TORONTO

STAFF REPORT
ACTION REQUIRED

Funding Strategies to Mitigate Financial Impacts on the City Due to Extreme Weather Conditions

Date:	March 14, 2008
To:	Executive Committee
From:	Deputy City Manager and Chief Financial Officer
Wards:	All
Reference Number:	P:\2008\Internal Services\CF\Ec08004Cf – et (AFS #7218)

SUMMARY

This report discusses the City's funding strategies to mitigate the expenditure impacts of extreme weather on City's annual budgets. More and more extreme weather conditions, such as extreme heat, extreme cold, high winds, rainstorms, snowstorms, flooding and drought, have caused economic losses to the city.

This report recommends the creation of an 'Extreme Weather Reserve Group' which will consist of separate accounts for specific weather risks. The Winter Control Stabilization Reserve will be transferred into this Reserve Group as an account. A new reserve account called the 'Parks, Forestry and Recreation Extreme Weather Reserve' will be created within the Group.

Financial Impact

There is no direct financial impact associated with this report since the recommended provisions to reserves have been included in the Budget Committee Recommended 2008 Operating Budget. The new reserve group and its accounts will assist in stabilizing future annual budgets and minimizing the impacts of extreme weather events on the City's future net financial results.

The financial impact is reflected in the (February 29, 2008) staff report titled 'Preliminary Operating Variance Report for the Year ended December 31, 2007' considered by the Budget Committee on March 6, 2008, where it recommended that $4.816 million of the $94.8 million 2007 preliminary year-end net operating surplus be allocated to the Extreme Weather Reserve, and $12.0 million be transferred from the 2007 preliminary year-end net operating surplus into the Winter Control Stabilization Reserve.

RECOMMENDATIONS

The Deputy City Manager and Chief Financial Officer recommends to City Council that:

1. City Council establish a reserve group within the Stabilization Reserves, called the "Extreme Weather Reserve Group", with separate accounts for specific risks, to mitigate the expenditure impacts on the City's budget as a result of extreme weather conditions in accordance with the policies and criteria as set out in Appendix 1.

2. City Council transfer the Winter Control Stabilization Reserve, along with its balance, to the Extreme Weather Reserve Group as an account.

3. City Council establish within the Extreme Weather Reserve Group an additional reserve account called 'Parks, Forestry and Recreation Extreme Weather Reserve' in accordance with the policies and criteria as set out in Appendix 1b, the purpose of which is to mitigate the expenditure impacts arising from extreme weather conditions on the annual Parks and Urban Forestry budgets, by providing funding at the end of the year to offset wholly or partly a budget shortfall resulting from unbudgeted and uninsured extreme weather-related costs incurred during the year.

4. Municipal Code Chapter 227 (Reserves and Reserves Funds) be amended by adding the Extreme Weather Reserve Group and its reserve accounts to Schedule #3 (Stabilization Reserves).

5. The Deputy City Manager and Chief Financial Officer be delegated authority to create new reserve accounts within the Extreme Weather Reserve Group and address their funding through the annual budget process and in accordance with the Surplus Management Policy.

6. Leave be granted for the introduction of any necessary bills in Council to give effect thereto.

DECISION HISTORY

Councillor Hall, at the February 4, 2008 Budget Committee meeting requested that the Budget Committee:

1. direct staff to review and report on the establishment of an extreme storm/weather reserve to finance extraordinary storm related costs.
2. consider allocating any available 2007 surplus for the establishment of an extreme storm/weather reserve."

http://www.toronto.ca/legdocs/mmis/2008/bu/decisions/2008-02-04-bu24-dd.pdf

At its meeting on March 6, 2008, the Budget Committee considered the staff report titled "Preliminary Operating Variance Report for the Year Ended December 31, 2007" which recommended that the Deputy City Manager and Chief Financial Officer report to the Executive Committee on the creation of an Extreme Weather Reserve, and that $4.816 million of the $94.8 million 2007 preliminary year-end net operating surplus be allocated to the Reserve. The report also recommended that Council allocate $12.0 million of the 2007 preliminary year-end net operating surplus to the Winter Control Stabilization Reserve.

In consideration of the 2008 Budget Committee Recommended Operating Budget at the same meeting, the Budget Committee requested the Deputy City Manager and Chief Financial Officer to report to the Executive Committee meeting on March 25, 2008 on the creation of an Extreme Weather Reserve.
http://www.toronto.ca/legdocs/mmis/2008/bu/decisions/2008-03-06-bu28-dd.pdf

ISSUE BACKGROUND

There has been increasing evidence that more and more extreme weather conditions are experienced globally. Appendix 2, Global and National Weather Trends, provides some empirical evidence showing increasing weather deviations from the long-term normal trends and their economic impacts. Snowstorms are the most obvious, but not the only natural phenomenon that can affect the City. Other severe weather conditions such as extreme heat, extreme cold, high winds, rainstorms, flooding and drought have various financial impacts on the services the City provide, especially if similar events happen within days of close proximity. They include:

- Repair of weather-related damage to City facilities, parks, infrastructure (e.g. pothole repair) and natural features (e.g. trees and other vegetation, watercourse erosion, slopes and embankments)
- Costs for premature replacement of infrastructure
- Expenditures during weather emergencies, e.g.
  - Transportation Services (snow clearing/removal, street cleaning due to debris)
  - Parks, Forestry and Recreation (pruning and clearing damaged trees, plant watering and pool opening in extreme heat)
  - TTC (additional shuttle buses when train and streetcar services are interrupted and loss of revenues)
  - Public Health (coordination of the City's Hot Weather Response Plan (HWR), declaring Heat/Extreme Heat Alerts, and providing direct services under the HWR plan)
  - Shelter, Support and Housing Administration (calling of and services associated with extreme cold alerts, opening of cooling centres during extreme heat alerts)
- Subsidies for uninsured City residents and businesses affected by weather events
- Increased insurance costs for the City
- Settling climate refugees

Appendix 3 describes some of these events in Toronto over the last 50 years and their impacts on City services. Although the exact costs to City due to these events were not known in all cases, an attempt has been made to provide an estimate of the financial impacts.

COMMENTS

Extreme weather events indeed impose a financial risk for the City. Depending on the severity of the event(s), the City could be exposed to budget over-expenditures in the order of tens of millions of dollars in a year. As the weather has become more volatile and the trend is going to escalate according to experts, the City needs to defend itself against weather-related financial risks. In the ensuing sections, a number of funding strategies, grouped into two categories: external and internal, are discussed.

Funding Strategies – External:

1. Weather Derivatives

   There are financial institutions which specialize in developing and providing innovative financial weather-risk-management products, designed to protect companies against weather conditions adversely affecting revenues. Organizations purchasing these weather derivatives may benefit from additional cost savings, more stable revenue flow, less uncertainty in budgeting and enhanced investors' confidence. The risks associated with uncertainties about weather are essentially transferred to the issuer of the weather derivatives. Appendix 4 provides additional information on weather derivatives and lists a few examples.

   Weather derivatives are suitable for corporations with few product lines or services and whose profit depends largely on consistent weather such as ski resort operators. For a municipal government like the City of Toronto with diverse programs and services, it may not be appropriate to use weather derivatives as a risk management strategy to defend the City against only one aspect — the weather. Nevertheless, as the weather derivatives market becomes more mature, and as these companies offering the products become more experienced and precise in their hedging techniques to reduce the volatility and financial uncertainty, City staff may wish to revisit this funding mechanism at a later date. An analogous situation exists for risks which are currently covered by insurance. The City self-insures to a maximum exposure and purchases insurance to transfer the claim financing obligations above the maximum.

