energies like oil, coal and natural gas are becoming scarcer and more costly. Further, the environmental footprint associated with producing and consuming energy creates greenhouse gas emissions which contribute to global climate change, air pollution that reduces local air quality, and land based disturbances that can reduce the integrity of natural ecosystems. This is of particular concern in Alberta, where traditional sources of energy are relied on heavily and make up the primary source of energy.

### 4.1 Current Conditions

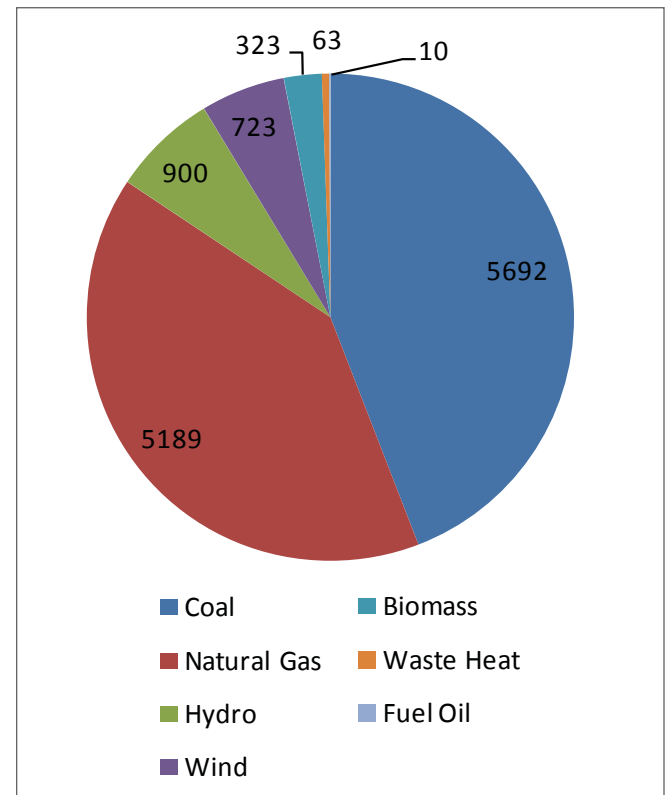
#### Electricity

The City of Leduc is connected to Alberta's electrical power generation, transmission and distribution system. Power in Alberta is primarily produced from coal (approximately 45%) and natural gas (approximately 40%) thermal generation facilities<sup>7</sup>. Alberta also uses wind, water, biomass and waste heat as electricity sources. Power is provided to local residents and businesses through a competitive market system that works to ensure Albertans have access to the most affordable power possible. The key electricity service providers in Alberta include Enmax, EPCOR, Spot Power and Direct Energy.

#### Natural Gas

Alberta provides over 75% of Canada's natural gas supply. Given the province's significant role as natural gas producer nationally, it is highly likely that the City of Leduc sources all of its natural gas from within the Province. Like electricity, natural gas is provided to local residents and businesses through a competitive market system by energy providers such as Altgas, EPCOR and Direct Energy.

Alberta's Existing Generation Capacity (Megawatts)



#### Transportation Fuels

Given Alberta's significant oil resource endowment and large petroleum refining capacity within the Capital Region, transportation fuel supplies consumed in the City of Leduc are likely sourced from within the Province of Alberta.

#### Energy Demand within the City of Leduc

The following provides a breakdown of the community's energy use by fuel (natural gas/electricity) and by sector (residential housing, commercial and institutional buildings, and corporate operations). Energy use data for industrial activities within the City is not publically available and therefore not accounted for in this baseline.

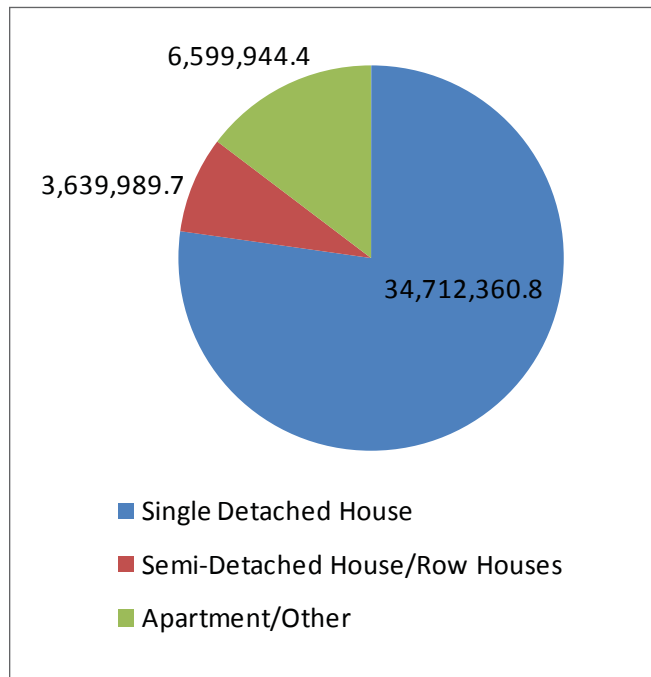
<sup>7</sup> Alberta Energy. Energy Statistics. Available at: <http://www.energy.alberta.ca/Electricity/682.asp>

### Residential Energy Profile

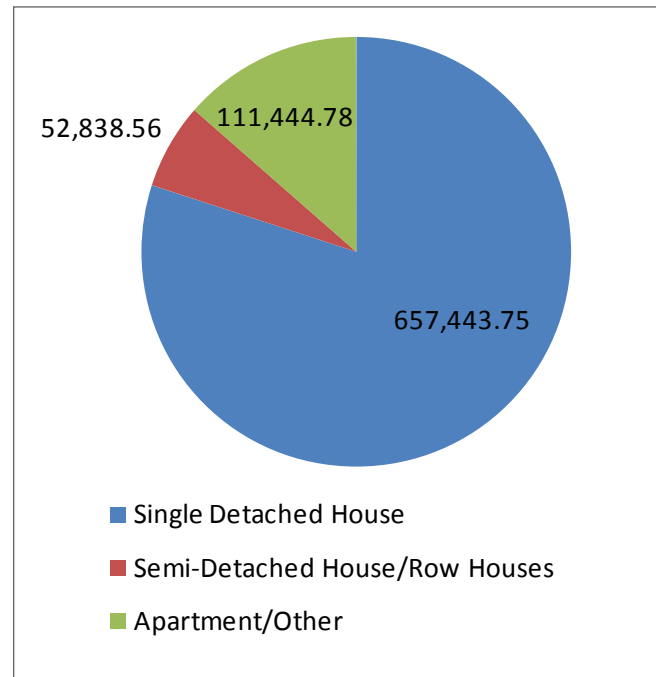
It is estimated that in 2008, residential buildings in the City of Leduc consumed approximately 45,000,000 kilowatt-hours of electricity. As highlighted in the following, it is evident that single detached houses had the greatest electrical demand in 2008, with an estimated demand of 34,712,360 KWh.

