OFFICE OF THE
City Auditor

Corporate Environmental Review

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THE CITY OF Edmonton

The Office of the City Auditor conducted this project in accordance with the *International Standards for the Professional Practice of Internal Auditing*

Corporate Environmental Review
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Corporate Environmental Review

Summary for City Council

Our review focused on the City's corporate environmental governance framework and selected strategic objectives contained in the *2008 EcoVision Annual Report.* The purpose of this summary is to provide an overview of our observations and to provide City Council with directions it may need to provide to Administration in order to fulfill its governance and oversight role.

The City of Edmonton is striving to be a leader in environmental preservation and sustainability as demonstrated by its environmental policies and corporate strategic plan. The City also has an appropriate corporate environmental governance framework in place to facilitate the sharing of information and decision making regarding environmental activities and issues. They have defined the roles and responsibilities of the committees involved, developed environmental strategic objectives and performance targets, and are collecting data and reporting on results.

Governing environmental activities and commitments is challenging because they occur throughout most of the City's departments. As well, some activities have a direct influence on environmental objectives, such as the protection of natural areas, and some have an indirect influence, such as the construction of the LRT. This also makes it difficult to determine the exact costs associated with achieving environmental objectives.

When conducting this review we found that there are no best practice criteria for governing environmental activities and commitments in municipalities. We therefore described the current state of the City of Edmonton's environmental governance framework. Council and the Administration need to decide if this structure is providing them with meaningful information that enables them to direct, manage, and monitor the City's progress towards the achievement of its environmental objectives.

Environmental Governance Framework

City Council's role is to lead the City's environmental governance framework. Council sets policy, corporate strategic direction, and budget, as well as provides direction to the City Manager. As a way of providing specific direction to the Administration, City Council has approved three environment related policies and included environmental priorities in the City's corporate strategic plan, *The Way Ahead - City of Edmonton Strategic Plan 2009-2018*.

The City Manager and SMT carry out Council's direction and administer public services. SMT makes the decisions regarding corporate environmental activities and initiatives through its approval of strategies, plans, and reports. SMT and the City Manager rely on many groups to provide environmental advice and to work on implementing the City's environment related policies and objectives.

Due to the expansiveness of environmental issues and activities within the City, the current governance framework allows for individual departments and branches to prioritize environmental issues and activities and allocate required resources within their own areas. City Council approves these prioritizations and allocations through the budget process.

Determining accountability for environmental strategic objectives is difficult. Depending on the goal, accountability for the achievement of the environmental strategic objectives may lie with the City Manager, a specific branch, or even with the citizens of Edmonton. For example the City Administration cannot be directly accountable for reducing greenhouse gases in the broader Edmonton community because the Administration cannot directly control the actions of citizens or industry. However, there are specific goals in which the City or specific City departments can be held accountable for, such as; tonnes of greenhouse gas emitted by City operations, environmental releases/spills from City operations, City purchases of hazardous material, reducing the use of herbicide on City parks, etc.

Meaningful Reporting and Decision Making

To show the progress made in achieving the environmental strategic objectives included in *The Way Ahead*, members of the Environmental Policy and Leadership Committee (EPLC) selected 17 of the 52 environmental strategic objectives contained in the *2006 Environmental Strategic Plan.* These 17 objectives are the ones that most closely align with the objectives in *The Way Ahead*. See appendix 2 for a listing of the 17 strategic objectives.

The City reported on its progress in achieving these 17 objectives in the *2008 EcoVision Annual Report,* which includes 49 indicators. This is a public document that the Environment Branch provided to members of City Council; however, it was not presented as a formal report to Council. It is important that City Council receive formal reports on the achievement of environmental objectives because it gives City Council members an opportunity to ask questions and provide feedback on the achievement of objectives, which are contained in the City's strategic plan. The City could incorporate this into their new Performance Management Framework, which intends to provide performance reports to Council on all of the 10-year goals in *The Way Ahead*.

We recommended that, as part of the new performance management framework, SMT ensure City Council receives formal council reports on the achievement of the City's environmental strategic objectives.

In our evaluation of the strategic objectives we selected from the *2008 EcoVision Annual Report,* we found that the City needs to ensure that for each objective they are reporting relevant indicators that will show the achievement of the objective and that there are sufficient indicators to report on all the components of the objective. As part of this process the City should assess how other cities and levels of government are reporting on similar objectives. In Appendix 3, we provide some examples of indicators other cities are using to show the achievement of similar objectives. Compared to the other cities we looked at the City of Edmonton is generally providing the most current results for publicly reported environmental indicators.

We recommended that the Environmental Policy and Leadership Committee ensure that their reports on environmental strategic objectives include indicators that are relevant to the objectives and sufficient to assess all components of the objective. They should also assess how other cities and levels of government are reporting on similar objectives.

For each strategic objective we selected, we chose one indicator that related to the objective and assessed it for reliability, accuracy, and completeness. We also assessed the process used to determine the targets for each indicator. We did not find any issues with how targets were selected, but we did find that in three of the five indicators there were issues with the accuracy, completeness, and reliability of data used to calculate the results. The indicators we found issues with are:

- tonnes of greenhouse gas emitted in Edmonton,
- percent of new homes built in mature neighbourhoods, downtown and premium transit locations versus the suburbs, and
- the mode split to central areas.

We recommended that:

- *The Environment Branch formalize the methodology it uses to estimate greenhouse gas emissions, including regularly reviewing the conversion factors they use in the calculation.*
- *The Planning and Development Department assess the General Permit Report and ensure that it provides data that is accurate, complete, and reliable.*
- *The Transportation Planning Branch conduct additional verification of the listing that matches transit routes and locations to the car data locations and the queries used to pull information from the ETS database.*

Environment Related Costs

Environment related costs to the City include the expenditures made to achieve environmental objectives and the impacts and implications to the environment as a result of management decisions.

The expenditure that relate to the achievement of environmental objectives are also not consistently reported. This is because, as we mentioned earlier, it is difficult to determine the exact expenditure associated with achieving environmental objectives. There are certain projects and activities that relate to specific environmental objectives that management does record expenditures for, such as the CO_2RE program. However, there are many other projects and activities that have an indirect effect on the achievement of the environmental strategic objectives. For these projects and activities if would be very difficult for anyone to determine the exact expenditures of the project or activity that specifically related to the environmental objective, such as the construction of the LRT.

The environmental implications or impacts that may result from management decisions include such things as: losing or gaining animal habitat, polluting or cleaning water and air, reducing or increasing greenhouse gas emissions, etc. City Council and the Administration need to decide if their decision making process would benefit from additional environmental related costs information.

Corporate Environmental Review

1. Introduction

The Office of the City Auditor (OCA) included the review of the City's environmental activities and commitments in its approved *2009 Annual Work Plan*. Environmental activities and commitments, and their costs, occur throughout most of the City's Departments. This report focuses on the corporate governance of environmental activities and commitments within the City and on an assessment of selected strategic objectives and indicators that the City reported on in its *2008 EcoVision Annual Report*. It also includes an "Environmental Scorecard" that highlights the City's performance on selected key environmental indicators.

2. Objectives, Scope, and Methodology

Objectives

The objectives of this audit were to determine if:

1. The City of Edmonton has an appropriate environmental management governance framework to ensure environmental strategic objectives are met. *(See Section 4.1)*
2. The reported results for environmental strategies are reliable, accurate, and complete. *(See Section 4.3)*
3. The processes to choose the targets for environmental strategic objective indicators are appropriate. *(See Section 4.3)*
4. The indicators used to measure the success of the environmental strategies are relevant and sufficient. (*See Section 4.3)*

In addition to these audit objectives we attempted to provide the following:

1. Key indicators, targets, and results for the environmental strategic objectives. *(See Section 4.2 and Appendix 1)*
2. Strategic objectives, indicators, targets, and results from other cities and levels of government. *(See Section 4.3 and Appendix 3)*
3. Costs associated with achieving the environmental strategic objectives. *(See Section 3.1)*

Scope

The scope of this audit included the corporate environmental management governance framework in place in 2008/2009. It does not include the Environmental Management Systems in place at the branch level. These systems are a part of the City's environmental governance framework; however, there is a low risk that they are not working well. The scope of this audit also included an assessment of selected strategic objectives and indicators from the City's *2008 EcoVision Annual Report*.

Methodology

To gather information on the City's environmental governance system we reviewed key documentation and interviewed select members of some of the City's Committees that are involved in environmental governance.

To test the reported results we chose a sample of five strategic objectives from the *2008 EcoVision Annual Report* and a sample of five environmental indicators; one that relates to each objective. In the *2008 EcoVision Annual Report* there are one or more indicators that relates to each strategic objective. For each of our selected strategic objectives, we researched how other cities are reporting the achievement of similar objectives. For each of our sampled indicators, we reviewed the target selection criteria, calculation methodology, and data used to calculate results. We also included the targets and results of similar indicators from other cities. None of the indicators we tested are prepared by the branches with certified environmental management systems.

3. Background

3.1. Environment Related Costs

Environment related costs to the City include the expenditures made to achieve environmental objectives and the impacts and implications to the environment as a result of management decisions.

The expenditure that relate to the achievement of environmental objectives are not consistently reported. Departments do record expenditures for certain projects and activities that relate to specific environmental objectives, such as the CO_2RE program. There is also the Environment Branch whose budget could be directly related to the achievement of environmental objectives. However, there are many other projects and activities performed throughout the City that have an indirect effect on the achievement of the environmental strategic objectives. For these projects and activities it would be very difficult for anyone to determine the financial expenditure of the project or activity that specifically related to the environmental objective, such as the construction of the LRT. For these reasons it is understandable that the City does not report the financial expenditure associated with the achievement of each environmental objective. As well, we felt that it would be very misleading for us to attempt to provide these expenditures and therefore we have not included them in this report.

Many decisions made by organizations result in some kind of environmental implication or impact. These implications or impacts could include: losing or gaining animal habitat, polluting or cleaning water and air, reducing or increasing greenhouse gas emissions, etc. These types of impacts on the environment are not consistently provided to decision makers in the City prior to a decision being made. However, the City does report the effects of management decisions on the environment in the *2008 EcoVision Annual Report.* The report links the result of environmental indicators to the City's environmental strategic objectives. We also provide the results to 19 of the City's environmental indicators in Appendix 1 of this report.