2. Financial Assistance from Other Orders of Government

   It has been argued that municipalities can rely on other orders of government to help them recover from natural disasters (that may have been caused by severe weather),

and therefore the City does not have to plan for such contingencies. However, municipalities are not entitled to direct federal assistance for recovery under the federal program for disaster relief, and not all public damages are eligible for reimbursement for cost-sharing under the provincial program. Appendix 5 outlines the federal and provincial programs for disaster relief. Therefore, the responsibility for municipal property damages resulting from extreme weather events, which are severe but not so severe as to constitute a natural disaster under the provincial definition, still remains the financial responsibility of the municipality. The Province does provide limited financial assistance in the form of cost-sharing where a disaster has been declared. However, the City still needs to bear the costs related to severe weather events — the portion that is not cost-shared by the Province, as well as for the total costs of less severe events which do not fit the Provincial definition of a natural disaster.

Funding Strategies – Internal:

3. Self Insurance

The City is self-insured and maintains an Insurance Reserve Fund which provides funding for insurance costs as explained below. The City purchases policies from insurance companies for vehicle, property and liability insurance coverage, and maintains $5 million self-insurance retention (SIR) on those insurance policies. Claim values exceeding the $5 million SIR become the insurer's responsibility to pay, while those below the $5 million SIR are administered based on the insurance policy terms and conditions and funded from the City's Insurance Reserve Fund. The Insurance Reserve Fund also provides funding for insurance payments which exceed insurance coverage levels.

The City's property insurance policy provides coverage for accidental loss or damage to buildings, contents, equipment, stock, supplies, fixtures and furniture, owned by or under the care, custody and control of the City of Toronto, resulting from an accident. The City's infrastructure such as roads, bridges, sewer systems, culverts, pipes, ravines and landscaping are not covered within the property policy.

Damages to property arising from extreme weather events are for the most part insurable. However, not all property is covered under a property insurance policy. As an illustration, the August 19, 2005 rainstorm caused significant damage to the City's physical infrastructure, requiring an estimated total of $44 million in multi-year operating and capital costs to repair and/or rebuild. The amount that was recovered through the City's property insurance policy was only approximately $2 million, equating to the cost of damage sustained to insurable property. The remainder of the total damage was to uninsured infrastructure like roads and bridges. The physical damages at Finch Avenue West near Keele Street (burst water lines and the resulting collapsed bridge) and Edwards Garden and Highland Creek/Colonel Danforth Park (damaged bridges, footpaths and parking lots) were not insured losses.

The City's property insurance policy and the Insurance Reserve Fund are formal funding mechanisms to finance weather-related damage to insured property. For weather-related damage to its uninsured property, the City needs a funding mechanism to supplement the Insurance Reserve Fund.

4. Budget Provision

Volatility in the weather pattern has become the norm. One funding option is to set up an annual budget provision for extreme weather–related events in each of the programs impacted by weather. For instance, Transportation Services has a Winter Maintenance Standby Policy. Although technically feasible, precise budget provisions may not be practical for each of the programs and services impacted by extreme weather because:

- weather is difficult to predict;
- the current lack of accurate and precise unit cost data and performance measures does not allow reliable cost projections to be made for those programs susceptible to weather changes; and
- standby contracts invariably increase the operating budget.

This was generally the experience of municipalities which had such winter contingency accounts. Given the weather variability, there is still a chance that the program's budget at the end of a year may be underspent or overspent depending on what actually happens.

5. Temporary Transfers from Existing Reserves

If no budget provisions have been established for extreme-weather events and no weather derivatives have been purchased, in the event of an unexpected cost spike due to extreme weather in any year, the City could make a temporary transfer from existing reserves or discretionary reserve funds to offset the program's net deficit, provided those funds are uncommitted. However, it should be noted that many existing reserves and reserve funds are significantly under-funded. There is, therefore, a need to implement an alternative plan to fund extraordinary events such as extreme weather.

6. Stabilization Reserve — Extreme Weather Reserve Group

As a funding option, a new stabilization reserve for extreme weather could be set up to provide funding for situations where programs incur extraordinary weather-related uninsured costs resulting in an operating deficit. Typically a target level would be set and annual contributions would be made into the reserve from unspent program budgets, or fixed direct contributions, or a combination of both. By funding the reserve at an appropriate level, it could be used as a stabilization mechanism to smooth out cost spikes arising from these conditions in a variety of program areas.

To this end, it is being recommended that a reserve group called "Extreme Weather Risk Reserve Group" be created within the Stabilization Reserves to cover all weather-related extreme conditions, including snow, heavy rain, extreme heat and cold, and high winds. It will have separate accounts for specific program risks that can be added as they are quantified and funded. (It is being recommended that the Group will have two accounts at this time as explained below.) These reserves would be applied only to extraordinary expenditure items (but not revenue shortfalls), both capital and operating, related to extreme weather. Should a program have a budget shortfall at year-end as a direct result of extreme weather event(s), then the first funding source would be under-expenditures in other components of the program's services. If the program has a separate stabilization reserve (such as TTC, Exhibition Place, Toronto Zoo, and Toronto Water) then the next call on funds would be to use the stabilization reserve to make up the shortfall. Only if the program can prove conclusively that the shortfall is solely related to weather, will it be able to call on the Extreme Weather Reserve account as a source of funding.

The City currently has a Winter Control Stabilization Reserve, whose purpose is to provide funding for unbudgeted snow removal operating costs and to smooth out operating expenditures for winter maintenance from year to year. It is recommended that the Winter Control Stabilization Reserve be transferred into the new reserve group as an account. It is also recommended that a new reserve account called Parks, Forestry and Recreation Extreme Weather Reserve be created within the Group. Appendices 1, 1a and 1b set out the policies and criteria for the establishment of the Extreme Weather Reserve Group and its reserve accounts. The criteria for the Winter Control Stabilization Reserve remain the same.

Allocation/Contribution of Funds to Reserve:

Funds may be allocated to these reserves according to the corporate Surplus Management Policy with respect to managing operating budget surpluses. This policy was adopted by Council on September 28, 29, 30 and October 1, 2004 (Policy and Finance Committee Report 7 Clause 15) and amended by Council on February 21, 22, 23, 24, 25, 28 and March 1, 2005 (Policy and Finance Committee Report #3 Clause 2) as item (3):

(1) starting with fiscal 2005, for any surplus, the Deputy City Manager and Chief Financial Officer be authorized to apply any additional surplus, in priority order to:
   (a) Capital Financing Reserve Fund (at least 75 percent of the additional surplus); and
   (b) the remainder to fund any under-funded liabilities, and/or reserves/reserve funds, as determined by the Deputy City Manager and Chief Financial Officer;
(2) any prior year end surplus be reported to the Budget Committee, in its entirety, prior to reallocation of the surplus and that this continue in 2007.