In 2008 it is estimated that residential buildings in the City of Leduc consumed approximately 821,000 gigajoules of natural gas for space and water heating purposes. As highlighted in the figure below, it is evident that single detached houses had the greatest natural gas demand. This can be attributed to the existing housing stock profile within the City and the fact that single detached houses typically require more natural gas relative to other housing types.

*Residential Electricity Demand by Housing Type (Annual Kilowatt-hours)*



*Residential Natural Gas Demand by Housing Type (Annual Gigajoules)*



### **Commercial and Institutional Buildings Energy Profile**

An energy profile is not available for commercial and institutional buildings in the City of Leduc. The required information to estimate these values was not readily available, but should be developed in future to allow this for of assessment in future.

### **The City of Leduc Energy Profile**

Based on the data provided by the City of Leduc, it is evident that City's corporate operations require a significant amount of energy. It is estimated that total utility cost over the course of 2010 was over approximately \$1.5 million. Approximately \$1.0 million of this total cost can be attributed to the energy demand of the Leduc Recreation Centre. While this seems high, the Leduc Recreation Centre has a considerably smaller environmental impact than other facilities of its kind and has been developed to use less energy. It was designed to use leading-edge technologies to minimize the environmental impact of the facility, including energy efficient lighting, a heat recovery system, low flush toilets and waterless urinals, locally produced materials, and environmental criteria for furnishing and cleaning products.

## **4.2 Current Initiatives**

The City of Leduc is evidently keen on supporting the wise use of energy. It has developed an outreach and engagement challenge to encourage local residents to save energy. The City has also partnered with Climate Change Central and the Government of Alberta to support community energy efficiency. Specifically, the City is offering financial support to local residents, in addition to that offered by Climate Change Central and the Government of Alberta, whom purchase ENERGY STAR washing machines, high efficiency furnaces and low flow toilets.

## **4.3 Gaps in Knowledge**

Energy estimates were derived using the best available information and data. However, if the City of Leduc is keen on enhancing the accuracy of this baseline a refined data set that is based on actual energy use within the City is required to ensure the analysis is specific to Leduc's context.

Specific energy use data for Leduc's transportation sector was not available.

## 5. GREENHOUSE GAS EMISSIONS

Greenhouse gas emissions are the principle cause of climate change. GHG emissions trap heat in the atmosphere and naturally occurring GHG emissions are an essential ingredient for making Earth hospitable. This is called the greenhouse effect. Since the Industrial Revolution, humans have significantly increased the concentration of greenhouse gases in the atmosphere by burning fossil fuels, including coal, oil and natural gas. As a result, our climatic system is under-going unprecedented changes that present social, economic and environmental risks to the global population.

Climate change represents one of our greatest environmental challenges. Our planet's climate is changing at a faster pace than any other time in recorded history. The scientific community agrees that our consumption of fossil fuels is likely the principal cause of global climate change. This is due to the fact that the combustion of fossil fuels results in the release of carbon dioxide; one of several a greenhouse gases. Other greenhouse gas (GHG) emissions include:

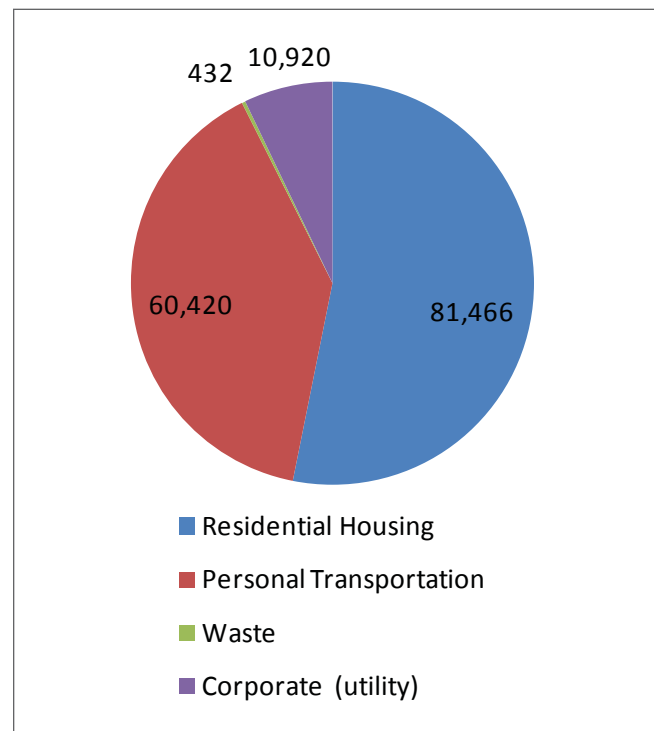
- » Methane
- » Nitrous oxide
- » Water vapor
- » Perfluorocarbons (PFCs)
- » Sulphurhexafluoride (SF<sub>6</sub>)
- » Hydrofluorocarbons

The opportunity to mitigate and reduce the effects of climate change exists. To do so will require leadership and action from the global community, national and provincial governments and local communities to reduce GHG emissions. The City of Leduc has the opportunity to play an important role by preserving carbon sinks within the community and reducing Leduc's consumption of fossil fuel energy to reduce GHG emissions.

### 5.1 Current Conditions

It is estimated that the City of Leduc has an annual GHG emissions profile of approximately 81,466 tonnes<sup>8</sup>. The principle source of GHG emissions in the community is from residential housing sector representing 53% of the City's total emissions. Personal transportation is also a significant contributor to the City's total emissions at 39% of the City's total emissions. Other key sources of emissions include commercial and institutional buildings, the City of Leduc's Corporate emissions at 7%, and waste management sector at 0.2%.