3.2. Environmental Policies

As a way of providing specific direction to the Administration, City Council has approved three environment related policies and included environmental priorities in the City's corporate strategic plan, *The Way Ahead - City of Edmonton Strategic Plan 2009-2018*.

Policy C512 The City of Edmonton's Environmental Policy

This policy states that "The City of Edmonton, through its planning, decision-making processes, and leadership, will promote the development of an environmentally sustainable community that functions in harmony with the natural environment." It also states that "The City of Edmonton will exercise environmental stewardship of its operations, products and services, based on its commitment to:

a. prevent pollution,
b. continually improve its environmental performance by setting and reviewing environmental objectives and targets, and
c. meet or exceed applicable environmental legal requirements and other requirements to which it subscribes."

Policy C505 Edmonton's Environmental Management System

The purpose of this policy is to establish ISO 14001, the international standard, as the benchmark for a corporate Environmental Management System (EMS). This system will allow the City to employ best available management practices and due diligence in promoting its environmental vision.

Policy C531 Natural Areas Systems

This policy states that the City of Edmonton:

- "Is committed to conserving, protecting, and restoring our natural uplands, wetlands, water bodies, and riparian areas, as an integrated and connected system of natural areas throughout the City."
- "Will balance ecological and environmental considerations with economic and social considerations in its decision making and demonstrate that it has done so."
- "Will lead by example – engaging the public in natural areas issues, and encouraging businesses, residents, and the community to secure new natural area systems and steward what we have effectively."

3.3. Environment Plans

City Council created and approved *The Way Ahead - City of Edmonton Strategic Plan 2009-2018* to help the City establish priorities and provide a vision for what the City will look like in the year 2040. It includes six ten-year strategic goals and each goal contains related progress measures and three-year priority goals.

One of the ten-year strategic goals is to Preserve and Sustain Edmonton's Environment. The plan states that Edmonton will be the nation's leader in setting and achieving the highest standards of environmental preservation and sustainability in its own practices and by encouraging and enabling the practices of its partners. To measure the success of achieving this goal the plan includes the following progress measures:

- Decrease in water use, waste generation, energy use, greenhouse gas emissions and ecological footprint.
- Protect, enhance, and restore acres of greenspace.
- Improve the environmental health of the city by improving air quality and water quality and by decreasing city-wide wastewater generation and the City's purchase of hazardous material.

Other goals that have progress measures that relate to the environment are: Transform Edmonton's Urban Form and Shift Edmonton's Transportation Mode.

The City's Administration has prepared other plans and reports that relate to the environment; however, City Council has not approved them. We discuss some of these plans and reports and how they tie into *The Way Ahead* in section 4.1.3 of this report.

3.4. Environmental Management

As per Policy C505 Edmonton's Environmental Management System, the City has chosen the ISO 14001 standard, Environmental Management Systems, as its standard for environmental management systems. This standard contains more than 100 environmental management system requirements that are designed to help organizations comply with relevant environmental legislation and regulations, prevent pollution, and continually improve their environmental performance. ISO 14001 certification involves having a third-party auditor perform an independent validation of the environmental management system in place to ensure it conforms to the ISO 14001 standards.

Currently there are nine City branches that are ISO 14001 certified (Drainage Services, Waste Management, Fleet Services, Fire Rescue Services, Operational Services, Parks, Edmonton Transit, Roads Design and Construction, and Transportation Operations) and two others (Corporate Properties and Recreation Facility Services) that have partially implemented the standards. The City selected these branches to implement the standards because it identified them as having the highest environmental risks. The environmental management systems in these branches form the foundation for environmental planning, control, monitoring, measuring, and management review at the branch level in the City.

This report focuses on environmental management at the corporate level, where the City has not implemented the ISO 14001 Standards. We did not look at the environmental management systems at the branch level due to the rigour already required to obtain ISO 14001 certification and the fact that the branches the City has identified as having the highest environmental risks have implemented or are in the process of implementing these standards.

4. Observations and Analysis

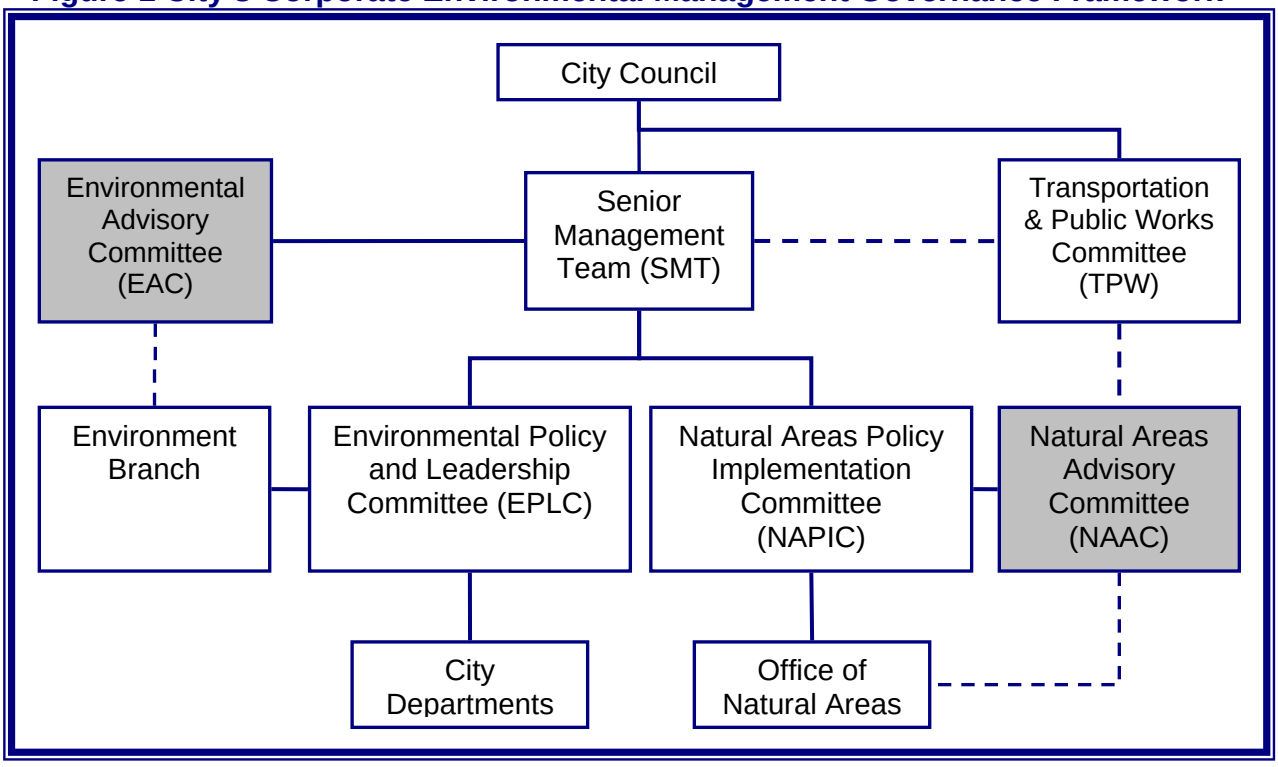
4.1. Current State of Environmental Governance

To determine the current state of the corporate environmental management governance system in the City we interviewed members from the following entities:

- Environmental Policy and Leadership Committee (EPLC)
- Natural Areas Policy Implementation Committee (NAPIC)
- Environmental Advisory Committee (EAC)
- Natural Areas Advisory Committee (NAAC)
- Environment Branch
- Office of Natural Areas

Figure 1 depicts the current state of the City's corporate environmental management governance framework based on these interviews.

Figure 1 City's Corporate Environmental Management Governance Framework



We do make some recommendation to improve governance; however, overall, we found that this environmental governance framework is an appropriate framework to manage the achievement of environmental strategic objectives. The framework is accountable, transparent, has defined roles and responsibilities for the committees involved, and allows for the prioritization and allocation of resources. The City also has developed environmental strategic objectives and performance targets, is collecting data, and is reporting on results.

The following sections describe the roles and responsibilities of the committees involved in environmental governance, how resources related to the achievement of environmental objectives are prioritized and allocated, and accountability and transparency in the environmental governance framework.

4.1.1. Roles and responsibilities

Each entity in the environmental management governance model has defined roles and responsibilities that are outlined in their respective Terms of Reference or in other documentation. Most of the committee members we interviewed felt that their role was clear. Additionally, some members reviewed the roles included in their Terms of Reference and agreed that their role was clearly defined.

The following paragraphs provide a brief description of the roles and responsibilities of each of the entities included in the City's environmental governance framework.

Members of City Council lead the City's environmental governance framework. Their role is to govern the corporation by setting policy, corporate strategic direction, and budget, as well as to direct the City Manager. As discussed in sections 3.2 and 3.3 of this report, in relation to the environment City Council created *The Way Ahead* which includes environment specific goals. They also approve the environment-related policies.

The City Manager and SMT carry out Council's direction and administer public services. SMT makes the decisions regarding corporate environmental activities and initiatives through its approval of strategies, plans, and reports.

There are many groups reporting to SMT and the City Manager that provide environmental advice and work to implement the City's environment related policies. They are:

- *The Environment Branch* – its mandate is to act as a focal point for environmental information; coordinate and facilitate environmental activities and projects which are interdepartmental or interagency in nature; and support and facilitate the effective operation of the EPLC and the EAC.
- *The Office of Natural Areas* – its mandate is to coordinate conservation efforts across the City, oversee the implementation of the City's Natural Area System Policy and the *Natural Connections Strategic Plan*. This plan includes the City's conservation vision, goals, and system outcomes.
- *EPLC and NAPIC* – These committees are made up of City branch managers whose branches have significant roles in environmental and natural areas related matters. They ensure that the planning, implementation, and monitoring of environmental management and functions within civic operations are carried out in a coordinated, effective, and efficient manner. They do this through monthly meetings where the managers discuss environmental matters that affect their branch and/or the City. The committee members communicate the results and advice obtained at the meetings back to SMT and incorporate them into their day-to-day decisions.
- *EAC and NAAC* – These committees are comprised of public members who advise the Administration on environmental and natural areas matters. The

EAC's purpose is to provide strategic advice and expertise to the EPLC and SMT for the continuing development of the *Environmental Strategic Plan* and other environmental issues as they arise. The NAAC's purpose is to advise NAPIC on policy and operational matters relevant to the Administration's responsibilities for natural areas conservation. They also reported to the Transportation and Public Works Committee in November 2006 and April 2008.