The preliminary 2007 year-end balance of the Winter Control Stabilization Reserve was $12.034 million. The March 6, 2008 Budget Committee recommended transferring $12.0 million from the 2007 preliminary year-end net operating surplus (totalling $94.8 million) into this reserve, which would result in a total balance of $24.034 million in this account once the 2008 Operating Budget is approved. However, the Transportation Services' estimate for the 2008 Winter Maintenance budget is for an over-expenditure of over $15 million, which necessitates the replenishment of the Winter Maintenance Stabilization Reserve. As well, $4.816 million of the 2007 preliminary year-end net operating surplus will be allocated to the new Parks, Forestry and Recreation Extreme Weather Reserve.

Withdrawal of Funds from Reserve:

At the end of a fiscal year, funds may be withdrawn at the request of a program for the purposes stated in the Statement of Purpose, subject to the availability of funds and the review by the Deputy City Manager and Chief Financial Officer as part of the budget process, as well as the year-end corporate financial position. Programs and services wishing to access the reserves are required to demonstrate the financial impacts of any extreme weather-related event by providing appropriate financial records and other documentation, e.g. photos, to the Financial Planning Division for review. In addition, the program is required to provide an explanation regarding the reason why the amount in question cannot be absorbed within its operating budget or covered by the City's insurance policy.

For programs and services which already have a stabilization reserve for the purpose of stabilizing the operating budgets, if they have incurred extraordinary costs leading to a budget shortfall due to extreme weather conditions, it is expected the first call of reserve funding would be their own stabilization reserve. In the event these stabilization reserves are exhausted, the second call could then be to the Extreme Weather Reserve Group. Examples of these programs and services include TTC, Toronto Water, the Zoo and Exhibition Place.

Level of Reserve Fund:

An appropriate funding level for a reserve is typically determined by estimating financial requirements, which in this case, is the expenditure impact on City services arising from extreme weather conditions. Weather is difficult to predict. Although historical data can be used to project a long-term trend, day-to-day weather fluctuations (around a long-term trend) are almost impossible to predict. It is these large unexpected swings that cause the most trouble in terms of instability in the operating budget. In addition, the lack of accurate unit cost data and performance measures does not allow reliable cost projections to be made at this time. Staff will continue to work on it to determine the appropriate target levels for these reserve accounts.

In future if new reserve accounts are required to address the needs of other programs, agencies, boards or commissions, it is recommended that the Deputy City Manager and Chief Financial Officer be delegated authority to create new reserve accounts within the Extreme Weather Reserve Group and address their funding through the annual budget process including the transfer-in of year-end net operating budget surplus in accordance with the Surplus Management Policy.

Climate Change & Extreme Weather:

There is evidence that natural disasters and extreme weather conditions are the direct results of climate change. It is appropriate to consider the funding strategies to mitigate financial impacts on the City due to extreme weather conditions in the larger context of resource requirements for climate change adaptation. Staff will continue to seek out funding opportunities that may become available in the Federal climate change adaptation initiatives.

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SIGNATURE

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ATTACHMENTS

Appendix 1 — Criteria for Extreme Weather Reserve Group
Appendix 1a — Criteria for Winter Control Stabilization Reserve
Appendix 1b — Criteria for Parks, Forestry and Recreation Extreme Weather Reserve
Appendix 2 — Global and National Weather Trends
Appendix 3 — Samples of Extreme Weather Events in Toronto and Estimates of Their Financial Impacts
Appendix 4 — Examples of Weather Derivatives
Appendix 5 — Financial Assistance for Natural Disasters from Other Orders of Government

Appendix 1 – Criteria for Extreme Weather Reserve Group

Reserve Name: Extreme Weather Reserve Group

(a) Statement of Purpose:

The Extreme Weather Reserve Group is intended to mitigate the expenditure impacts arising from extreme weather conditions on the City's budget, by providing funding at the end of the year to offset wholly or partly a budget shortfall resulting from unbudgeted extreme weather-related costs incurred during the year. It may consist of separate accounts for specific risks.

(b) Service Area or Beneficiary Program:

For accounting purposes the Deputy City Manager & Chief Financial Officer shall have primary responsibility for the Reserve Group.

(c) Initial Contribution:

To be set for each account

(d) Target Level:

To be determined on an account-by-account basis

(e) Contribution Policy:

Funds will be transferred into the various accounts of the Group from the Operating Budget in support of its purpose or as a result of the application of the corporate Surplus Management Policy.

(f) Withdrawal Policy:

Funds to be withdrawn as required from the reserve accounts to fund the operating and/or capital budgets as approved by Council from time to time.

(g) Review Cycle:

The Reserve Group shall be reviewed once every three years. The Deputy City Manager and Chief Financial Officer, in consultation with City programs and services, shall report back to the Executive Committee. The review may also include a consideration of the requirement for divisions, agencies, boards and commissions to make annual contributions to reserve group based on a formula.

Appendix 1a - Criteria for Winter Control Stabilization Reserve

Reserve Name: Winter Control Stabilization Reserve

(a) Statement of Purpose:

The Winter Control Stabilization Reserve provides funding for unbudgeted snow removal operating costs and to smooth the operating expenditures from year to year. It is a reserve account within the Extreme Weather Reserve Group.

(b) Service Area or Beneficiary Program:

For accounting purposes Transportation Services shall have primary responsibility for the Reserve.

(c) Initial Contribution:

Not applicable

(d) Target Level:

To be determined and reported back

(e) Contribution Policy:

The Reserve is to help fund winter maintenance expenditures in years when such expenditures exceeded amounts budgeted. This reserve will be funded from winter maintenance accounts in years of under-expenditures or as a result of the application of the corporate Surplus Management Policy.

(f) Withdrawal Policy:

Funds to be withdrawn as required from the reserve account to fund the Winter Maintenance operating budget as approved by Council.

(g) Review Cycle:

The Reserve shall be reviewed once every five years. The Deputy City Manager and Chief Financial Officer, in consultation with the General Manager of Transportation Services, shall report back to the Executive Committee.

Appendix 1b – Criteria for Parks, Forestry and Recreation Extreme Weather Reserve (continued)

Reserve Name: Parks, Forestry and Recreation Extreme Weather Reserve

(a) Statement of Purpose:

The Parks, Forestry and Recreation Extreme Weather Reserve is intended to mitigate the expenditure impacts arising from extreme weather conditions on Parks' and Urban Forestry's capital and operating budgets, by providing funding at the end of the year to offset wholly or partly a budget shortfall resulting from unbudgeted extreme weather-related costs incurred during the year. It is a reserve account within the Extreme Weather Reserve Group.

(b) Service Area or Beneficiary Program:

For accounting purposes Parks, Forestry and Recreation shall have primary responsibility for the Reserve.

(c) Initial Contribution:

The initial contribution will be $4.816 million from the City's 2007 year-end net operating surplus as directed by Council.

(d) Target Level: to be determined and reported back

(e) Contribution Policy:

The Deputy City Manager and Chief Financial Officer will determine the amount to be allocated to the reserve as part of the fiscal year-end processing or the annual budget process.

(f) Withdrawal Policy:

Withdrawal of funds will be contingent upon prior approval by City Council. At the end of a fiscal year, funds may be withdrawn at the request of a program for the purposes stated in the Statement of Purpose, subject to the availability of funds and the review by the Financial Planning Division as part of the budget process, as well as the year-end corporate position. The program is required to demonstrate the expenditure impacts of any extreme weather-related event by providing appropriate financial records and other documentation to the Deputy City Manager & Chief Financial Officer for review. In addition, the program is required to provide an explanation regarding the reason why the amount in question cannot be absorbed within the program's operating budget or covered by the City's insurance policy.