*City of Leduc Preliminary Emissions Inventory (tonnes CO<sub>2</sub>e)*



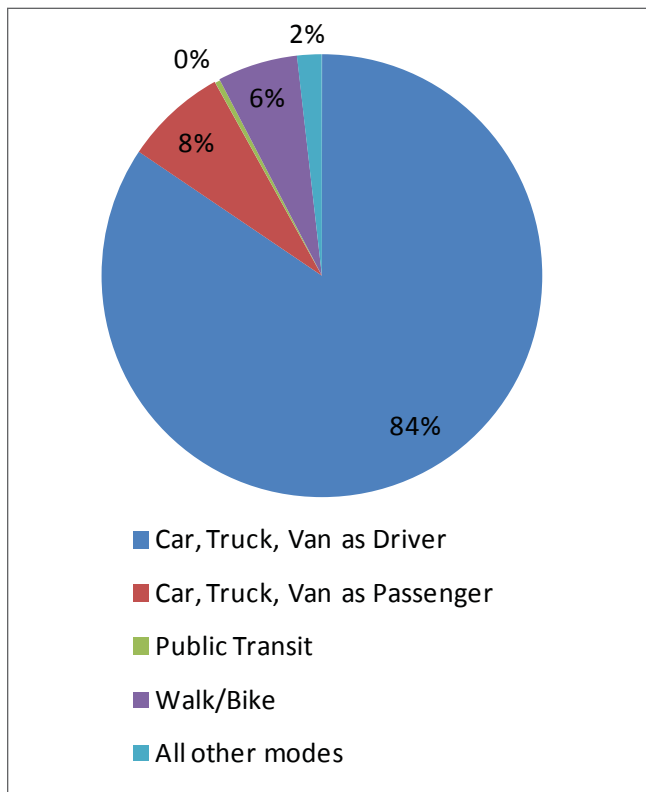
<sup>8</sup> This does not include emissions data from the commercial and institutional buildings within the City of Leduc.

## Personal Transportation Emissions Profile

Based on the 2008 census data, it is estimated that the residents of Leduc travel over 240 million kilometres annually. Using this estimate and the Transport Canada "Urban Transportation Emission Calculator", it is estimated that the annual greenhouse gas emissions associated with transportation in the City of Leduc is 60,420 tonnes.

Using data collected from the 2006 Leduc Community Profile produced by Statistics Canada<sup>9</sup>, it is evident that over 90% of Leduc working population travels to work via a personal automobile as the either the driver or passenger. This is based on an average annual commuting distance value for Leduc residents of 10,863 km using census data. This was used to calculate the total to work commuting value for the City of Leduc residents, which was determined to be approximately 238,910,000 km annually. The Transport Canada *Urban Transportation Emissions Calculator* was then used to determine GHG estimates.

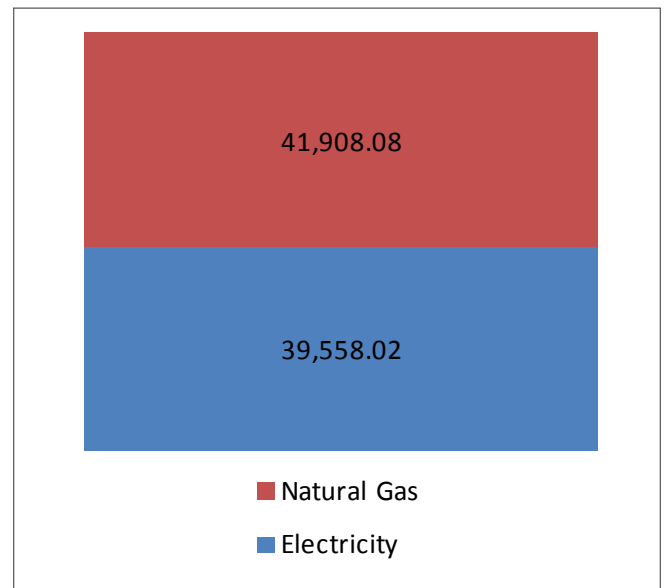
*How the People of Leduc Get to Work*



## Residential Buildings Emissions Profile

It is estimated that the City of Leduc's residential housing stock has an annual GHG emissions profile of approximately 81,466 tonnes. Of which, approximately 50% of the housing stock's emissions can be attributed to electricity demand and the other 50% can be attributed to natural gas demand.

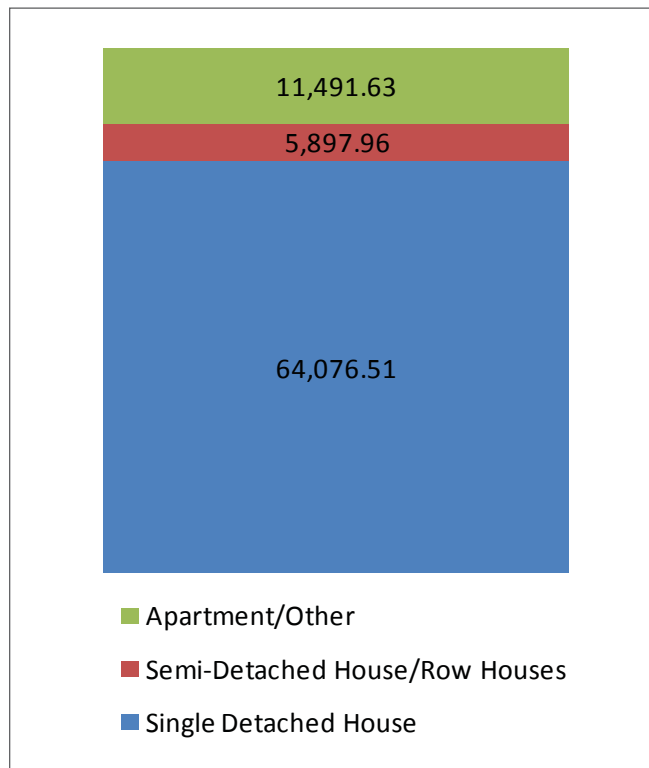
*Residential Housing Emissions Sources in Leduc (tonnes)*



<sup>9</sup> Statistics Canada. 2007. *Leduc, Alberta (Code4811016) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007.*

As highlighted in the figure below, it is evident that single detached houses have the greatest emissions profile relative to other housing types in Leduc. This can be attributed to the existing housing stock profile and the fact that single detached houses typically have a greater natural gas and electricity demand relative to other housing types.