4.1.2. Allocation and prioritization of resources

Due to the expansiveness of environmental issues and activities within the City, the current governance framework allows for individual departments and branches to prioritize environmental issues and activities and allocate required resources within their own areas. Guidance on what environmental activities and issues to focus on comes from the City Council approved corporate strategic plan, *The Way Ahead*. As discussed in section 3.2 this document includes three and 10-year goals that relate to the environment, as well as indicators to measure the City's progress in attaining these goals.

The members of the EPLC that we interviewed told us that they try to align their branch's activities with the priorities in *The Way Ahead* and to the environment-related policies. They use information obtained at EPLC and NAPIC meetings and from NAAC and EAC to help in their prioritization. City Council approves these prioritizations and allocations through the budget process.

The environmental progress measure to decrease greenhouse gas emissions illustrates how environmental issues are impacted by many City Departments. The decisions of many City departments effect the achievement of this measure. For example: the Transportation Department makes decisions regarding the construction of LRT and roads, the Asset Management and Public Works Department makes decisions regarding the maintenance of buildings and the Capital Construction Department makes decisions regarding the construction of buildings.

4.1.3. Accountability and transparency

Determining accountability for environmental strategic objectives is difficult. Depending on the goal, accountability for the achievement of the environmental strategic objectives may lie with the City Manager, a specific branch, or even with the citizens of Edmonton. For example the City Administration cannot be directly accountable for reducing greenhouse gases in the broader Edmonton community because the Administration cannot directly control the actions of citizens or industry. However, there are specific goals in which the City or specific City departments can be held accountable for, such as; tonnes of greenhouse gas emitted by City operations, environmental releases/spills from City operations, City purchases of hazardous material, reducing the use of herbicide on City parks, etc.

In our interviews with members of the EPLC there were mixed responses to the question of who is accountable when the strategic objectives are not met. Some felt it was the departments or operating areas and some did not think anyone was accountable.

The Terms of Reference of the EPLC indicate that the EPLC is responsible for implementing the Environmental Policy – Policy C512. To guide this responsibility the Environment Branch, along with the EPLC, developed an *Environmental Strategic Plan* in 2006. This plan contains 52 environmental strategic objectives that address the environmental threats and opportunities facing Edmonton. After the approval of *The Way Ahead,* the Environment Branch, with advice from the EPLC, linked the environment related goals from *The Way Ahead* to 17 of the 52 environmental strategic objectives contained in the *Environmental Strategic Plan 2006*. SMT has approved these 17 objectives. Appendix 2 lists the 17 objectives.

To show their progress in achieving the 17 environmental strategic objectives the Environment Branch and the EPLC prepared the *2008 EcoVision Annual Report*. In 2008 the EPLC and SMT reviewed and approved this report and provided copies to members of City Council. However, they did not present the report as a formal report to Council. It is important that City Council receive formal reports to Council on the achievement of environmental objectives because it gives City Council members an opportunity to ask questions and provide feedback on the achievement of objectives, which are contained in the City's strategic plan. The City could incorporate this into their new Performance Management Framework, which intends to provide performance reports to Council on all of the 10-year goals in *The Way Ahead*. ***Recommendation 1***

Going forward the EPLC has appointed task forces, made up of representatives from related City departments, to develop action plans for achieving each of the 17 environmental strategic objectives. The task forces were also asked to determine the costs associated with the actions required to achieve the objectives.

The *2008 EcoVision Annual Report* produced by the EPLC is a publicly available document. Additionally, reports from NAPIC, EAC and NAAC are available on the City's webpage. Finally, there is a general consensus from EPLC members that environmental issues are discussed and dealt with in a transparent manner by the committees.

4.2. Environmental Scorecard

In the *2008 EcoVision Annual Report* there are 49 indicators that relate to the 17 environmental strategic objectives. Of these indicators, 39 have targets and of those indicators 21 (54%) met their targets and 18 (46%) have not met their targets. Appendix 2 lists the 17 objectives and the number of indicators that relate to each objective. As discussed in section 4.1.3, the task forces appointed by the EPLC developed action plans for achieving the 17 strategic objectives, which include the targets for indicators the City has not met.

We selected 19 of the environmental indicators from the 49 presented in the City's *2008 EcoVision Annual Report* to present in this report. These 19 indicators provide a high level overview of how the City is doing in achieving its environmental strategic objectives. Of the 19 indicators we chose, nine (47%) had positive results and 10 (53%) had negative results.

Appendix 1 presents the results of these 19 indicators as an example of an environmental scorecard. We verified the results of five of the 19 indicators and our

observations are reported in section 4.3 of this report. We obtained the information for each indicator presented in Appendix 1 from the *2008 EcoVision Annual Report* and program staff. For additional information on the indicators please see the City of Edmonton *2008 EcoVision Annual Report*. The report is available on the City of Edmonton website at:
http://www.edmonton.ca/environmental/documents/Ecovision_Annual_report_2008.pdf

The presentation of the indicator results in Appendix 1 differs from the *2008 EcoVision Annual Report* in that we have colour coded the objectives to show whether the indicator results relating the objective are more negative (red) or positive (green), we included historic results for each indicator (if available), and we also included the source of the information.

Table 1 presents a summary of the information in the scorecard in Appendix 1:

Table 1 Environmental Scorecard (Appendix 1) Summary

Indicator	Target	Result
Air		
Air Quality		
Air quality index (percent of hours with good air quality)*	Continual improvement	Target not met
Climate		
Greenhouse Gas Emissions		
Tonnes of greenhouse gas emitted in Edmonton*	2010: 13,100,100 tonnes	Target not met
Tonnes of greenhouse gas emissions from City operations	2011: 275,000 tonnes	Negative trend
Land		
Environmental Releases		
Number of environmental releases from City Operations	N/A	Target met
Protection of Natural Areas		
Percent of Edmonton's total area consisting of protected natural areas	8% city wide	Target not met
Protected natural areas that have a Natural Area Management Plan in place	2019: 100%	Positive trend
Priority natural areas secured annually	82 hectares/year city wide	Target not met
Waste Management		
Proportion of residential waste diverted from landfill	60% diversion	Target met
Average tonnes of residential waste generated per capita	Downward trend	Target met
Sustainable Development		
Housing stock density	Increase density	Target not met
Population density	Increase density	Target not met
Percent of new housing built in mature areas, downtown and premium transit locations*	25%	Target not met
Efficient Transportation		
Mode split to central areas*	Car driver share: decrease Car passenger share: increase Transit share: increase	Target not met
Pesticide and Toxic Materials Usage		
Use of conventional turf herbicide on parks inventory	Less than 10%	Target met
Compliance with green procurement work instructions in various branches	100%	Target met
Contaminated Sites		
Dollars issued through the City's brownfield redevelopment grant pilot program	Min $100,000	Target not met
Water		
Water Quality		
River water quality index	Minimize changes is water quality as the river flows through Edmonton	Target met
Wastewater		
Discharge limits as per approval to operate	Alberta Environment approval to operate standards	Target met
Water Consumption		
Litres of water consumed per Edmontonian per day*	250 litres/person/day	Target met

* See section 4.3 for a detailed analysis of the data used to calculate this indicator.

4.3. Detailed Analysis of Five Environmental Strategic Objectives

We performed more in-depth analysis on five selected environmental strategic objectives from the *2008 EcoVision Annual Report*. Our sample included:

- Ambient air quality
- Reduce greenhouse gas emissions in Edmonton
- Sustainable development of communities
- Efficient transportation systems
- Water use efficiency in the community

We completed the following procedures for each strategic objective we selected:

- Determined if the indicators reported for each selected objective were relevant to the objective and if there were sufficient indicators to assess all the components of the objective.
- Provided the indicators other Cities report on that relate to objectives similar to the ones we selected. We have included this information in Appendix 3. The City can use these indicators and those of other Cities they find as a reference when determining which indicators best show the achievement of the City's environmental objectives.

We also chose one indicator that is related to each selected objective and tested for:

- Reliability – Is the source of the data used to calculate the indicator reliable?
- Completeness – Does the underlying data used to calculate the results include all relevant data?
- Accuracy – Do the results presented in the *2008 EcoVision Annual Report* fairly represent the underlying data?
- Reasonableness of the process used to determine target – Did the process include:
    a. A variety of qualitative and quantitative information?
    b. The consideration of: past performance, measure and trends over time, and legal and other requirements?
    c. Ensuring the target setting is consistent with data collection methods?
    d. Taking into account data reliability and variability?
    e. Stakeholder input?

Also, for each selected indicator, we provided the target and results for similar indicators from other cities. Caution should be used when comparing these results because we do not know if the methodology used by the other cities to calculate the results is the same as the methodology used by Edmonton.

The following sections show the results from our testing for each selected objective and the related indicator.

4.3.1. Ambient air quality

Objective

Strive to ensure that Edmonton ambient air quality meets or surpasses national and provincial air quality standards and guidelines by encouraging community action.

Indicators

The indicators presented in the *2008 EcoVision Annual Report* that show the achievement of this objective are:

- Air Quality Index (AQI) - percent of hours with good air quality
- Number of times Alberta Ambient Air Quality Objectives (AAAQO) for ozone were exceeded
- Number of times AAAQO for particulate matter were exceeded

Relevance and sufficiency

We concluded that all three indicators are relevant to the objective and sufficient to show the achievement of the objective. The indicators do not appear to be measuring air quality against national standards; however, the AAAQO's for ozone and particulate matter are in line with the national standards.

Indicator testing

We tested the "Air Quality Index (AQI) - percent of hours with good air quality" indicator.

The AQI is a numerical value that describes the quality of the outdoor air in Alberta. To calculate the AQI, Alberta Environment collects data on the hourly concentration levels of particulate matter, carbon monoxide, sulphur dioxide, nitrogen dioxide and ozone in the outdoor air at various air monitoring stations throughout the province. They convert the value generated by the index into the four air quality categories of good, fair, poor, or very poor. The calculation for Edmonton's AQI is the average of the AQI from the three air monitoring stations in the City.

The target for this indicator is to have continual improvement. The results for 2008 were 96.15% of hours with good air quality. This dropped from 97.46% in 2007.