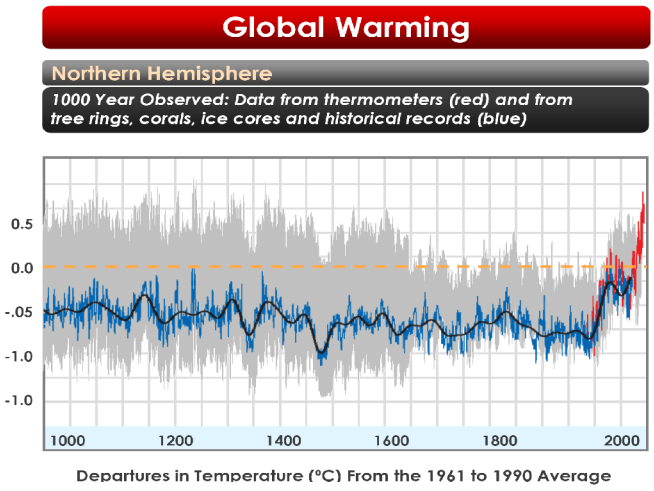
Appendix 1b – Criteria for Parks, Forestry and Recreation Extreme Weather Reserve (continued)

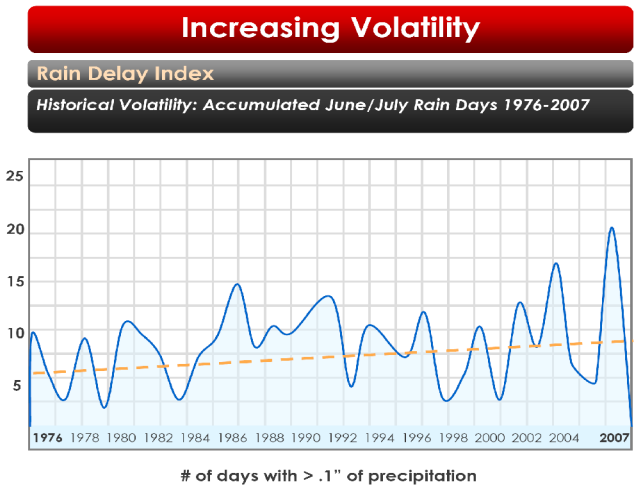
(g) Review Cycle:

The Reserve shall be reviewed once every three years. The Deputy City Manager and Chief Financial Officer, in consultation with the General Manager of Parks, Forestry and Recreation, shall report back to the Executive Committee.

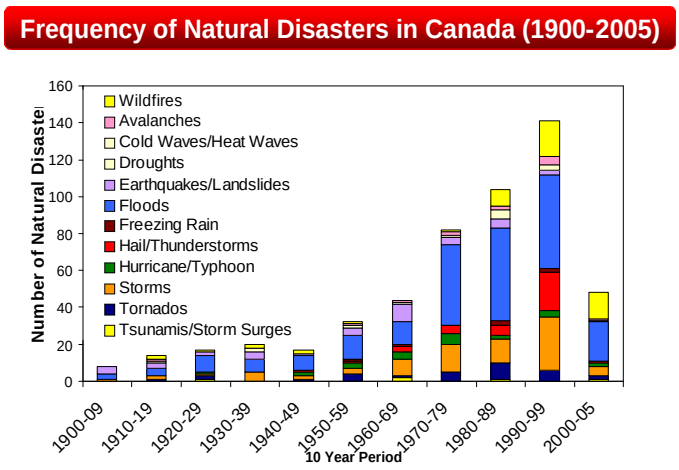
Appendix 2 — Global and National Weather Trends

Global warming has been felt in all continents. 2005 was the warmest year on record, and the magnitude of warming during the 20th century is the greatest experienced in the past 1,000 years. There is increasing evidence that the global weather (temperature, precipitation and wind) has been undergoing increasing deviations from the normal long-term trend. The increasing volatility and extreme weather events, such as prolonged heat waves and periods of droughts, are intensifying. Weather-related natural disasters have escalated exponentially in the last century, causing devastating economic losses that are way in excess of insured losses. The following charts illustrate these points.

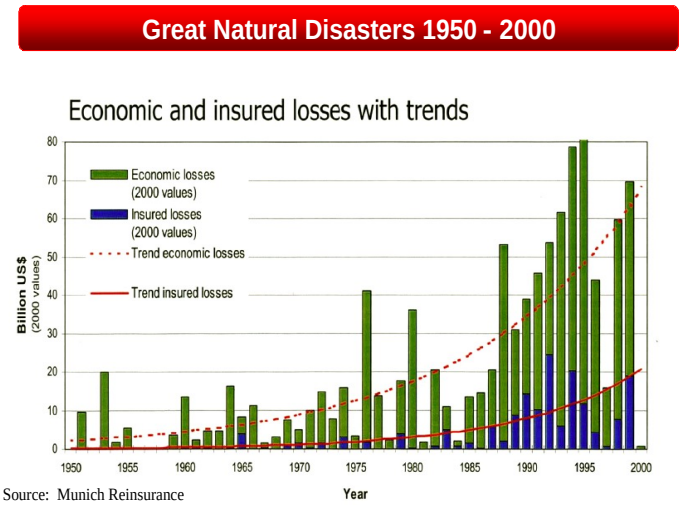




Source: Storm Exchange



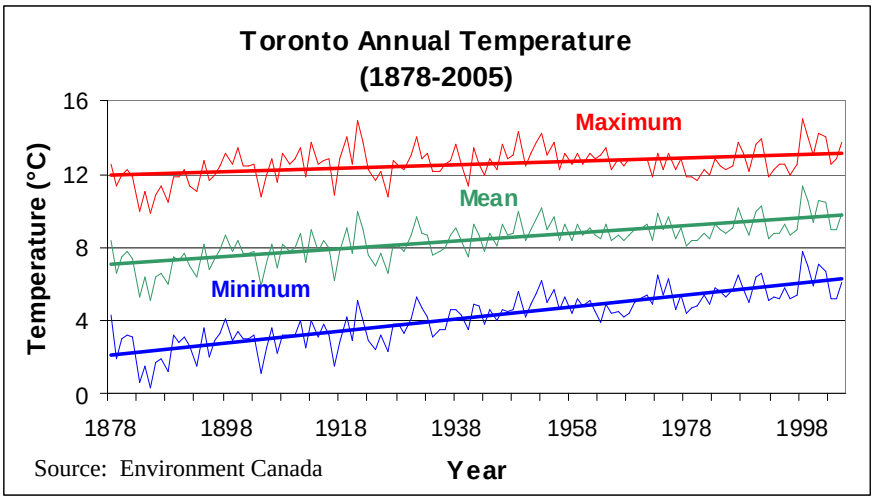
Source: Heather Auld, Environment Canada, 2007. Note: The final bar in the graph only covers the first half of the decade and does not indicate a decline in numbers of natural disasters.



Source: Munich Reinsurance

Appendix 3 — Samples of Extreme Weather Events in Toronto and Estimates of Their Financial Impacts

Toronto's temperature has been slowly increasing in the last 130 years. As can be seen in the chart below, the average temperature has crept up by approximately 3°C in this period.