*Estimated Greenhouse Gas Emissions  
by Residential Housing Type*



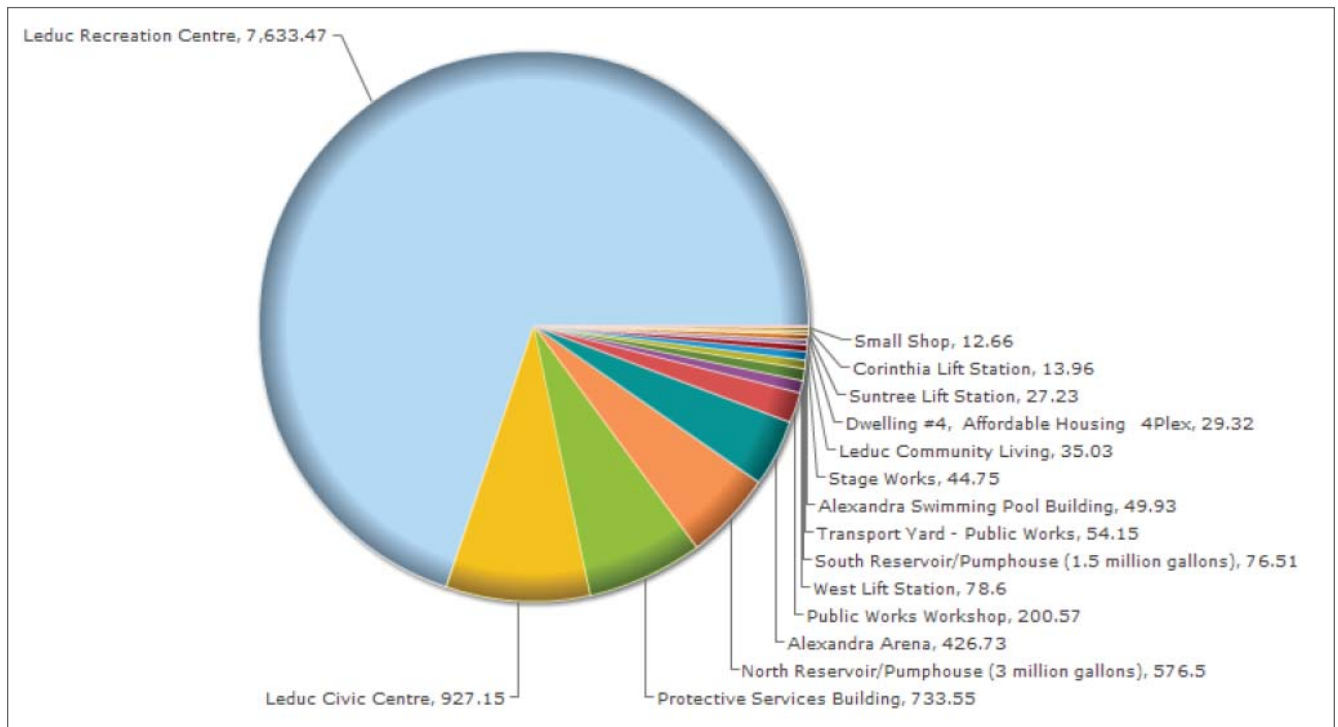
To estimate the total greenhouse gas emissions associated with Leduc's residential sector, data from Statistics Canada 2006 Census data for Leduc was used to develop a residential building profile for City of Leduc single-detached houses, semi-detached and row houses, and apartments. Data from Natural Resources Canada's Comprehensive Energy Use Data Base, 1990 to 2008 was then used to develop an assumed energy use profile for each housing type based on the amount of electricity and natural gas each housing type would use on an annual basis. Commonly accepted emission factors for both electricity and natural gas were applied to calculate the total emissions profile for each housing type in Leduc, and the total residential sector.

## The City of Leduc Emissions Profile

The City of Leduc's operations, specifically the City's corporate building fleet, represent a significant portion of the community's total emissions. Based on available records, the total emissions associated with the City's utilities is 10,920 tonnes annually. As illustrated in the figure below, the majority of emissions (7,633.47 tonnes or 70%) of the City's total emissions can be attributed to the Leduc Recreation Centre, which as previously identified, was designed to reduce its environmental impact and emits less than many other facilities of similar use and scale.

According to the Advanced Enviro Engineering Limited Residential Solid Waste Management Study completed for the City of Leduc, approximately 7200 tonnes of solid waste is generated annually within the City. Based on this value, and using the waste commitment GHG calculation methodology, it is estimated that City of Leduc's waste stream produces approximately 600 tonnes of GHG annually.

*Utility - Carbon Footprint  
for Type Electricity, Natural Gas tonnes  
of CO2 based on consumption between  
2009-12-01 and 2010-11-30*



### Industrial Emissions Profile

The Government of Alberta regulates GHG emissions from large industrial facilities. A large industrial facility is defined as a facility that emits more than 100,000 tonnes of GHG emissions annually. Based on a preliminary scan of industrial activities in the City of Leduc and Alberta Environment's Specified Gas Emitters Reporting Regulation, it was determined that the industrial facilities present in Leduc were not large enough to qualify for the GHG identifier of 100,000 tonnes per year from a single user. Therefore, industrial emissions were not accounted for in this community GHG emissions baseline.

## 5.2 Current Initiatives

In addition to the energy efficiency incentive programs highlighted above that aim to reduce energy demand and reduce greenhouse gas emissions, the City of Leduc supports the following strategies to reduce GHG emissions:

**The C-Line** - The C-Line is an inter-municipal commuter transit service that links the City of Leduc, the County of Leduc, Nisku to the Edmonton International Airport and the City of Edmonton. This service offers the residents of Leduc an affordable and environmentally-friendly commuting alternative to the personal automobile.

**Light it Right** - The Government of Alberta in partnership with Climate Change Central has developed the Light it Right program. This program offers building owners an incentive program to support the transition from energy wasteful lighting systems to efficient systems. This program will cover up to 25% of the total cost of retrofitting a building's lighting system.

## 5.3 Gaps in Knowledge

Both the energy and emissions baselines developed for the City of Leduc have been developed using key assumptions and provincial energy and emission intensity values. While this approach offers a strong foundation in developing a community energy and emissions baseline; increasing the robustness of the City's data and energy use information will enhance the accuracy of the values presented above. Furthermore, increasing the accuracy of this data will help support the City of Leduc in its future efforts to reduce both energy use and GHG emissions.

## 6. LAND USE

A community's land base is a vital resource. Using land wisely and finding an appropriate land is important for maximizing economic development, providing social cohesion, and room for key environmental processes. Land is required to support vital processes including:

- » Homes for people;
- » Commercial and industrial economic activity;
- » Recreation;
- » Natural space for key ecological processes such as pollination, photosynthesis, and wildlife habitat;
- » Food growth;
- » Stormwater infiltration; and
- » Transportation corridors for moving of people and goods.

Balancing land use to meet all these objectives is critical to the sustainability of a community.

### 6.1 Current Conditions

The City of Leduc contains over 3100 ha of land. Based on the Land Use Bylaw, the City has designated the following land uses within its existing boundary.