We concluded that the data and processes used to calculate this indicator are reliable, accurate, and complete and we did not find any issues with the process used to determine the target for this measure.

Results from other cities

Table 2 shows the targets and results from similar indicators used by other cities.

Table 2 – Percent of Good Air Quality Hours Results from Other Cities

City	Target	2008 Result*
Edmonton	Continuous improvement	96.15%
Calgary	Not available	98.04%
Fort McMurray	Not available	98.19%
Red Deer	Not available	96.82%
Lethbridge	Not available	97.22%

* Obtained from the Clean Air Strategic Alliance (CASA) website

4.3.2. Greenhouse gas emissions in Edmonton

Objective

Reduce greenhouse gas emissions from the broader Edmonton community.

Indicators

The indicators presented in the *2008 EcoVision Annual Report* that show the achievement of this objective are:

- Tonnes of greenhouse gas emitted in Edmonton
- Tonnes of greenhouse gas emitted per capita
- Number of measurable greenhouse gas emissions (tonnes) reduced as direct result of CO_2RE rebates and initiatives
- Number of CO_2RE members/percentage increase
- CO_2Re program recognition

Relevance and sufficiency

We concluded that all of the indicators, except "tonnes of greenhouse gas emitted per capita" are relevant to the objective and all the indicators are sufficient to assess the components of the objective. "Tonnes of greenhouse gas emitted per capita" is not relevant to the objective because the goal is to reduce greenhouse gas emissions overall. The greenhouse gas emissions per capita may decrease due to an increasing population, even though the total amount of greenhouse gas emissions are still increasing. ***Recommendation 2***

Indicator testing

We tested the results reported for the "tonnes of greenhouse gas emitted in Edmonton" indicator. The targets for this indicator are to reduce greenhouses gas emitted in Edmonton to 6% below 1990 levels by 2010 (13.1 million tonnes of CO_2 emissions (TCO_2e) in 2010) and 20% below 1990 levels by 2020 (11.2 million TCO_2e in 2020). The *2008 EcoVision Annual Report* reported 36% over 1990 levels for 2007 (19.0 million TCO_2e in 2007).

At the time the Environment Branch was calculating the 2007 result there were no accepted, standardized, or regulated methods for calculating greenhouse gas emissions for municipalities. They used a methodology developed by an external contractor in 1998. Management asserts that the contractor designed this methodology to estimate emissions, with an emphasis on the accurate determination of trends. They did not intend it to be an exact or precise measure of the tonnes of greenhouse gas generated by the City. Going forward the Environment Branch is going to use the ICLEI[1] International Greenhouse Gas Municipal Reporting Protocol. This protocol specifies the emission categories municipalities should include in the community greenhouse gas emission inventory and the method for capturing the data they need to calculate these emissions.

[1] ICLEI (Local Government for Sustainability) is an international association of local governments and national and regional government organizations that have made a commitment to sustainable development.

The majority (83%) of the total tonnes of greenhouse gas emitted in Edmonton in 2007 are from energy consumption and transportation consumption. This includes the consumption of natural gas, electricity, propane, gasoline, and diesel. The Environment Branch obtains the total amount consumed in Edmonton for each of these categories from third parties, such as ATCO and EPCOR. The Environment Branch determines the greenhouse gas emissions by multiplying the amount of each category by a CO_2 equivalency factor. The consultant hired to create the original methodology in 1998 incorporated CO_2 equivalency factors based on industry norms and practice. We found that the Environment Branch last reviewed and updated these factors in 2005. The CO_2 equivalency factors may change over time. For example the CO_2 equivalency factor for electricity will change depending on how electricity is generated; coal versus wind.

The remainder of the greenhouse gas emissions included in the calculation are from 16 other categories including landfills, livestock, and cement plants. The Environment Branch will update these categories when new information is available, otherwise they use the latest available information. Our review of the 2007 result found that for 11 of these categories the latest available data are from 2000 to 2004.

In order to ensure the accuracy, reliability, and completeness of data used to calculate this indicator the Environment Branch needs to ensure they are regularly reviewing and updating the methodology they use to calculate this indicator. They also need to ensure they have included all appropriate categories of emitters and that they are using the most recent and relevant CO_2 equivalency factors. ***Recommendation 3***

We were however, satisfied with the process used to determine the target. The Environment Branch developed the target for this indicator using a formal process that involved many stakeholders and had the endorsement of City Council. In addition, it was in line with the Kyoto Protocol.

Results from other cities

Table 3 shows the targets and results from similar indicators used by other cities.

Table 3 – Tonnes of Greenhouse Gas Emitted Results from Other Cities

City	Target	Result*
Edmonton	6% below 1990 levels by 2010	2007 - Approximately 19.0M tonnes (45% above 1990 levels)
Calgary	20% below 2005 levels by 2020	2005 - Approximately 16.8M tonnes (40% above 1990 levels)
Toronto	6% below 1990 levels by 2012	2004 - Approximately 24.4M tonnes (11% above 1990 levels)
Vancouver	6% below 1990 levels by 2012	2006 - Approximately 2.8M tonnes (5% above 1990 levels)

*These figures may not be comparable because there was not a standard methodology for calculating greenhouse gas emissions.

4.3.3. Sustainable development of communities

Objective

Steer urban development in a more environmentally, socially, and financially sustainable direction by guiding the type and form of Edmonton's development to reduce outward urban growth, increase density, and facilitate greater use of public transit, cycling, and walking.

Indicators

The indicators presented in the *2008 EcoVision Annual Report* that show the achievement of this objective are:

- Housing stock density – number of units versus land with urban zones
- Population density – number of people versus land with urban zones
- Percent of new housing built in mature areas, downtown, and premium transit locations (versus the suburbs)

Relevance and sufficiency

We concluded that all three indicators are relevant to the objective and sufficient to assess all the components of the objective.

Indicator testing

We tested the results reported for the "percent of new housing built in mature areas, downtown, and premium transit locations" indicator. The target for 2008 is 25%. The result reported in the *2008 EcoVision Annual Report* for 2008 was 19.7%.

The data to calculate this indicator comes from the building permits the City issues each year. The City maintains its building permit data in an integrated computer system called POSSE. The Planning and Policy Branch staff retrieve the data they need to calculate this indicator from POSSE using the General Permit Report. The Planning and Policy Branch did not create the General Permit Report; it is one of many reports available to all City staff for obtaining information from POSSE. The report contains the total number of dwelling units people will create or demolish and the neighbourhoods where the construction or demolition will occur for each building permit the City issued in the year. The indicator is the total number of dwelling units people are going to build less the total number they are going to demolish in mature neighbourhoods, including Griesbach and downtown, divided by the total number of dwelling units people are going to build less the total number they are going to demolish for the entire City.

We concluded that we would rely on the data in POSSE because it is one of the City's main IT systems. However, we did find issues with the completeness and accuracy of the data that is included in the General Permit Report. ***Recommendation 4***

In order to ensure that the data in the General Permit Report is complete and accurate we re-ran the report using the same parameters as the original report and re-calculated the indicator results. Our result was five percent less than the reported result in the *2008 EcoVision Annual Report*. When we compared the two reports we found that there were 359 permits that appeared in the original report, but not ours, and 287 permits that appeared in our report, but not the original one. At the time this report was completed

the Administration could not provide us with a reasonable explanation as to why the reports would differ so significantly.

However, we found that the Planning and Policy Branch correctly calculated the results presented in the *2008 EcoVision Annual Report* based on the information in the original General Permit Report that they ran. We also concluded that the process used to determine the target of 25% per year was reasonable.

Results from other cities

Table 4 shows the targets and results from similar indicators used by other cities.

Table 4 – Percent of New Housing Built in Mature Areas, Downtown, and Premium Transit Locations Results from Other Cities

City	Indicator	Target	Result
Edmonton	Percent of new housing built in mature areas, downtown, and premium transit locations	25%	2008 - 19.7%
Calgary	Percent of population growth accumulated in developed areas (2005 boundary areas)	50% in 60 years	2005 - losing 5%

4.3.4. Efficient transportation systems

Objective

Continuously improve the environmental and economic efficiency of Edmonton's transportation system by expanding and upgrading public transit, facilitating safe and convenient pedestrian and bicycle transportation, and proactively managing demand for private vehicle transportation.

Indicators

The indicators presented in the *2008 EcoVision Annual Report* that show the achievement of this objective are:

- Transit ridership per capita
- Vehicle ownership per licensed driver
- Length and quality of cycling network
- Mode split to central areas
- Residents' perceptions of accessibility and affordability of sustainable transportation options

These indicators are the same as the progress measures in *The Way Ahead* for the Shift Edmonton's Transportation Mode ten-year strategic goal.

Relevance and sufficiency

We concluded that all of the indicators are relevant to the objective. However, the indicators are not sufficient to assess all the components of the objective. The report does not include a measure to assess the component of the objective relating to expanding and upgrading public transit. ***Recommendation 2***

Indicator testing

We tested the results reported for the "mode split to central areas" indicator. The targets, with reported results, for this indicator are to achieve a decrease in car driver share, an increase in car passenger share, and an increase in transit share. The result from the latest count in 2007 show that car driver share has decreased, car passenger share has decreased, and transit share has increased.

The Transportation Planning Branch calculates this indicator using data from two sources. They obtain the car driver and car passenger count data from a survey they conduct and they obtain the transit count data from the Edmonton Transit System (ETS) Fall Station Counts.

We concluded that there are no issues with the reliability, completeness, or accuracy of the car driver and car passenger counts data. However, we did find issues with the completeness and accuracy of the transit count data used to calculate the measure. We were also unable to conclude on the reliability of the transit count data.

Recommendation 5

ETS staff records the location, time, route number, number of passengers, and other data they collect in their station counts into a database. The locations where ETS bus drivers conduct the counts do not always agree to where Transportation Planning staff conduct the counts for the car driver and passenger data. The Transportation Planning Branch maintains a listing that matches car data count locations with the corresponding transit data count locations. The transit data used to calculate this indicator is extracted from a database using the listing as a reference. However, in our testing we found that the Transportation Planning staff do not rely completely on the listing. They use their own judgment when writing the queries because the listing can sometimes contain errors.