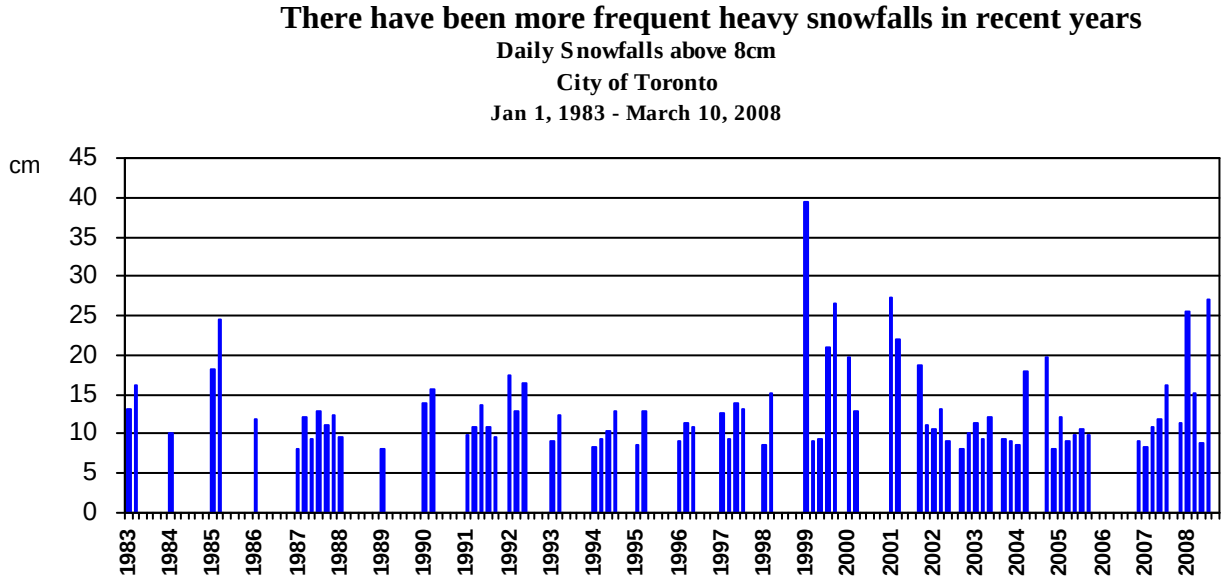
There is evidence that extreme weather conditions and natural disasters are the result of climate change. A range of City programs and services are impacted financially by extreme weather conditions, including Transportation Services, TTC, Toronto Water, Public Health, Shelter, Housing and Support, Parks, Forestry & Recreation, Police Services, Emergency Medical Services and Finance. Certain programs have made estimates of potential financial impacts of extreme weather fluctuations. However, the City does not have a city-wide system to track weather-related events and the associated costs. It is difficult to quantify program costs, e.g. wages and benefits, supplies and equipment, associated with any weather-related event, although some programs have better tracking system than others. It should also be noted that revenues from outdoor programs that charge user fees are impacted by extreme weather conditions. They include ice rinks, ski centres, golf courses, ferry services, Exhibition Place and the Zoo. The following are some samples of known major extreme weather events that triggered a number of city actions and a discussion of the estimated costs:

Snowstorms:

It is not uncommon to see snow accumulations up to 5 cm on Toronto's roads and streets — about 30 to 40 times a year. Environment Canada data shows that on average in Toronto a snowstorm of 20 cm occurs once in four years, while a snowstorm of 30 cm occurs once in 20 years. The figure below shows the occurrences of daily snowfalls in excess of 8 cm for the winter months in Toronto during the period from 1983 to March 10, 2008. It appears that heavy snowfalls have occurred more frequently in the last few years. The City's Transportations Services is responsible for 5,365 km of road (streets,

expressways, ramps and laneways) and 7,060 km of sidewalks with respect to snow clearing, removal/disposal, salt de-icing, and pothole repairs which are worsened by the severe freeze-thaw cycles.

There have been more frequent heavy snowfalls in recent years



No. of bars on horizontal axis in a year represents frequency of occurrence in that year.
Source: Environment Canada

- The winter of 2007/2008 is a near record year with respect to snowfall. As of March 9, 2008 a total of 195.2 cm of snow has fallen in Toronto this winter, just 12.2 cm below the historical high of 207.4 cm recorded in 1938/39.

  Transportation Services' Winter Maintenance Operating Budget was $10.320 million overspent in 2007 (Budget: 76.095 million, Actual $65.775 million). Included in these figures was the expenditure for de-icing salt, which was $5.029 million overspent in 2007 (Budget: 11.314 million, Actual: $6.285 million). For 2008, Transportation Services' spending to March 13, 2008 on Winter Maintenance is estimated to be between $45 and $50 million with snow removal operations continuing. Transportation Services estimated that the total Winter Maintenance costs for 2008, assuming normal November and December weather conditions, would be in the range of $80 to $85 million compared with the Operating Budget of $64.344 million. This means that there would likely be an over-expenditure of $15 million to $20 million in the 2008 Winter Maintenance Operating Budget.

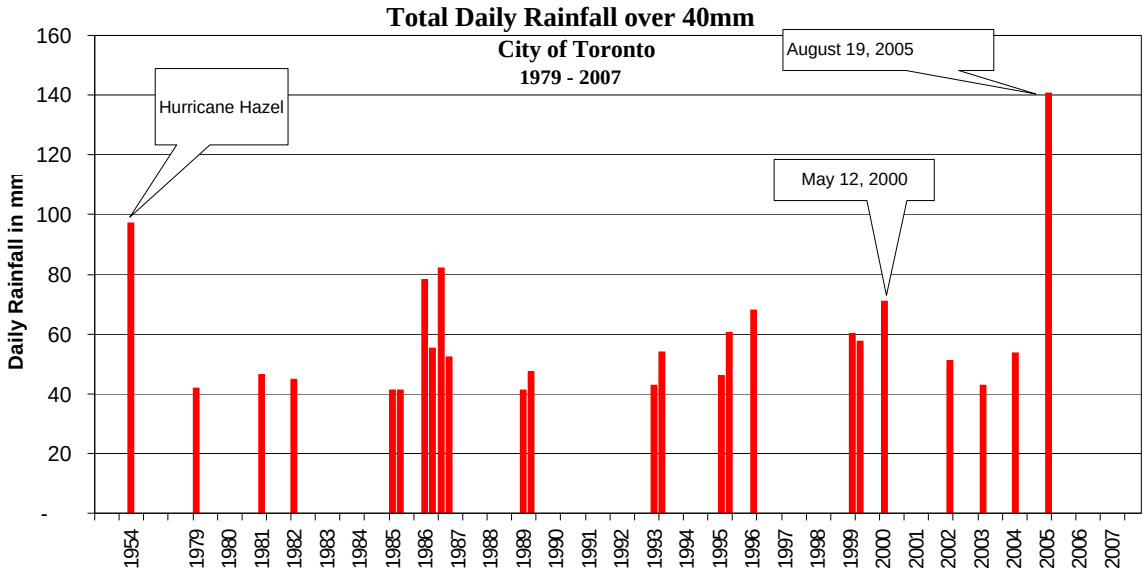
- On January 2, 1999, 39.0 cm of snow fell and on January 14/15, 1999, 26.6 cm of snow fell. The total snowfall of 118 cm in the month of January 1999 was more than 90% of that in a normal year (130 cm). These snowstorms caused a $37.9 million shortfall in Transportation Services' 1999 Winter Maintenance budget, which resulted from the following: staff overtime, extra snow removal of tracks, arterial roads and core districts, additional material (such as salt and sand), and equipment costs (such as for activation of melters and snow dumps). It led to the formation of a more

comprehensive and co-ordinated Snow Plan requiring increased resource allocation. The $37.9 million over-expenditures in the Winter Maintenance Operating Budget was partially offset by transferring $16.5 million from the Winter Control Stabilization Reserve Fund, which essentially depleted the entire account. In addition, the January 1999 snowstorm caused the TTC to request $4.4 million funding from the City to offset its cost overrun arising from its operations.