Main Use	Size (ha)	Proportion
Agriculture/Urban Reserve	1702	54%
Commercial	176	6%
Conservation	15	0%
Direct Control	11	0%
Industrial	321	10%
Recreation/Parks	316	10%
Residential	540	17%
Utilities	81	3%
Total	3161	

Source: City of Leduc Land Use Bylaw

A significant portion of land within the City boundary is currently used for agriculture and is classified as urban reserve. This land is currently undeveloped, but is intended to support future urban growth. Most of this land is designated in the Municipal Development Plan for future residential, commercial, and industrial development. Leduc has some natural open space in the area around Telford Lake and Deer Valley Ravine, but the majority of park spaces are active play fields associated with schools or recreation facilities.

The Edmonton International Airport noise exposure forecast (NEF) contours have a significant impact on land development in Leduc. These contours impact where certain land uses can be located and to what intensity they can be developed.

Residential density is often times another way to compare land use efficiency. Given the high amount of urban reserve within the City's boundary, much of which cannot be developed for residential purposes because of the NEF contours, the City of Leduc has a low residential density of 2.99 units per hectare of land, or 6.5 people per hectare. However, this value is skewed due to the large amount of undeveloped land within Leduc's civic boundary. When looking strictly at residential area densities, that value changes to 25.9 people per hectare. Leduc's population density, using 2006 Statistics Canada data, compares with other jurisdictions as follows:

City	Pop.	Dwelling Units	Area (km)	Pop. Density (ppkm <sup>2</sup> )
Leduc	16,967	6,718	37.0	458.9
Medicine Hat	56,997	24,729	112.0	508.9
Airdrie	28,927	10,768	33.1	873.9
Camrose	15,620	6,962	31.1	501.6
Fort Saskatchewan	14,957	5,825	48.1	310.8
Calgary	988,193	401,389	726.5	1,360.2
Edmonton	730,372	314,362	684.4	1,067.2

Source: Statistics Canada 2006 Census

Note: A census undertaken for the City of Leduc in 2010 identified the population as 23,293, which results in a population density of 629.5 ppkm<sup>2</sup>

In 2008, the Government of Alberta amended the Municipal Government Act to establish a Capital Region Board (CRB), consisting of 24 participating municipalities surrounding the City of Edmonton. The City of Leduc is included in the CRB's mandate. The CRB's role is to provide coordination to the Capital Region to keep it a successful and thriving region as a whole. A part of their regional mandate was to develop a plan to implement more regional thinking in key areas like land use, key infrastructure, and information sharing. This resulted in the development of The Capital Region Growth Plan: Growing Forward, which was approved by the Government of Alberta on March 11, 2010.

The Capital Region Growth Plan identifies broad development patterns and future infrastructure investments that would best complement existing infrastructure, services, and land use in the Capital Region. This is intended to coordinate decisions regionally in order to "sustain economic growth, ensure strong communities and a healthy environment" (p.46). The Growth Plan will make up a part of the North Saskatchewan Regional Plan under the Provincial Land Use Framework when that Regional Plan is developed, and therefore has been designed to support the Land Use Framework's three desired outcomes, which are "Healthy economy supported by our land and natural resources, healthy ecosystems and environment, and people-friendly communities with ample recreational and cultural opportunities"(p.47). There are four main components to the Growth Plan: a Land Use plan, an Intermunicipal Transit Network plan, a Geographic Information Services (GIS) plan, and a Housing plan.

There are six key land use themes identified in the Capital Region Growth Plan:

- » Protect the environment and resources
- » Minimize regional footprint
- » Strengthen communities
- » Increase transportation choice
- » Ensure efficient provision of services
- » Support regional economic development

Another important facet of the Land Use plan section of the Capital Region Growth Plan is the Regional Evaluation Framework process (REF), which is the governance aspect of the land use plan. The REF process requires that the CRB review and approve any new Municipal Development Plans (MDPs), Intermunicipal Development Plans (IDPs), or statutory plans. It also reviews and approves any amendments to MDPs, IDPs, or statutory plans (p.55). This means that regional oversight will be required when developing statutory planning policy. It also identifies density targets for municipalities within its boundaries, which are related to whether or not the area has been designated as a 'priority growth area' or not. The City of Leduc is so identified within Priority Growth Area E, and therefore has a population estimate of nearly 44,000 people by 2043.

### **Brownfields**

The City of Leduc has several sites that are contaminated from their previous use. Many of these sites were former gas stations, but could also include other sites where storage of polluting materials (such as hydrocarbons, salt, creosote, etc) have occurred, in either large or small quantities. The City of Leduc reviews development applications in these areas and ensures that proper testing and/or remediation is undertaken prior to allowing redevelopment of these sites.

### **Wellsites and Pipelines**

Like many Alberta municipalities, the City of Leduc is impacted by oil and gas activity. This is both in existing development and in lands that are currently identified as urban reserve. Oil and gas facilities are identified in the area level planning stage and incorporated into the design of the area. Often, pipeline alignments provide good locations to develop walkways and trails.

## **Pesticide Management**

Pesticides are managed federally, and Canada has some of the most stringent pesticide regulations in the world. In Leduc, both municipal employees or municipal consultants must be certified in order to apply pesticides. The City of Leduc has both No Mow and No Spray zones. The No Mow zones are areas where naturalized landscapes are either being maintained or developed. No Spray zones are determined based on federal and provincial regulation, and include areas like vegetation surrounding water bodies. The City of Leduc has also committed to pesticide use reduction near school yards, playfields, and garden plots. In these areas, localized spraying is undertaken to address any significant concerns. The City of Leduc ends up spraying only approximately 4% of its land area by using these methods. The City of Leduc also allows residents to register to be notified of spraying activities in their area.

## **6.2 Current Initiatives**

### **Land Use Planning**

The City of Leduc is currently updating its Municipal Development Plan and is also working with Leduc County to develop an Intermunicipal Development Plan. The Intermunicipal Development Plan will identify how systems will be connected with Leduc County, including roadways, land use, trails, and other municipal systems.

Land use planning in Leduc is regulated by the Edmonton International Airport Vicinity Protection Area Regulation. The Noise Exposure Forecast (NEF) contours regulate land uses in the City of Leduc to ensure that locations unsuitable for residential development are identified to reduce negative impacts to people. The City has also recently completed a master plan for the Telford Lake Area and is working to update the Downtown Plan.

The City is also working with the Edmonton International Airport (EIA) to develop the Aerotropolis Integrated Land Use Compatibility Plan, which seeks to determine the viability of an airport centred business hub. The land uses in the City of Leduc would be impacted by the use of this development model, which is explored in the report. It also identifies recommended land uses at the northern boundary between Leduc and EIA that are consistent with the Aerotropolis concept. This report is currently being finalized.