We had the Transportation Planning staff re-run the queries for a sample of five car data count locations out of the total of 16 locations where transit data was available. For each route number in each location we compared the number of passengers in the new database extraction to the original one. Our comparison found that in three of the five locations the number of passengers in the new database query output did not agree to what was in the original extraction. These errors were not material and did not have a significant impact on the overall result.

However, the errors do show that the listing, which matches the bus route and location with the car data count locations, should be verified and followed exactly when running the queries. Some of the discrepancies we found also occurred because ETS made changes in their database, but Transportation Planning staff did not re-run the queries to update the indicator results after ETS made the changes.

We were unable to conclude on the reliability of the transit data because ETS staff have discarded the original count sheets completed by the bus drivers. Therefore we were unable to reconcile them to the data contained in the database. It is understandable that the count sheets have been destroyed since the count was completed in the fall of 2006.

We assessed the method used to determine the targets for this indicator and found it to be reasonable.

Results from other cities

Table 5 shows the targets and results from similar indicators used by other cities.

Table 5 – Mode Split to Central Areas Results from Other Cities

City	Indicator	Target	Result
Edmonton	Mode split to central areas	Car driver share: decrease Car passenger share: increase Transit share: increase	Car driver share: decrease (2004 55%, 2007- 54%) Passenger share: decrease (2004 - 11%, 2007 - 10%) Transit share: increase (2004 - 34%, 2007- 36%)
Calgary	Transit and auto mode split	60 year target (city wide, 24 hours): Transit: 15% - 20% Car: 65% - 55%	2005 Transit: 9% Car: 77%
Vancouver	% of trips to downtown made by walking, bicycling, transit, car passenger, and car driver	n/a	2006: Single occupancy vehicle: 30% Vehicle passenger: 9% Transit: 30% Walk: 27% Bike: 3%
Portland	Commute mode share for Portland	2030 Targets: Single driver: 30% Carpool: 15% Transit: 15% Walk: 10% Bike: 20% Telecommute: 10%	2007: Single driver: 66% Carpool: 10% Transit: 10% Walk: 4% Bike: 4% Telecommute: 6%

4.3.5. Water use efficiency in the community

Objective

Conserve water and improve residential and commercial water use efficiency in Edmonton.

Indicator

The indicator presented in the *2008 EcoVision Annual Report* to show the achievement of this objective is:

- Litres of water consumed per Edmontonian per day

Relevance and sufficiency

We concluded that the indicator is relevant to the objective. However, the indicator is not sufficient to assess all the components of the objective. The report does not include a measure to assess the component of conserving and improving commercial water use efficiency. ***Recommendation 2***

Indicator testing

We tested the "litres of water consumed per Edmontonian per day" indicator. The target for this indicator is 250 litres per person per day and the result for 2008 was 224 litres per person per day.

The Environment Branch obtained the result of this indicator from EPCOR. The calculation used by EPCOR to determine the indicator results is: the amount of water supplied to residential and multi-residential households divided by the number of accounts divided by the average number of people per household for single and multi-family residences.

We concluded that the data and processes used to calculate this indicator are reliable, accurate, and complete and we did not find any issues with the process used to determine the target for this measure.

Results from other cities

Table 6 and 7 show the targets and results from similar indicators used by other cities, provinces and the Canadian average.

Table 6 – Residential Water Consumption Results from Other Cities, Provinces, and the Canadian Average

City	Indicator	Target	Result
Edmonton	Litres of water consumed per Edmontonian per day	250	224 (2008)
Canadian Average	Litres per person per day in large metered communities	Not available	266 (2008)
Ottawa	Average residential consumption	Not available	259 (2007)
BC	Average daily residential flow (litres per person per day)	Not available	426 (2004)

Table 7 – Residential and Commercial Water Consumption Results from Other Cities

City	Indicator	Target	Result
Edmonton	Litres per capita per day (residential and non-residential)	Not available	338 (2008)
Calgary	Per capita demand per day (including residential, business and municipal)	485	422 (2008)
Windsor	Litres of drinking water treated per capita per day (includes residential, industrial, and commercial)	Not available	685 (2007)
Regina	Total water used per person per day	Not available	385 (2000)
Whistler	Litres per person per day	425	575 (2008)

5. Conclusion

Our review covered the environmental governance framework in the City and a sample of the environmental strategic objectives and indicator, included in the *2008 EcoVision Annual Report.*

We found that the City has an appropriate environmental governance framework in place. They have defined the roles and responsibilities of the committees involved, developed environmental strategic objectives and performance targets, and are collecting data and reporting on results. We are recommending that City Council receives formal reports to Council on the achievement of environmental strategic objectives to ensure they have an opportunity to ask questions and provide comments on how the City is progressing towards meeting its environmental objectives.

We also found that in order to ensure meaningful decision making, management needs to improve the accuracy, completeness, and reliability of reported results for three of the five indicators we selected. Management should also ensure each indicator reported is relevant to the objective and that sufficient indicators are reported to assess each component of the objectives.

We also included an environmental scorecard that presents the results of 19 environmental indicators. Of the 19 indicators we reported on, nine had positive results and 10 had negative results.

We would like to thank all City staff who participated in this review for their cooperation and assistance.

6. Recommendations and Management Responses

Recommendation 1

The Office of the City Auditor recommends that, as part of the new performance management framework, SMT ensure City Council receives formal council reports on the achievement of the City's environmental strategic objectives.

Management Response

Accepted: The Deputy City Manager's Office will continue to produce the City of Edmonton's annual report on the environment. The next report – *EcoVsion Annual Report 2009* – will be tabled with City Council in May/June 2010. The Report will provide a detailed update on environmental objectives that are most important to the success of three- and ten-year goals contained in *The Way Ahead.*

Responsible party: Branch Manager, Environment Branch

Planned implementation: EcoVision Annual Report 2009 will be tabled with City Council in May/June 2010.

Recommendation 2

The Office of the City Auditor recommends that the Environmental Policy and Leadership Committee ensure that their reports on environmental strategic objectives include indicators that are relevant to the objectives and sufficient to assess all components of the objective. They should also assess how other cities and levels of government are reporting on similar objectives.

Management Response

Accepted: The Environmental Policy Leadership Committee (EPLC) devotes considerable time and effort throughout the year to understand the status of environmental objectives, focusing on ones that are most important to the success of three- and ten- year goals in *The Way Ahead.* The status of objectives is reviewed as required during monthly EPLC meetings. Currently, more than 50 performance indicators are used to track the achievement of environmental objectives, with others in the process of being developed and refined. As part of its ongoing effort in overseeing the implementation of the Environmental Strategic Plan, the EPLC will review each of the City's priority strategic objectives to ensure performance indicators are relevant and sufficient.

For the EcoVision Annual Report, the Environment Branch reviewed a number of similar reports produced by large Canadian municipalities and business entities. The best reporting practices were incorporated into the EcoVision Annual Reports to achieve clarity, transparency and accountability. The Environment Branch will continue to e-search environmental reports from other cities (world wide) and other orders of government (Canada) to continually improve reporting.

Responsible party: Branch Manager, Environment Branch

Planned implementation: EPLC will review by June 30, 2010, the City's priority strategic objectives to ensure performance indicators are relevant and sufficient.

Environment Branch will complete a thorough e-search of annual environmental reports (for select large cities worldwide and for other orders of government (Canada) by December 31, 2009 to identify improvements for the EcoVision Annual Report.

Recommendation 3

The Office of the City Auditor recommends that the Environment Branch formalize the methodology it uses to estimate greenhouse gas emissions, including regularly reviewing the conversion factors they use in the calculation.

Management Response

Accepted: The calculation of community greenhouse gas emissions is a complex calculation involving variables and conversion factors that change. Over the past decade, the Environment Branch has revised its greenhouse gas inventory and conversion factors on a number of occasions to reflect new information and changing circumstances. Particular emphasis has been placed on inventories and conversion factors that were most likely to change from one reporting period to the next, e.g., the conversion factor for electricity consumed. Given the complexities and importance of this calculation, the Branch will formally document an Operational Control Procedure that defines the categories of inventory included, methods of updating inventory, frequency of inventory updates, sources of conversion factors, frequency of conversion factor updates and mechanics of the calculation.

Responsible party: Branch Manager, Environment Branch

Planned implementation: Environment Branch will develop by December 31, 2009, a formal operational control procedure for calculating community greenhouse gas emissions.

Recommendation 4

The Office of the City Auditor recommends that the Planning and Development Department assess the General Permit Report and ensure that it provides data that is accurate, complete, and reliable.

Management Response

Accepted: The General Permit Report (GPR) within POSSE will be assessed to ensure the data it provides are accurate, complete, and reliable.

Responsible party: Current Planning and Planning and Policy Branches.

Planned implementation: An assessment of the GPR will be completed before the end of 2009. Any identified required adjustments to the GPR will be undertaken during the next cycle of POSSE enhancements scheduled for 2010.

Recommendation 5

The Office of the City Auditor recommends that the Transportation Planning Branch conduct additional verification of the listing that matches transit routes and locations to the car data locations and the queries used to pull information from the ETS database.

Management Response

Accepted

Responsible party: Transportation Department, Transportation Planning

Planned implementation: The additional verification will begin immediately

Appendix 1 – Environmental Scorecard

For a more detailed understanding of the following indicators please see the City of Edmonton 2008 EcoVision Annual Report. You can find this document on the City's website at:
http://www.edmonton.ca/environmental/documents/Ecovision_Annual_report_2008.pdf

AIR

Air Quality

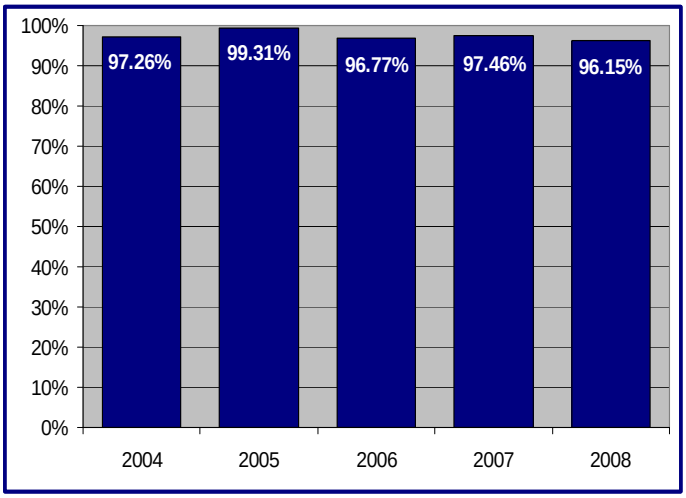
Air Quality Index (% of hours with good air quality)

Definition: The Air Quality Index (AQI) is a method of evaluating ambient air quality.