Rainstorms

The following figure depicts the occurrences of heavy rainfall over the last 50 years. Heavy rain over an extended period of time may clog sewers, cause flooding or landslides especially when the soil is saturated.

Heavy Rainfalls are Not Uncommon



Source: Environment Canada

City programs that may be impacted are Toronto Water as it relates to maintenance of water and sewer pipes across the City, Transportation Services as it relates to cleaning roads and side-streets, repairing road signs and traffic signals, and maintaining road operation, as well as Parks, Forestry and Recreation as it relates to tree and parks maintenance. The majority of the City's watermains and sewer infrastructure was built in the 1950's and 1960's, and some are over 100 years old. The total replacement value of the City's water and sewer distribution system is estimated to be $16.7 billion (water distribution: $5.7 billion, sewer collection: $11.0 billion). Examples of more significant events are described below.

- On August 19, 2005 a torrential rainstorm coupled with lightning, thunder, golf-ball sized hail and high winds caused chaos across the city. Within a period of less than three hours, rainfall in excess of 100 mm was recorded in the City, causing flash

floods, eroding many watercourse banks, destroying vegetation and damaging much City infrastructure. The rainstorm resulted in property and liability insurance claims totalling an estimated $500 million in damage across the Greater Toronto Area, leading it to be one of the top ten insurance claims in Canadian history. The worst hit location in the City was Finch Avenue West near Keele Street where a bridge was destroyed and took months to repair. The City estimated that it required a total of over $44 million in multi-year operating and capital expenditures to bring the City's infrastructure back into service. The City established a $4 million Flood Grant which provided financial assistance to those residents who sustained uninsured property damages due to basement flooding and related incidents on that day.

- On May 12, 2000 Toronto received 67.8 mm of heavy downpour following five days of continuous rain, causing widespread flooding on roads and transit tracks, sewer backups causing basement flooding, erosion in ravines and watercourses, and damages to the City's infrastructure such as roads, bridges, culverts and pipes. The heavy rain caused severe flooding of the lower Don Valley, leading to complete closure of the southern part of the Don Valley Parkway and a portion of Bayview Avenue. This, together with the malfunctioning of over 200 traffic signals, created traffic problems.

  Subsequent to the rainstorm in May 2000, the Works and Emergency Services Department was allocated $1 million to facilitate the immediate retention of technical consultants and investigation services to review the state of sewer structure in the areas subject to major flooding, and to develop recommendations and cost estimates for permanent solutions to the problem.

- In 1954, Hurricane Hazel hit Toronto on October 15 and 16, bringing extensive wind and flood damage leading to 81 deaths. Over a 72-hour period, the storm brought a deluge of 276 mm to Brampton, northwest of Toronto. Most of the bridges on the Don River as well as on the west side of Toronto were destroyed. Many roads, parks, public utilities and even an entire street of houses were washed out. The total damage to the Toronto and neighbouring areas from Hurricane Hazel was astronomical at the time — $25 million (almost $200 million in today's dollars).

- Impact of Rainstorms on Tree Maintenance (Parks, Forestry & Recreation):

  - Severe high winds that are normally associated with a storm (blizzard, rainstorm or tornado) may cause flying debris from tree limbs, fallen hydro poles, and unsecured objects to cause property damage. Severe rain and high wind could have significant impacts on Parks, Forestry and Recreation. Infrastructure repair and replacement is the highest cost component. The Division estimates that over $8 million in capital damage was sustained to parks, greenspace and hard surface infrastructure, including the loss of playgrounds, portions of parking lots, signs, life saving stations along waterways, bridges, fences and trails from the August 19, 2005 storm alone.

- In 2007, there were more than 9,000 City tree failures. Most of these occurred during three severe storms (March 1, June 8 and June 19, 2007). The storms with high winds resulted in tree failures and extensive property damage.

- The increase in the number of City tree failures can be linked with lack of regular maintenance caused by the tree service delay, and an increase in the frequency and severity of storms. Emergencies commonly include partial or complete tree failures with the failed portion of the tree being caught up on houses, utility lines or other portions of the tree, or down on cars and blocking roads.

Year	2000	2001	2002	2003	2004	2005	2006	2007
Number of Tree Failures	768	684	1,539	2,136	1,378	4,642	5,873	9,183

- Wide scale tree failures associated with storms result in:
  1. emergency response with associated dramatic increases in overtime and contractor costs.
  2. post emergency follow-up maintenance. On average relative to the number of calls received; 20% result in large tree removals, 65% in large tree pruning, and 85% in follow-up inspections.
  3. deferral of routine tree maintenance work.

- The estimated cost associated with emergency response and all follow-up tree maintenance incurred in 2007 is $6 million. It resulted in an increase of service delay by approximately nine months. In 2007, Forestry Operations, which is responsible for City tree maintenance and emergency response, had a total budget of $14.92 million.

- An insufficient resource base to maintain Urban Forestry has resulted in an increasing service delay, which is significantly compounded by the impact of storms. This results in poor service to the public and increased liability as hazards are not addressed in a timely manner.

Extreme High Temperatures:

- Extreme high temperatures, coupled with dryness, have direct and indirect impacts on the City. For example, the summer of 2001 was the driest summer in 50 years when there were 23 days with temperatures topping 30°C. Hydro usage from air-conditioners and cooling devices reached a record high. Hydro-Quebec, North America's largest electricity provider, exported increased power to help its neighbours in Canada and the United States amid a heat wave that had caused "transformer brownouts" to thousands of homes in the GTA in early August. The City urged residents to curb lawn watering as soaring consumption brought on by the heat wave

strained capacity, and the City almost imposed a ban on outdoor water use similar to Peel, York and Halton regions. If the heat and drought extended for a prolonged period, demand would exceed supply to the extent that there would be pressures to increase hydro and water rates.

On the other hand, cool and wet summers (such as the one in 2000) would likely result in lower water consumption and hence lower-than-budget water revenues.

- Extreme heat can also result the loss of unirrigated flowerbeds and turf, which is costly to replace outside the growing season. Prolonged heat and drought in the summer of 2007 resulted in the death of many newly planted trees and decline of established trees, which are the responsibilities of Parks, Forestry and Recreation. Additionally manicured park landscapes, particularly perennial gardens and turf on sports fields, deteriorated in quality during prolonged heat/drought. Watering programs cannot compensate for extended periods without rain. Depending on the nature of the extreme weather and the severity, the operating loss can be from $250,000 to $1,000,000 per event.