### **Natural Areas**

The City of Leduc has an extensive open space system, tied together by the multiway systems with connections to Telford Lake. This green space system provides recreation opportunities for the City's residents as well as creating connected habitat areas for wildlife. This system is also augmented by the use of stormwater management facilities as amenity spaces. This extensive network is a source of pride for the City of Leduc.

### **Urban Forestry**

The City has developed an urban forestry report which provides a strategy for protecting and enhancing the tree canopy of the community. The report includes strategies for inspecting tree conditions, maintenance, diversifying tree species, and education. It also includes an aggressive tree planting protocol, which has seen the City of Leduc plant many new trees to increase the urban canopy.

### **Local Agriculture**

The City has over 130 community garden plots available which are located near Telford Lake, as well as a demonstration garden at one of the local schools, at the LRC, and at Rainbow Park. Leduc has taken steps to promote to residents the value of eating local food. The Leduc Farmers' Market also offers an opportunity to promote locally grown food.

## 7. AIR QUALITY

In Alberta, air quality is monitored by a comprehensive network of over 160 monitoring stations that are operated by Alberta Environment, Airshed Zones, Environment Canada and industrial facilities.

The closest air quality monitoring station to the City of Leduc is the Edmonton South Air Quality Monitoring Station. The Edmonton South Air Quality Monitoring Station is owned and operated by Alberta Environment. This station is located approximately 25 kilometres from the downtown of the City of Leduc.

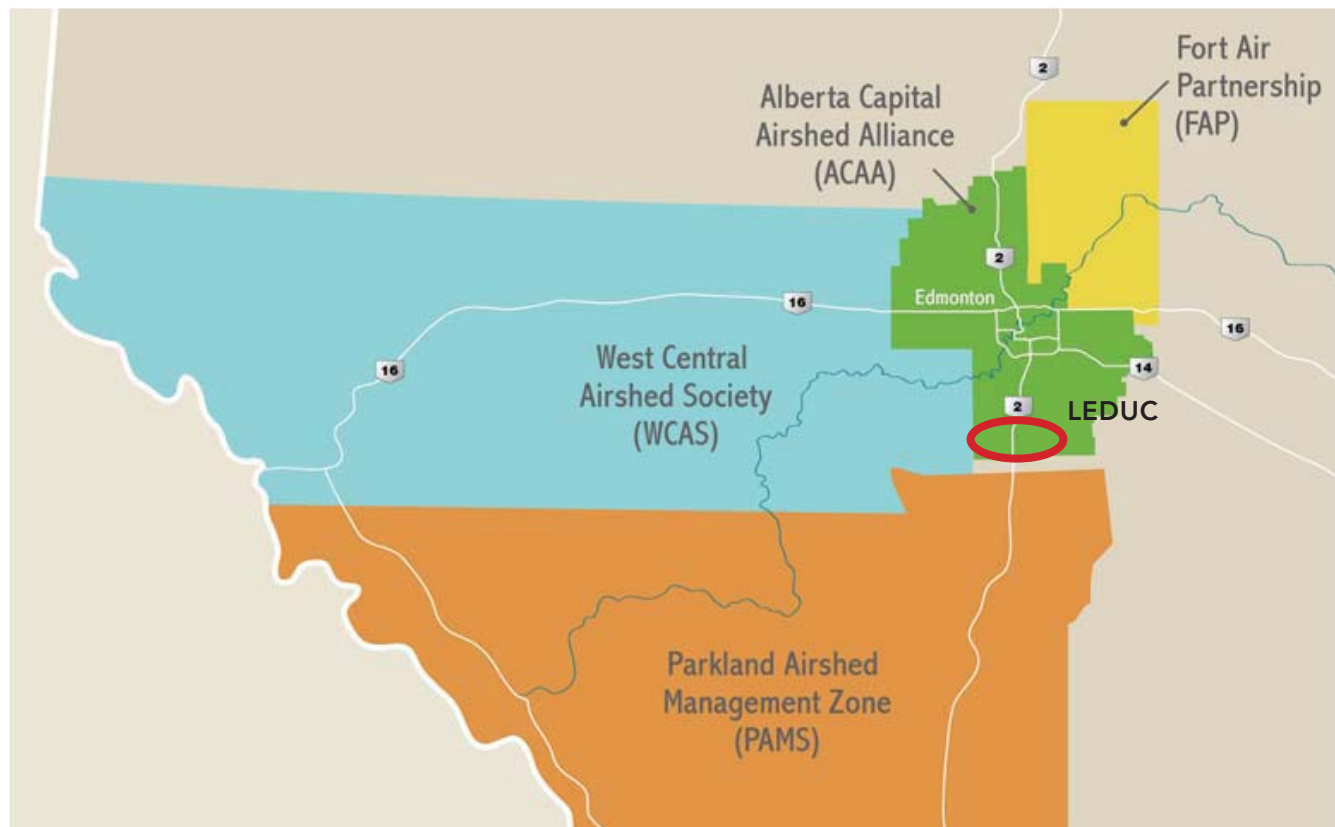
In Alberta, the development of regulations and policies to manage air quality follow a shared-governance model with members from the Provincial and Federal governments, the Clean Air Strategic Alliance, Industry, Airshed Zones and industry. This governance model is designed to establish

Province wide-standards and develop regional and locally based initiatives to protect and improve air quality. The policies, air quality standards and emission regulations are primarily implemented by Alberta Environment, Government of Alberta.

The City of Leduc is located within the Alberta Capital Airshed Alliance (ACAA). The ACAA is a partnership of industry, Alberta Environment, municipal governments and other interest groups and individuals. The City of Leduc is currently not a member of the ACAA.

The ACAA is one of the Airshed Zone agencies, which represent the Capital Airshed Partnership, that leads efforts to protect and improve air quality in the Capital Region. The other two Airshed Zones within the Capital Airshed Partnership are: the West Central Airshed Society and the Fort Air Partnership.

*The Capital Airshed Partnership*



From a human health and environmental quality standpoint, the primary air pollutants of concern are: sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), ground-level ozone, and fine particulate matter. Above certain thresholds these substances can negatively impact human health and environmental quality. These air pollutants have been linked to the following impacts:

## Human Health

- » Challenges in breathing patterns that can lead to wheezing and coughing, aggravation of existing respiratory and cardiac conditions.
- » For high-risk population members, poor air quality can result in premature death due to increased system strain.