Target: Continual improvement

Result: Target not met

Calculation: The AQI calculation considers the levels of particulate matter, carbon monoxide, sulphur dioxide, nitrogen dioxide and ozone. Scores generated by the index are representative of a one-year period and categorized as "good", "fair" or "poor". This measure is the percentage of hours with good air quality.



Source: City of Edmonton

See section 4.3 for a detailed analysis of the data used to calculate this indicator.

CLIMATE

Greenhouse Gas Emissions

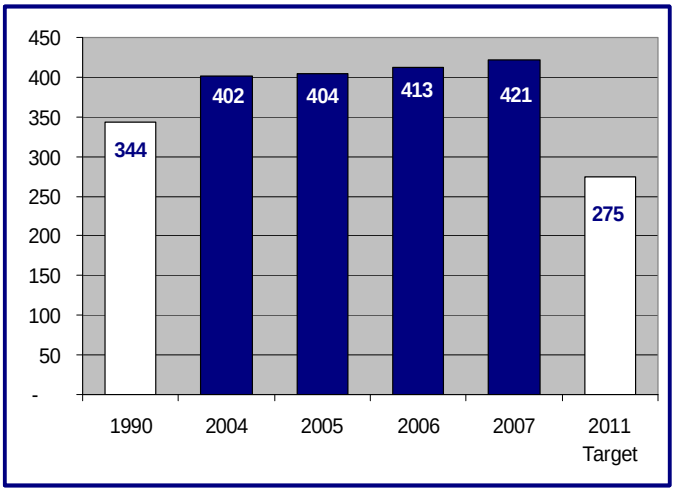
Tonnes of Greenhouse Gas Emissions from City Operations

Definition: Calculation of the tonnes of green house gas (GHG) emitted (TCO_2e) from city operations (in thousands).

2011 Target: 20% below 1990 levels or 275,049 TCO_2e/yr

Result: 421,471 TCO_2e/yr (2007) (negative trend)

Calculation: This estimate of GHG emissions from City operations is based on the City's consumption of electricity, transportation fuel, and natural gas; as well as estimates of CO_2 emitted by various contractor activities.



Source: City of Edmonton

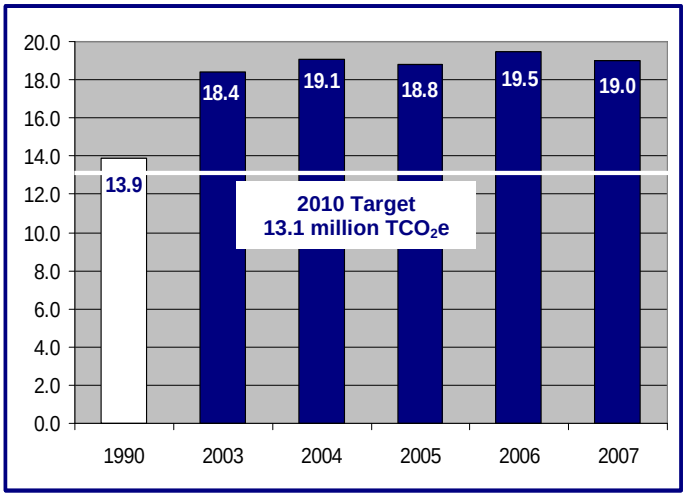
Tonnes of Greenhouse Gas (GHG) Emitted (TCO_2e) in Edmonton

Definition: TCO_2e in the City of Edmonton (in millions)

2010 Target:
6% below 1990 level by 2010 (13,100,000 TCO_2e)

Result: Target not met

Calculation: This measure is based on estimated amounts of CO_2 emitted from the use of electricity, natural gas, automobile fuel, and other CO_2 emitting processes such as cement production and landfills.



Source: City of Edmonton

See section 4.3 for a detailed analysis of the data used to calculate this indicator.

LAND

Environmental Releases

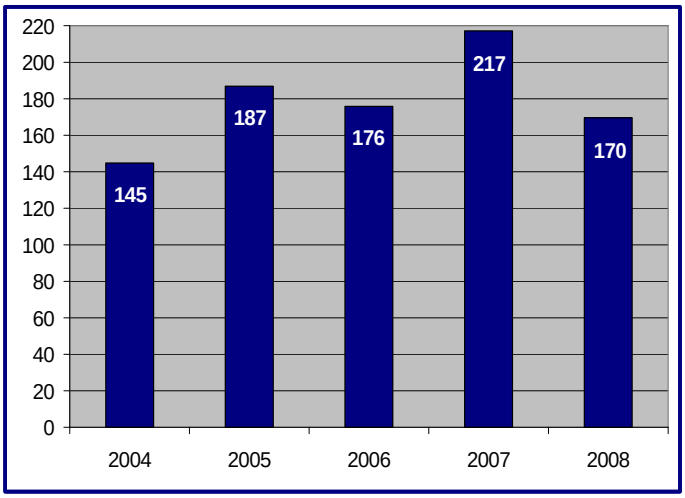
Number of Environmental Releases from City Operations

Definition: Total number of environmental releases from City operations reported to Alberta Environment.

Target: Not available

Result: Decrease from 2007

Calculation: Count includes all releases that the City reported to Alberta Environment as required under the Environmental Protection and Enhancement Act (EPEA). This includes: exceedance of license conditions, discharge to the environment of listed substances (e.g. halon), and discharge of substances that may be considered environmentally harmful.



Source: City of Edmonton

Protection of Natural Areas

Percent of Edmonton's Total Area Consisting of Protected Natural Areas

Definition: Protected natural areas are: areas currently owned by the City, Crown water bodies, areas with private conservation agreements, and those natural areas planned for retention through approved structure plans.

Result: Targets not met

	2004	2005	2006	2007	2008	2008 Target
City Wide	n/a	n/a	n/a	n/a	5.04%	8.00%
River Valley and Ravine Systems	n/a	n/a	n/a	n/a	4.55%	6.90%
Tablelands	0.35%	0.38%	0.43%	0.47%	0.49%	1.10%

Calculation: The total hectares of protected areas in Edmonton divided by Edmonton's total land base (69,980 hectares in 2008).

Source: City of Edmonton

Protection of Natural Areas continued

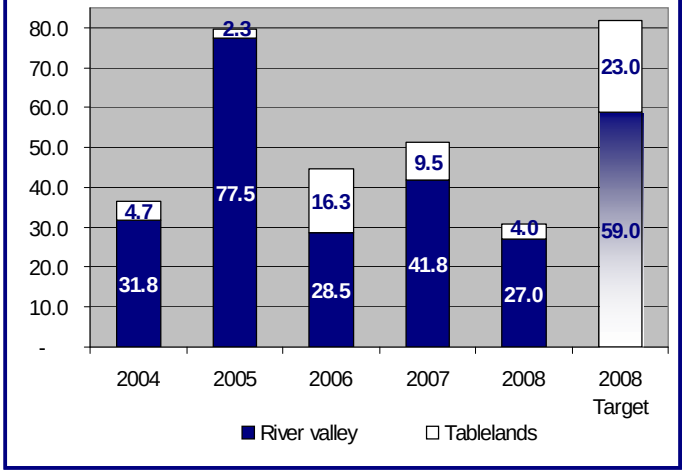
Priority Natural Areas Secured Annually (hectares)

Definition: Priority natural areas have high biodiversity values as determined by independent consultants and are called Tableland Environmentally Sensitive Areas (ESA) and Significant Natural Areas (SNA). They also include all river valley and ravine system natural areas.

Target:
City-wide: 82 ha/yr
River Valley (RV) & Ravine System (RS): 59 ha/yr
Tablelands: 23 ha/yr

Result: Targets not met

Calculation: Total number of priority natural areas that come into the City's inventory within a given year.



Source: City of Edmonton

Protected natural areas that have a Natural Area Management Plan (NAMP) in place

Definition: NAMP's are developed for natural areas that the City wants to conserve. They provide a baseline description of the site, as well as site-specific management goals, objectives and strategies. They also identify the parties responsible for management activities.

2019 Target: 100% of protected natural areas will have a Natural Areas Management Plan in place.

Result: Positive trend

	2004	2005	2006	2007	2008
Number of natural areas with a NAMP	4 of 40	6 of 45	6 of 50	8 of 55	15 of 59
Percent of City area covered by a NAMP	30%	30%	26%	27%	48%

Calculation: The percent of area is calculated by dividing the area covered by the NAMPs by Edmonton's total area.

Source: City of Edmonton

Sustainable Development

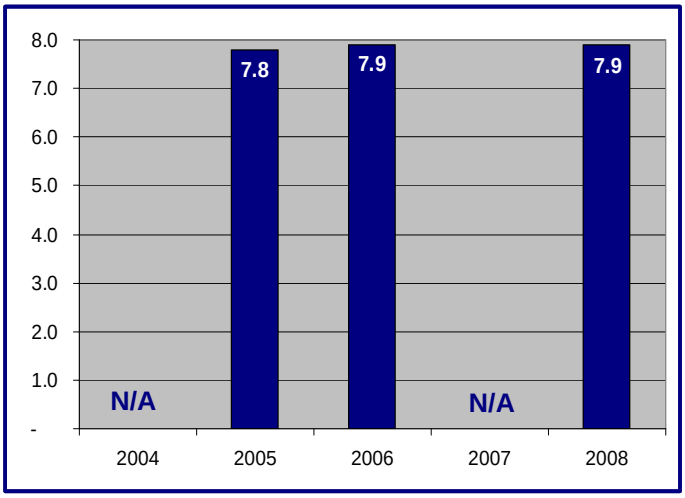
Housing Stock Density

Definition: Number of housing units per hectare of the land zoned for urban use. Urban use land is zoned as residential, industrial, commercial, direct control, institutional, and parklands. Urban zones do not include land zoned for agricultural use.

2008 Target: Increase density

Result: Target not met

Calculation:
This measure is calculated by dividing the total number of homes in Edmonton by the total number of hectares of land with urban zones in Edmonton (42,120 hectares in 2008). Unit counts were not performed in 2004 and 2007; therefore, results are not available for those years.