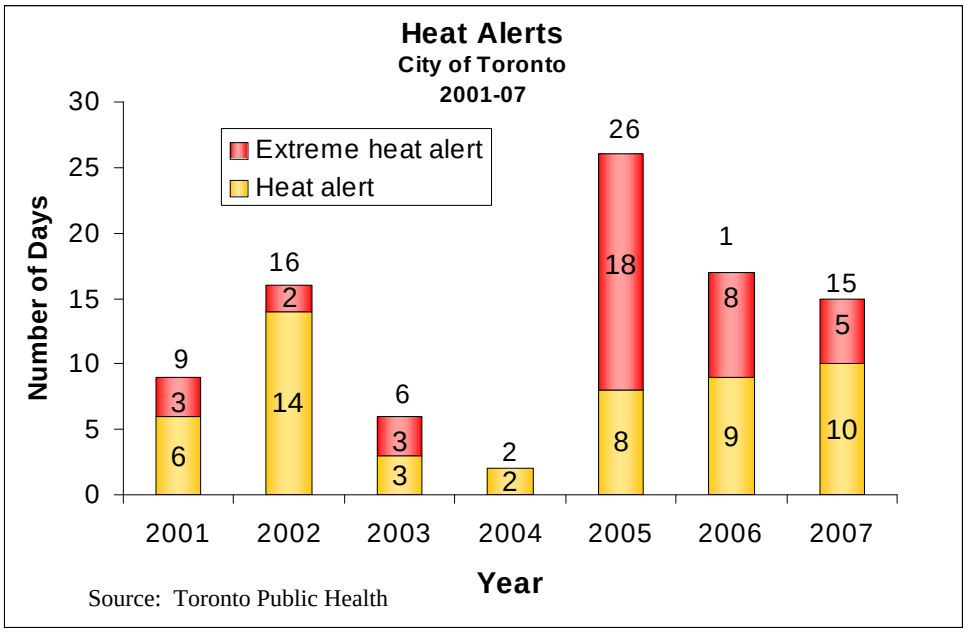
- Hot Weather Response Plan:

  - Toronto Public Health staff monitor the Heat Health Alert System from May 15 to September 30 each year and this synoptic system aids the City's Medical Officer of Health in determining when to call Heat/Extreme Heat Alerts.

  - People who live in areas which experience irregular but intense heat waves are most affected by oppressive hot weather. Socially isolated seniors are at higher risk of heat-related morbidity and mortality. Other at-risk groups include people with chronic illness including mental illness, children and people who have poor housing or are homeless.

  - Factors used to determine whether a Heat Alert or Extreme Heat Alert is called include: temperature, dew point, cloud cover, humidity, wind speed and direction, type of air mass and number of consecutive days with high temperatures. Based on the results, the Medical Officer of Health declares either a Heat Alert or an Extreme Heat Alert depending on specific criteria.

  - In the summer of 2005, there were an unprecedented number of Heat Alert and Extreme Heat Alert days as shown in the chart below:



- Toronto Public Health and its partners provide a coordinated hot weather response during heat alerts. Other key member agencies include Toronto Emergency Medical Services, Toronto Police Service, Shelter Support and Housing Administration, Parks, Forestry and Recreation, Toronto Public Library, Canadian Red Cross, Toronto Community Housing Corporation, Information Findhelp Services, Community Care Access Centres and Ontario Community Support Association.

- The Hot Weather Response Plan is a protocol that establishes the basic responsibilities of member and delineates the notification process for calling a Heat Alert or Extreme Heat Alert. This involves a series of special measures for the vulnerable populations — community outreach and education activities, opening air-conditioned spaces/cooling centres for vulnerable populations providing TTC tokens or transportation to a cooling centre if needed, extending hours of service such as libraries and swimming pools, distributing bottled water, and operating a heat emergency phone line. In addition, special events such as the World Youth Day 2002 attracted large crowds of people for an extended period of time. Extreme heat in these circumstances may call for Public Health's special measures to ensure the crowd's health is not at risk.

- The recommended 2008 budget for the Hot Weather Response Program under TPH is $379,100 ($226,500 cost shared and $152,600 municipally funded). This pays for the staffing of the program and other costs such as contracts between the City and the Canadian Red Cross and Findhelp Information Services, procurement of tokens, printing of resources, translation services, and purchasing of materials/supplies.

- Shelter, Support and Housing Administration is responsible for operating cooling centres in the event of extreme heat alerts. During the summer of 2007, $12,000 was spent on the operation of these services.

- In 2001, when Toronto Public Health launched its new Heat Health Alert System to help forecast heat alert days, the expected average number of Heat Alert and Extreme Heat Alert days was 4.5 per year (heat alert: 3.1 days; extreme heat alert: 1.4 days). This estimate was based on the 46 years of meteorological data used to create the Heat Health Alert System. In the seven years since implementation of the Heat Health Alert System, the average total number of Heat Alerts has been 7.6 days and Extreme Heat Alert days 5.6 days, for a total average of 13.1 days. This higher number of heat alert days per year far exceeds the number of previously anticipated heat events, and it has been a challenge for Toronto Public Health and its partners to carry out the Hot Weather Response Plan within existing resources.

- Parks, Forestry and Recreation runs a swimming program at the City's outdoor pools in the summer. When a Heat Alert/Emergency is called, the hours of these outdoor pools are extended past their normal operating hours to after midnight. Based on past experience, there are on average four to five days in a year that a Heat Alert may be called. Based on nine outdoor pools and five events per year, the operating budget impact is estimated at $36,000. Over the past years, the Division experienced up to 14 nights of Heat Alert. The situation could be exacerbated if weather becomes more extreme and these events become more frequent.

Extremely Low Temperatures/ Extreme Cold Weather Alerts:

- Extreme Cold Weather Alerts are called by the Director of Hostel Services between November 15 and April 15 each year when predicted overnight temperature without windchill is -15 or below or when other extreme winter weather conditions exist.

- Extreme Cold Weather Alerts are called to help get homeless people in from the cold. They trigger extra services such as street outreach and additional shelter beds to ensure the immediate safety of vulnerable homeless people.

- The City has a total budget of $33,000 for the Extreme Cold Alert Programs in the Shelter, Support and Housing Administration budget which provides enhanced services such as street outreach and distribution of tokens. Shelter, Support and Housing Administration also contributes funding for additional shelter beds that are made available. Staff budget for an average of 20 cold alert days in a year.

- Cold alerts were called over the past three years as follows:

Winter	2004/2005	2005/2006	2006/2007
Cold Alert Days	21 days	9 days	18 days

- For 2007/2008 12 days of alerts have been called to March 12, with approximately one months remaining in the Cold Alert season.