## Environmental

- » Ground-level ozone can damage vegetation, agricultural crops, flowers, shrubs and forests by interfering with a plant's ability grow. As a result, vegetation can become more susceptible to disease and pests. Ozone can also adversely affect ecological functions such as water movement, mineral nutrient cycling and habitats for various animal and plant species.
- » Sulphur dioxide and nitrogen oxides are precursors of PM<sub>2.5</sub>. They are the pollutants that contribute to acid deposition, commonly known as "acid rain". Acid rain can alter the nutrient and chemical cycles in soils and surface water, and erodes infrastructure.
- » PM<sub>2.5</sub> is a major contributor to reduced visibility and smog.

## Economic

- » The health effects of ground-level ozone and PM<sub>2.5</sub> can lead to absences at work and reduced productivity in the labour force. As well, it can lead to increased health care costs.

## Sources of air pollutants in the Capital Airshed Partnership

Within the Capital Airshed Partnership area there are many sources of air pollutants. Significant sources of air pollutants in the area include, but are not limited to:

- » Transportation vehicles;
- » Air traffic;
- » Railways;
- » Petroleum sector (primarily from upgrading and refining located in the Fort Air Partnership);
- » Power generation (primarily in the Lake Wabamun area);
- » Livestock from agricultural practices;
- » Commercial and residential buildings.

## Air Quality in Leduc

The Air Quality Index (AQI) is an indicator of air quality, based on a series of air pollutants that have adverse effects on human health and the environment. The AQI is calculated from ambient measurements of carbon monoxide, fine particulate matter, nitrogen dioxide and sulphur dioxide. Under the AQI, air quality is assigned a numerical ranking from 0-99 and then rated as good, fair, poor or very poor.

From 2006 to 2010, the AQI has been rated "good" or better more than 98% of the time, based on the air quality monitoring in Edmonton South. For the same time period, the AQI has been rated "very good" approximately 64% of the time<sup>10</sup>. However, this station is located far from the City of Leduc and would not reflect its unique circumstances and adjacency to a major airport.

<sup>10</sup> CASA Data Warehouse. Edmonton South Monitoring Station. <http://www.casadata.org/Reports/SelectCategory.asp>. Accessed Feb. 16, 2011.



Air pollutant levels measured at the Edmonton South monitoring station have remained below annual average Alberta Ambient Air Quality Objectives (AAAQO) levels. However, some pollutants have exceeded their one-hour or daily AAAQO levels. As illustrated below, there have been a total of 33 measured exceedences from 2006 to 2010.

*Alberta Ambient Air Quality Objective exceedences from 2006 to 2010 measured at the Edmonton South Air Quality Monitoring Station.*

Year	PM 2.5 Daily Exceedences (greater than 30.0 ug/m3)	Ozone (O3) Exceedences (greater than 0.082 ppm)
2010	12	0
2009	6	2
2008	6	2
2007	3	1
2006	0	1

Source: CASA Data Warehouse. <http://www.casadata.org/Reports/SelectCategory.asp>

## 7.2 Current Initiatives

Currently there are two key priorities for the Capital Airshed Partnership. The first priority is the implementation of the Capital Airshed Partnership Ozone Management Plan. The development of this plan was completed through a multi-stakeholder process that brought together industry, government and non-government partners. This plan has been developed to provide both regulatory and non-regulatory tools to

ensure ground-level ozone levels don't increase as the Capital Region continues to see growth in population, industrial activity and vehicle use.

The other ongoing initiative is an anti-idling campaign. This education and outreach campaign has been designed to encourage drivers within the Capital Region to reduce idling times and support community engagement.

## 7.3 Gaps in Knowledge

The City of Leduc does not have a nearby Air Quality Monitoring Station, so there are no numbers specific to the City of Leduc's context. This makes understanding Leduc's unique air quality conditions, which are impacted by their specific context, impossible to calculate, quantify, or measure.

The City of Leduc is adjacent to an international airport. Air traffic is known to negatively impact air quality, including the potential for increases in particulate matter, VOCs, carbon monoxide, nitrogen, and/or ozone levels. It is also adjacent to Highway 2, which impacts air quality by introducing potential pollutants from passenger vehicles as well as commercial trucks.

Of the existing available information from the Air Quality Monitoring Station located 25 km away, there is limited ability to provide analysis. The provincial inventory does not enable specific point source emissions data to be retrieved. Additional air pollution data is available from Alberta Environment, which will require synthesis and extrapolation for Leduc's context, but additional location-specific air quality monitoring is required to better understand air quality issues in the City of Leduc.

## 8. NOISE AND LIGHT POLLUTION

Excessive noise and light pollution are growing to be recognized as disruptive to human and environmental health.

Due to the presence of Edmonton International Airport, major highways and other large industries in the area, residents of Leduc are exposed to both types of pollution.

While light pollution is primarily an aesthetic concern, there are serious impacts on birds migrating who are drawn to artificial lights and can become trapped in light beams (Nature Conservancy of Canada). According to the International Dark Sky Association, there is a 'growing body of evidence links the brightening night sky directly to measurable negative impacts on human health and immune function, on adverse behavioral changes in insect and animal populations, and on a decrease of both ambient quality and safety in our nighttime environment.' Additionally, the International Dark Sky Association notes that human circadian rhythms are disrupted by light.

### 8.1 Current Conditions

#### Noise

The City of Leduc has conducted several noise-related studies over the years to understand and quantify noise related problems and concerns. The City of Leduc is interested in developing a clear understanding of the noise impacts in its community to develop mitigation techniques and ensure that effective land use planning prevents noise concerns from future developments.

Research has found that outdoor noise levels above 65 dBA  $L_{eq}24$  are more likely to interfere with verbal communication and sleep.'

A study of the impact of major road noise indicated that there were two areas that exceeded the noise threshold of 65 dBA  $L_{eq}24$ . These areas were located in the Willow Park area adjacent to Highway 2.

A Noise Impact Assessment (NIA) was also undertaken as a part of the Aerotropolis Integrated Land Use Compatibility Plan. It reviewed aircraft noise, traffic noise, and ground noise associated with the future Port Alberta development. It determined that there were areas where current noise levels exceeded standards adjacent to Highway 2, but that this was based on combined noise of road, rail, and air traffic. It further identified areas within the Aerotropolis lands that development could be affected by noise and provides a list of acceptable uses in the subject lands to mitigate negative noise impacts. It also proposed mitigation strategies, including a noise barrier along Highway 2, buffer space between uses, enhanced building codes, ensuring building orientation considers noise reduction, and increased insulation.