Source: City of Edmonton

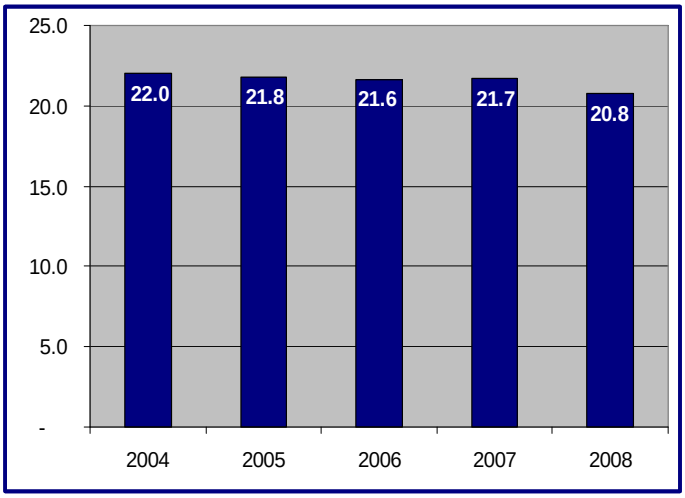
Population Density

Definition: Persons per hectare in the City's built areas. This includes land zoned as residential, industrial, commercial, direct control, and institutional. Built area does not include agricultural land.

Target: Increase density

Result: Target not met

Calculation: This measure is calculated by dividing Edmonton's population by the total number of hectares of built area in Edmonton (36,130 hectares in 2008).



Source: City of Edmonton

Sustainable Development continued

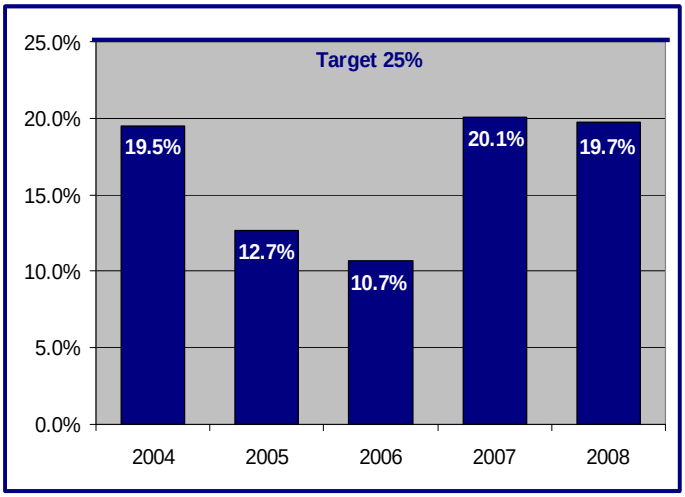
Percent of New Housing Built in Mature Areas, Downtown, and Premium Transit Locations versus New Suburbs

Definition: Annual percentage of new housing built in mature areas, downtown, or premium transit locations versus in the suburbs.

2008 Target: 25%

Result: Target not met

Calculation:
The calculation for this measure uses City of Edmonton building permits to determine the number of new units to be built or demolished in specific locations.



Source: City of Edmonton

See section 4.3 for a detailed analysis of the data used to calculate this indicator.

Efficient Transportation

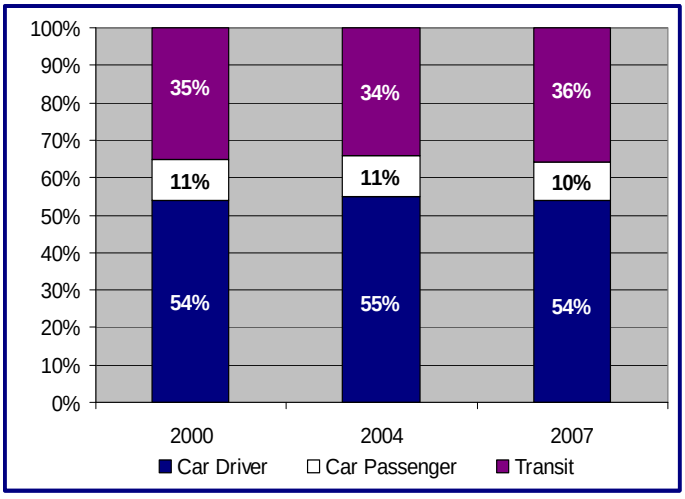
Mode Split to Central Areas

Definition: Percent of people, accessing the downtown core in the AM peak period, who drove a car, rode as a passenger in a car, or took transit.

Target:
Car driver share: Decrease
Car passenger share: Increase
Transit share: Increase

Result: Target not met

Calculation:
Percentages are based on a one time count of the number of people entering the downtown core in the AM peak period by driving a car, riding as a passenger in a car, or using transit.



Source: City of Edmonton

See section 4.3 for a detailed analysis of the data used to calculate this indicator.

Waste Management

Proportion of Residential Waste Diverted From Landfill

Definition: Measure the waste diverted from the landfill as a result of the City's recycling and composting programs.

Target: 60% diversion

Result: Target met

Calculation:
Total tonnes of residential waste diverted from landfills divided by the total tonnes of residential garbage and recycling collected.

Source: City of Edmonton

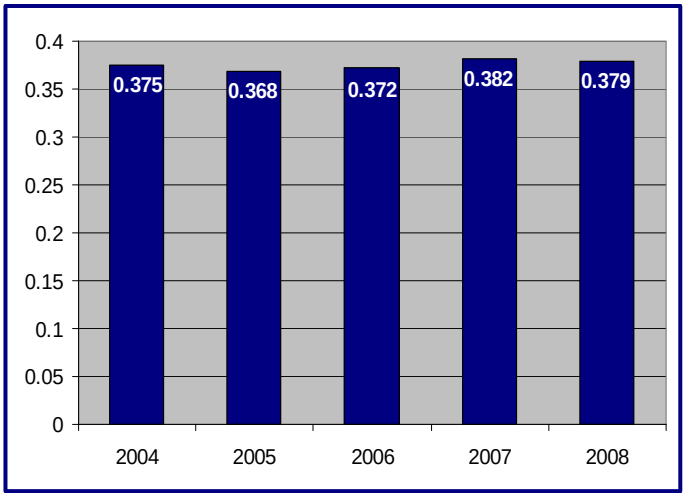
Average Tonnes of Residential Waste Generated per Capita

Definition: Tonnes of residential garbage and recycling collected per person

Target: Downward trend

Result: Target met (2007 to 2008)

Calculation:
Tonnes of residential garbage and recycling collected divided by the total population of Edmonton.



Source: City of Edmonton

Pesticide and Toxic Materials Usage

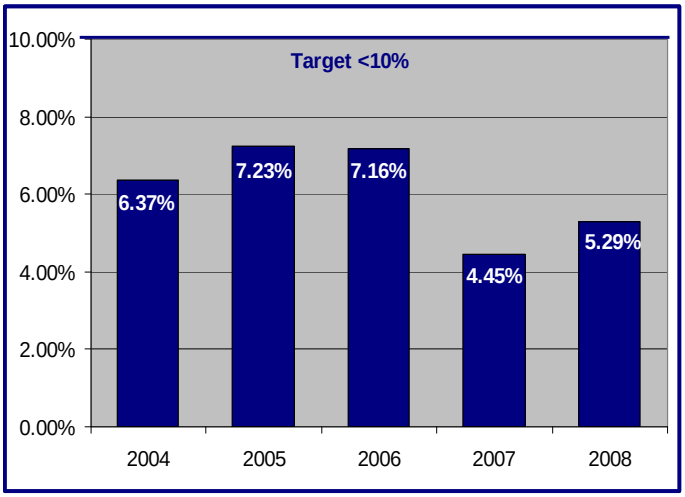
Use of Conventional Turf Herbicides on Parks Turf Inventory

Definition: The Parks Branch is reducing the amount of conventional turf herbicides they use on their inventory of turf through spot spraying and improved plant health care techniques.

Target: Apply turf herbicide to less than 10% of Parks turf inventory

Result: Target Met

Calculation:
This measure is calculated by dividing the total number of hectares the Parks Branch applied turf herbicide to by the total number of hectares they maintain.



Source: City of Edmonton

Compliance with Green Procurement Work Instructions in Various Branches

Definition: The Corporate Properties Branch follows green procurement of custodial products requiring products to be certified under Canada's Environmental Choice Program or U.S. Green Seal. The Mobile Equipment Services Branch and Edmonton Transit follow green procurement work instructions in the purchase of chemical products.

Result: Target Met

Department	2008 Targets	2008 Results
Corporate Properties	100%	100%
Edmonton Transit	100%	100%
Mobile Equipment Services	100%	100%

Calculation:
This information is gathered by the Toxic Reduction Task Force. This is a new initiative and this is the first year they tracked this information.

Source: City of Edmonton

Contaminated Sites

Dollars issued through the City of Edmonton's Brownfield Redevelopment Grant Pilot Program

Definition: The Brownfields Redevelopment Grant Pilot Program enables owners of contaminated sites to apply for financial assistance for the remediation of their site. The City initiated the program in 2006 and filled all five applicant spots. As a condition of the program, land owners have to complete the remediation and land use redevelopment by September 1, 2011.

Target: Min: $100,000 Max: $500,000

Result: Target not met

Calculation: To date the City has not provided any funding under this program because applicants have withdrawn from the program or have not completed the redevelopment on the contaminated sites.

Source: City of Edmonton

WATER

Water Quality

River Water Quality Index

Definition: Alberta Environment uses the River Water Quality Index to evaluate water quality in Alberta's major river system with respect to variables in four different categories: metals, bacteria, nutrients, and pesticides.

Target: Minimize changes in water quality as the river flows through Edmonton.

Result: Target met – Water quality remained "good" downstream of Edmonton.