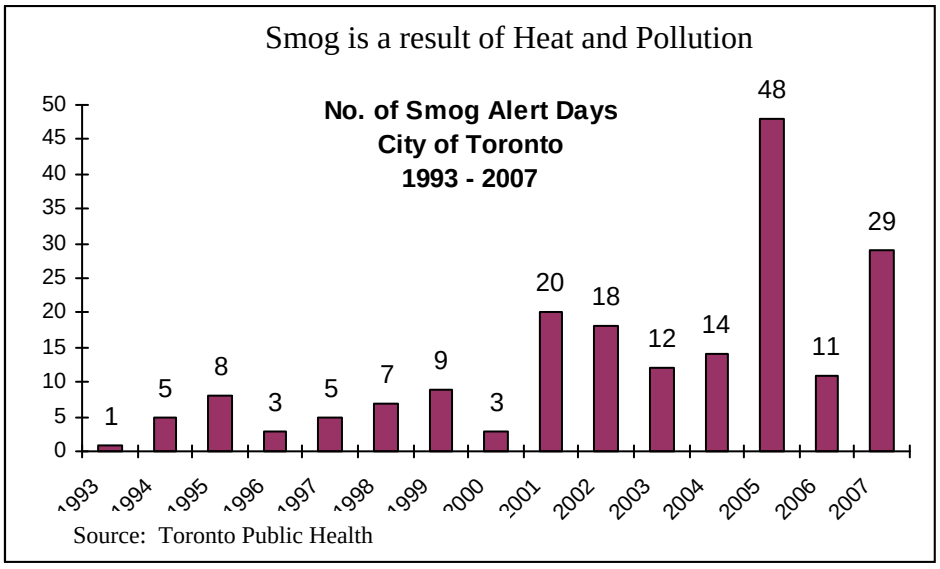
Smog:

- High temperatures, coupled with significant air pollution in Toronto, result in smog which is made up of ground-level ozone, fine particles and other pollutants.

- Smog can harm our health, e.g. worsen heart problems, asthma, bronchitis and other lung problems. It also irritates eyes, nose and throat. Toronto Public Health estimates that because of air pollution, every year about 1,700 people die earlier than expected and 6,000 visits are made to hospital because of heart and lung diseases.

- A Smog Alert is issued by the Ministry of the Environment when smog conditions are expected to reach dangerous levels in Ontario (Air Quality Index reaches or exceeds 50).

- Smog Alerts usually take place in May to September. The following chart clearly shows the increasing frequency of smog alerts in Toronto over the last 15 years from 1993 to 2007.



Appendix 4 – Examples of Weather Derivatives

Weather derivatives are financial products designed to protect companies against financial risks related to weather conditions adversely affecting revenues. The risks associated with uncertainties about weather are essentially transferred to the issuer of the weather derivatives. Examples include weather-indexed commodity contracts such as swaps, caps, floors and collars, weather-linked financing and weather-linked securities. A typical risk management contract is written in terms of cooling or heating degree days which is a measure of how far the mean daily temperature deviates from, say 21°C, requiring users to run their air conditioning or heating. However, contracts can also be written in terms of maximum/minimum temperatures, rainfall, snowfall or any combination of these.

Weather derivatives are mostly utilized by corporations with few product lines or services and whose profit depends largely on consistent weather. Here are some examples:

- Utility and energy companies can protect their volume-related revenue against, for example, cooler than average summers, or unusually warm winters. Using weather derivatives may stabilize their rates in an increasingly competitive market.
- Agricultural companies can replace revenues that might be lost due to freeze or drought. This adds stability to an inherently unpredictable business.
- Ski resort operators can add stability to their winter business which may be negatively impacted if the winter weather is warm.

Appendix 5 — Financial Assistance for Natural Disasters from Other Orders of Government

There are Federal and provincial programs in place that provide for financial relief for large-scale disasters that satisfy certain conditions. These programs are described below.

Provincial

The Ontario Disaster Relief Assistance Program (ODRAP), established in October 1999, is an assistance program designed to help municipalities, individuals, farmers, small business, and non-profit organizations get back on their feet after a natural disaster. It is intended to cover the costs of returning essential items to pre-disaster condition for people who have suffered damage in designated disaster areas. It provides provincial assistance, on a cost-shared basis, for private homeowners, farmers, small business enterprises and non-profit organizations, whose essential property has been damaged in a sudden and unexpected natural disaster, when damages are so extensive that they exceed the financial resources of the affected individuals, the municipality and community at large.

In the event of a natural disaster, individuals are expected to bear the initial responsibility for their losses. If the losses are so extensive that individuals cannot cope on their own, the municipality and the community at large are expected to provide support. ODRAP is not intended to be an alternative or a substitute for adequate insurance coverage. ODRAP provides financial aid for damages or losses of principal residence and property not covered by insurance, when the damage is caused by natural disasters. The Minister of Municipal Affairs and Housing has the authority to declare a disaster area for the purpose of this program. As well, municipalities who have sustained damages caused by a natural disaster which has been declared by the Minister of Municipal Affairs and Housing as a disaster area are eligible for provincial funding toward certain damages. Municipalities experiencing public property damages as a result of a natural disaster are required to adopt a council resolution requesting financial assistance and submit to the Ministry within 14 working days of the disaster. As an illustration, on July 31, 2001 eight municipalities and two municipally unorganized areas in Northwestern Ontario (including townships of Morley, Chapple, Dawson, Emo, Lake of the Woods, La Vallee, the towns of Rainy River and Fort Frances) were declared disaster areas by the Municipal Affairs and Housing Minister, making them eligible for funding under ODRAP. These areas experienced a severe storm with high winds and resulting flooding. Eventually the province covered eligible individual private losses at up to 90 per cent and 100 per cent of eligible municipal damages.

Federal

Under the 1970 Disaster Financial Assistance Arrangements (DFAA) the Federal Government provides financial assistance, on a cost-shared basis, to provincial and

territorial governments when response and recovery costs exceed what individual provinces or territories could reasonably be expected to bear on their own. The amount of this Federal compensation is determined by a formula which considers the severity of the disaster as well as the province's population. Eligible costs include those related to restoring public works to their pre-disaster condition and replacing or repairing basic, essential personal property of individuals, small businesses and farmsteads. The first level of coverage is normal insurance and the second level is DFAA programs. Since the inception of the program in 1970, the Government of Canada has paid out more than $1.8 billion in post-disaster assistance to help provinces and territories with the costs of response and of returning infrastructure and personal property to pre-disaster condition. Past payments under DFAA include those for the 2005 Alberta floods, the 2003 British Columbia wildfires, the 2003 floods in Nova Scotia, the 1997 Manitoba floods (Red River) and the 1996 Quebec floods (Saguenay Valley and North-Shore).

It should be noted the Federal Government does not provide assistance directly to municipalities under Disaster Financial Assistance Arrangements (DFAA). It offers assistance to the province for its extraordinary costs associated with emergency response. Eligible disaster damages must exceed $12.39 million (based on 2004 population) before Ontario becomes eligible for DFAA. Ontario has received compensation under DFAA on two occasions: 1998 ice storm and 2004 Peterborough flood.

In summary, municipalities are not entitled to direct Federal assistance for recovery under DFAA. Also, the Province will recognize and declare only major events causing severe damages as natural disasters. Even so, public damages will be cost-shared only under ODRAP. The responsibility for municipal property damages resulting from extreme events due to severe weather, but not so severe as to constitute a natural disaster under the provincial definition, still remain with the municipality. For example, while the regular snow-clearing budget provides for an average of one Type 3 snowstorm in a given year, five Type 3 storms in a row plus an average number of Types 1 and 2 storms would likely cause the budget to over-run. Yet, these storms would not be severe enough to meet the definition of a natural disaster. There is, therefore, a need for the City to plan for a funding strategy for costs related to severe weather events — the portion that is not cost-shared by the senior governments, as well as for the total costs of less severe events which do not fit the Provincial definition of a natural disaster.