Edmonton International Airport currently has a number of noise abatement procedures to reduce noise levels in Leduc and the surrounding area. These include mandating that aircraft fly at least 5000 feet above the City of Leduc, and avoiding turn maneuvers that would take aircraft over Leduc. In addition, Leduc is part of the Airport Vicinity Protection Area for Edmonton International Airport. This regulation directs what kind of development can occur in certain areas of Leduc based on noise exposure forecasts (NEF) for each of the runways at the airport. Much of Leduc is located in the NEF zones for Edmonton International Airport, meaning that a number of land uses are prohibited in certain areas of the City.

**Light**

Lighting from the highways, the airport, the City of Leduc, and the proximity to the City of Edmonton means that residents of Leduc are exposed to a significant amount of light pollution. This reduces residents' ability to see the night sky and can have impacts on the health and wellness of people and wildlife.

## 8.2 Current Initiatives

**Noise**

The City is currently developing a surface transportation noise policy to address responsibility for traffic noise attenuation.

**Light**

While light pollution is becoming an emerging topic of concerns for residents of Leduc, the City has already begun initiatives to reduce light pollution by asking developers to incorporate light efficiency into site designs. The City of Edmonton has also begun to implement lighting standards in order to reduce light pollution.

## 8.3 Gaps in Knowledge

Little is currently known about the current extent or impact of light pollution in Leduc. More analysis will be required in order to better understand Leduc's unique situation.

## 9. CONCLUSION

The City of Leduc is seeking to better understand its existing relationship with the environment and understand the different areas that contribute to its overall environmental foundation.

The following key areas were reviewed to understand the City of Leduc's existing state:

- » Waste Management
- » Water and Wastewater Stewardship
- » Energy Use
- » Greenhouse Gas Emissions
- » Land Use
- » Air Quality
- » Noise Pollution and Light Efficiency

The following provides key highlights for each of these areas:

### Waste Management

The City of Leduc has an existing waste management program that collects both landfill waste, recyclables, and seasonal yard waste. Leduc residents generated 9105 tonnes of residential waste in 2009, of which, 20% was diverted from the landfill. That breaks down to 338 kg of waste per person in Leduc. That is 53kg/person more than the provincial average, but an improvement from a previous high of 378kg/person.

The City of Leduc pays the Leduc & District Regional Waste Management Facility differential fees for disposal, which is significantly lower for compostables. This creates a strong financial incentive for separation of generic waste from items that are compostable.

The City of Leduc is currently considering adding an organics program to the waste management system.

### Water and Wastewater Stewardship

The City of Leduc's drinking water comes from the North Saskatchewan River via the Capital

Region Southwest - Water Services Commission via EPCOR, and met all applicable standards for water quality when reviewed in 2009. Water use in Leduc is consistent with provincial and national averages. The system is currently well monitored.

The City of Leduc's sewage is managed by the Alberta Capital Region Wastewater Commission and is treated at the Gold Bar Wastewater Treatment Plant in Edmonton, which also met all key quality standards in 2009.

The City of Leduc and its residents (via user fees) pay a flat rate for water and sewer treatment, which can make it challenging to implement water conservation incentives. However, the City is committed to water conservation and currently has a voluntary, alternate day lawn watering program, and will be using a new water metering system to encourage conservation.

Stormwater in the City of Leduc is managed using traditional methods, including collection and discharge at pre-development rates ('pond and pipe' philosophy). This approach is conventional and does not incorporate emerging trends in this field.

### Energy Use

Power in Alberta is primarily from coal (45%) and natural gas (40%). Residential energy use in Leduc was 45,000,000 kilowatt hours of electricity and 821,000 gigajoules of natural gas for heating in 2008, with both energy and heat use being largely dominated by single family housing. The City of Leduc's corporate operations in 2010 cost approximately \$1.5 million, most of which was related to the operation of the Leduc Recreation Centre (LRC), which was developed to reduce energy consumption compared to other similar facilities. The City of Leduc is currently supporting energy reduction by providing a rebate program in conjunction with Climate Change Central that covers ENERGY STAR washing machines, high efficiency furnaces, and low flow toilets.

### Greenhouse Gas Emissions

The City of Leduc's annual greenhouse gas (GHG) emissions were approximately 81,466 tonnes. Of that, the two most significant sources were the residential housing sector (53%) and personal transportation (39%). Based on the 2006 Statistics Canada census, 90% of Leduc's working population travel to work via a personal automobile. Residential housing GHGs are evenly attributable to heating and electricity. The City of Leduc's corporate operations contribute 10,920 tonnes of GHGs, most of which (70%) are generated by the LRC. The City of Leduc is supporting GHG reduction by participating in the C-Line transit initiative, and offers access to the provincial Light It Right program.

### Land Use

The City of Leduc currently contains over 3011 ha of land. Of that, 54% is identified as urban reserve, with the balance currently being used for commercial, residential, industrial, recreation, and utilities. The Edmonton International Airport noise exposure forecast plays a significant role in restricting the form and type of land use permitted in many areas of Leduc. The City of Leduc's current residential density is 6.5 people per hectare. The City of Leduc is currently updating its Municipal Development Plan, preparing an Intermunicipal Development Plan with Leduc County, considering the Aerotropolis concept of development, and is undertaking updates to the Downtown Plan. The City of Leduc has also created an Urban Forestry report to outline strategies to encourage growth of its urban tree canopy. The City of Leduc includes many community garden plots, has a demonstration garden at a local school, and supports the Leduc farmer's market.

### Air Quality

The City of Leduc is included in the Alberta Capital Airshed Alliance boundary, though it is not currently a member. Air quality monitoring information is not available for the City of Leduc, but the closest monitoring station in south Edmonton identifies the air quality as 'good' or better more than 98% of the time from 2006-10. The Capital Airshed Partnership is undertaking several key initiatives to improve air quality, including the development of an Ozone Management Plan and an anti-idling campaign.

### Noise Pollution and Light Efficiency

Based on research undertaken in the City of Leduc, two areas exceed acceptable outdoor noise levels in Leduc to a level that could interfere with verbal communication and sleep - both were in the Willow Park area. The Edmonton International Airport has noise abatement procedures in place to reduce noise exposure associated with flights in Leduc.

Leduc has several key areas of high lighting activity, including Highway 2 and 2A, the EIA, urban lighting in the City of Leduc, and proximity to urban lighting in Edmonton. This high light exposure can have negative impacts on the health and wellness of both people and wildlife.

This information provides a baseline understanding of the existing condition of the City of Leduc in these key areas, and will contribute to the development of strategies to move the City of Leduc to undertake improvements in these areas.