	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Upstream of Edmonton	98 (Excellent)	98 (Excellent)	88 (Good)	98 (Excellent)	93 (Good)
Downstream of Edmonton	74 (Fair)	74 (Fair)	79 (Fair)	83 (Good)	85 (Good)

Calculation: Alberta Environment's Water Quality Index mathematically combines the variables into one value between 0 and 100. The following water quality descriptions relate to the different values:

- Excellent (96-100) – Guidelines almost always met; "best" quality.
- Good (81-95) – Guidelines occasionally exceeded, but usually by small amounts; threat to water quality is minimal.
- Fair (66-80) – Guidelines sometimes exceeded by moderate amounts; quality occasionally departs from desirable levels.
- Marginal (46-65) – Guidelines often exceeded, sometimes by large amounts; quality is threatened, often departing form desirable levels.
- Poor (0-45) – Guidelines almost always exceeded by large amounts; quality is significantly impaired and is well below desirable levels; "Worst" quality

Source: Alberta Environment

Water Consumption

Litres of Water Consumed per Edmontonian per Day

Definition: Average daily residential water consumption per person.

Target: 250 litres/person/day

Result: Target Met

Calculation: EPCOR calculates this measure by dividing the amount of water supplied to residential and multi-residential households by the number of accounts, then by the average number of people per household for single and multi-family residences.

Source: EPCOR

See section 4.3 for a detailed analysis of the data used to calculate this indicator.

Wastewater

Discharge Limits as per Approval to Operate

Definition: Maintain discharge from the Gold Bar Waste Water Treatment Plant below Alberta Environment approval to operate standards for total suspended solids (TSS), biochemical oxygen demand (BOD), ammonia (NH3-N), total phosphorus (TP), E.coli, and pH.

Result: Target Met

	2004	2005	2006	2007	2008	2008 Target
TSS	5.8	6.1	4.2	8.4	5.9	20 mg/L
BOD	5.0	3.8	3.6	4.1	4.1	20mg/L
NH3-N	5.3	2.7	3.2	1.9	1.2	10 mg/L (winter) 5 mg/L (summer)
TP	0.8	0.6	0.6	0.7	0.6	1 mg/L
E.coli	18.0	7.0	9.0	10.0	5.0	200 counts/100 mL sample
PH					Achieved	6.5-9.5

Calculation:
The amounts for each item are continuously monitored at the Gold Bar Wastewater treatment Plant (as per Approval to Operate 639-02-07). The amounts reported for total suspended solids (TSS), biochemical oxygen demand (BOD), ammonia (NH3-N), total phosphorus (TP), E.coli, and pH are the average of the daily amounts recorded for the year.

Source: City of Edmonton

Appendix 2 – City of Edmonton 2008 Environmental Strategic Objectives

These are the 17 environmental strategic objectives contained in the 2008 EcoVision Annual Report. These 17 objectives closely align with the environment related objectives in *The Way Ahead - City of Edmonton Strategic Plan 2009-2018.*

The 2008 EcoVision Annual Report is available on the City's website at: http://www.edmonton.ca/environmental/documents/Ecovision_Annual_report_2008.pdf

AIR

Strategic Objective	# of Indicators
Objective 1: Air emissions from City Operations: Continually reduce total air pollutant emission levels from city operations.	1
***Objective 2: Ambient air quality:** Strive to ensure that Edmonton ambient air quality meets or surpasses national and provincial air quality standards and guidelines by encouraging community action.	3

*See section 4.3 for a detailed analysis of this strategic objective.

CLIMATE

Strategic Objective	# of Indicators
***Objective 3: Greenhouse gas emissions in Edmonton:** Reduce greenhouse gas emissions from the broader Edmonton community.	5
Objective 4: Greenhouse gas emissions from City operations: Reduce total greenhouse gas emissions from city operations and facilities to achieve the Partners for Climate Protection goal of annual emissions 20% below 1990 levels by 2008.	1

*See section 4.3 for a detailed analysis of this strategic objective.

LAND

Strategic Objective	# of Indicators
Objective 5: Release of spills from City operations: Prevent environmental harm and risk to human health and safety from accidental releases or spills associated with the city's operations and facilities and meet or exceed provincial or federal spill reporting and response obligations.	5
Objective 6: Increase the City's capacity for the management of natural areas: Using the means available to it, the city will increase capacity for ecological stewardship by implementing programs and practices that establish clear management roles and responsibilities, support the efforts of conservation organizations and private corporations and reflect a watershed approach to the management of Edmonton's natural systems.	2
Objective 7: Expand Edmonton's ecological network through securement and restoration: Using the means available to it, the city will expand Edmonton's ecological	5

Strategic Objective	# of Indicators
network by securing and restoring natural systems and by supporting and partnering with others in this work in the areas where it is appropriate to do so.	
Objective 8: Minimizing landfilling of waste: Minimize the landfilling of municipal solid waste through reduction, reuse, recycling and recovery.	2
***Objective 9: Sustainable development of communities:** Steer urban development in a more environmentally, socially and financially sustainable direction by guiding the type and form of Edmonton's development to reduce outward urban growth, increase density, and facilitate greater use of public transit, cycling and walking.	3
***Objective 10: Efficient transportation systems:** Continuously improve the environmental and economic efficiency of Edmonton's transportation systems by expanding and upgrading public transit, facilitating safe and convenient pedestrian and bicycle transportation, and proactively managing demand for private vehicle transportation.	5
Objective 11: Contaminated land impacts: Protect public health, the environment and community quality of life from negative impacts related to contaminated land, and maximize opportunities to reclaim and subsequently redevelop currently contaminated land.	3
Objective 12: Reduction of pesticide usage in City operations: Continuously reduce the amounts of pesticides used by the city of Edmonton and minimize the potential for chemical pesticides to be dispersed into the environment.	4
Objective 13: Reduction of hazardous or toxic material usage in City operations: Reduce city use of household, commercial and industrial hazardous or toxic materials from all aspects of office, recreational facility, transit and public works in order to minimize dispersion of these substances into the environment.	3

*See section 4.3 for a detailed analysis of this strategic objective.

WATER

Strategic Objective	# of Indicators
Objective 14: Treatment of wastewater: Ensure that wastewater from Edmonton's sanitary and combined sewer systems is treated in accordance with best practical technology and is returned to the north Saskatchewan river System so as to minimize negative impacts on downstream water quality.	3
Objective 15: Water use efficiency in City operations: Conserve water and improve water use efficiency in city operations.	2
Objective 16: Protection of community water quality: Protect the quality of surface runoff waters entering the north Saskatchewan river to support a diversity of uses (including local and downstream recreation); maintain the ecological integrity of the north Saskatchewan river; and protect groundwater for local and regional users.	1
***Objective 17: Water use efficiency in the community:** Conserve water and improve residential and commercial water use efficiency in Edmonton.	1

*See section 4.3 for a detailed analysis of this strategic objective.

Appendix 3 – Indicators Used by Other Cities to Show the Achievement of Similar Environmental Objectives

Ambient Air Quality

Indicators in *blue italics* are similar to Edmonton's indicators

Edmonton	Calgary	Regina	Richmond	Portland
• Air Quality Index (AQI) - percent of hours with good air quality • Number of times Alberta Ambient Air Quality Objectives (AAAQO) for ozone were exceeded • Number of times AAAQO for particulate matter were exceeded	Annual average concentrations of • nitrogen dioxide (NO2) • sulphur dioxide (SO2) • carbon monoxide (CO) • particulate matter 2.5 (PM2.5) • ozone (O3)	• *Annual air quality index* • *# of days ozone exceeded Sask. ambient air quality standard* • *# of days total suspended particulates exceeded Sask. ambient air quality standards* • Range of inhalable particulates in air samples at commercial site • Number of Regina Transit rides • Number of vehicles registered in Regina • Estimated CO_2 emissions from City-owned vehicles	• *Particulate matter 10 (PM10) exceedances* • Annual average ozone concentrations • Annual average particulate matter 10 (PM10) concentrations	• *Air pollution index*

Greenhouse Gas Emissions

Indicators in *blue italics* are similar to Edmonton's indicators

Edmonton	Calgary	Vancouver	Toronto	Portland
• Tonnes of greenhouse gas emitted in Edmonton • Tonnes of greenhouse gas emitted per capita • Number of measurable greenhouse gas emissions (tonnes) reduced as direct result of CO2RE rebates and initiatives • Number of CO2RE members/percentage increase • CO2Re program recognition	• *Community GHG emissions and population* • Community GHG emissions by source • Total and per capita electricity consumption • Green electricity consumption • Total and per capita natural gas use in Calgary • Total and per capita vehicle fuel use in Calgary	• *GHG reduction targets* • All new construction is GHG neutral by 2030	• *GHG reduction targets*	• *Total carbon dioxide emissions*

Sustainable Development

Indicators in *blue italics* are similar to Edmonton's indicators

Edmonton	Calgary	Regina	Richmond
• Housing stock density – number of units versus land with urban zones • Population density – number of people versus land with urban zones • Percent of new housing built in mature areas, downtown, and premium transit locations (versus the suburbs)	• *Population density per km of developed land* • Total number of residential units in the inner city and downtown • Residential density in new developing areas	• *The number of residents per hectare* • Vacant land as a percentage of total city area • Percentage of one or two family dwellings units, multi-attached dwelling units and apartment units.	• *Population density* • *Housing density* • Share of housing as single-family dwellings for selected urban areas

Efficient Transportation

Indicators in *blue italics* are similar to Edmonton's indicators

Edmonton	Calgary	Vancouver	Richmond	Portland
• Transit ridership per capita • Vehicle ownership per licensed driver • Length and quality of cycling network • Mode split to central areas • Residents' perceptions of accessibility and affordability of sustainable transportation options	• *Transit and auto mode split* • Transit ridership • Transit service hours • Pathway and bikeway network	• *% of trips to downtown made by walking, bicycling, transit, car passenger, and car driver* • % of trips in Vancouver made by walking, bicycling, transit, car passenger, and car driver	• *Choice of transportation mode for journey-to-work trips* • *Registered passenger vehicles* • *Cycling facilities* • Transit access	• *Commute mode share for Portland* • Percent of workers age 16 and over using public transportation

Water Consumption

Indicators in *blue italics* are similar to Edmonton's indicators

Edmonton	Calgary	Regina	Toronto	Portland
• Litres of water consumed per Edmontonian per day	• *Calgary's per capita water demand* • Water meter accounts in Calgary • Calgary's maximum day water demand	• *Average City-wide water usage per person per day* • Total annual City-wide water usage • Percentage of total City water lost	• *Per capita demand* • Annual average day demands • Peak day demand and peaking factor • Wastewater flows • Number of water accounts by sector • Water demand by sector (ML/d)	• *Per capita water consumption*