

Toronto's Adaptation Actions

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Introduction

The following is a summary of the projects and programs that Toronto is undertaking in support of climate change adaptation. Many of these actions have been pursued with climate change adaptation as a "co-benefit" (i.e. adaptation was not the primary motivation for the action, rather it was a secondary benefit). A small number of the projects and programs however could be considered more just adaptive in nature (i.e. the main benefit is just coping with the impacts of extreme weather).

Toronto Environment Office has developed a Climate Change Risk Assessment Process and Electronic Tool. This Process and Tool have recently been applied to some City Divisions. It is anticipated that this risk assessment work will help more accurately identify and prioritize what adaptation actions are necessary. Accordingly, it is anticipated that more purely adaptation oriented projects or programs may be initiated. The results of the tool can be used to inform decision making on existing and future City projects and programs.

Given the rapid changes in the global and local climate, it is anticipated that the level of activity in climate change adaptation will likely increase as a result of prudent fiscal management and in the best interest of preservation of infrastructure and city services required by residents.

NAME OF PROGRAM OR ACTION	DESCRIPTION	LEAD
1. The Toronto Green Standard	Provides a set of mandatory performance targets for the design and construction of new developments in Toronto. The Standard will increase energy efficiency of buildings, reduce greenhouse gas emissions, reduce the urban heat island, conserve water, reduce storm water runoff and enhance neighbourhood green space (effective as of January 31, 2010). http://www.toronto.ca/planning/environment/greendevlopment.htm	City Planning
2. Green Development Standard Training Green Development Standard Training	A course aimed at developing staff capacity in understanding sustainable development as defined in the TGS. Intent is to create resource people throughout City Divisions and to shift corporate culture. This training is now offered as an official course by Human Resources. http://insideto.toronto.ca/uds/city_planning/pdf/tgs_manual.pdf http://www.cleanairpartnership.org/practices/Jane%20Welsh%20Toronto%20GDS.pdf	City Planning
3. Green Roof Bylaw	Requires green roofs on new developments or additions with a gross floor area of over 2000 square meters. (effective January 31, 2010). Requirements for industrial building were not yet in effect at the time of publication of this document. http://www.toronto.ca/greenroofs/overview.htm	City Planning Toronto Building
4. Deep Lake Water Cooling (Enwave)	Innovative program that involves pumping cold lake water to heat exchangers connected to cooling fluid sent to large buildings downtown where cooling is needed. This conserves electrical energy, reduce peak	Enwave Toronto Hydro

<p>and Peaksaver and Keep Cool Programs (Toronto Hydro)</p>	<p>electricity demand on hot summer days. Reducing dependency on the grid increases the resilience of Toronto by reducing the risk of brownouts and blackouts during heat waves. http://www.enwave.com/district_cooling_system.html http://www.torontohydro.com/sites/electricsystem/electricityconservation/residentialconservation/Pages/peaksaver.aspx</p>	
<p>5. The Better Buildings Partnership</p>	<p>This program helps building owners and developers to increase energy efficiency in existing buildings and in new construction, which decreases energy use and peak energy demand, reducing the vulnerability of the grid to brownouts and blackouts during heat waves. http://bbptoronto.ca/</p>	<p>Facilities Management</p>
<p>6. Integrated Plant Health Care (IPHC) Program</p>	<p>Healthy plants in parks improve urban environmental quality. Healthy plants are more resilient to drought and pests associated with climate change. IPHC Program develops standards of operation and delivers best practices for turf and horticultural management in parks and in so doing protects the environmental values associated with healthy urban greenspace. Impacts 3100 ha. of maintained parkland including 1,471 parks, 839 sports fields, 5 golf courses and 28 lawn bowling greens. http://www.toronto.ca/health/hphe/pdf/playing_it_safe_text.pdf</p>	<p>Parks, Forestry and Recreation</p>
<p>7. A Commitment to Double the Tree Canopy</p>	<p>Completed study of canopy potential, active planting of new forests and maintenance of existing ones. Expanding the tree canopy in Toronto will provide shade, lessen the urban heat island effect, and reduce runoff and other effects of climate change. The goal is to increase tree canopy cover from 17% to between 30 and 50%. http://www.toronto.ca/changeisintheair/pdf/clean_air_action_plan.pdf</p>	<p>Parks, Forestry and Recreation Transportation Services</p>
<p>8. Eco- Roof Incentive Program</p>	<p>Part of the City's Green Roof Strategy, "Making Green Roofs Happen", this program provides an incentive for green roofs to be installed on new or renovated Toronto buildings. http://www.toronto.ca/livegreen/greenbusiness_greenroofs_eco-roof.htm</p>	<p>Toronto Environment Office</p>
<p>9. Environmental Risk Assessment Project</p>	<p>International benchmarking study on climate change risk assessment; internal study on state of environmental risk management, training 30 staff in use of the Risk Assessment Process and Tools. http://www.toronto.ca/legdocs/mmis/2010/ex/bgrd/backgroundfile-32902.pdf</p>	<p>Toronto Environment Office Transportation Services Shelter Support and Housing Administration</p>
<p>10. Climate Drivers Study</p>	<p>Using state of the art climate models to understand what is driving severe weather events in the Toronto area and to see the frequency and magnitude of these events in future.</p>	<p>Toronto Environment Office</p>

11. Toronto Urban Climate Change Network	Convene climate scientists from a variety of organizations to assess climate studies and develop consensus on future climate of Toronto. http://www.tuccn.org	Toronto Environment Office
12. Toronto's Heat Alert system and Hot Weather Response Plan	Work with community agencies to prevent illness and death during periods of extreme hot weather. http://www.toronto.ca/health/heatalerts/index.htm	Toronto Public Health
13. Spatial Heat Vulnerability Assessment	To create a spatial heat-related vulnerability assessment tool and gather information about access top cooling to improve the effectiveness of the City's Hot Weather Response Plan. http://www.toronto.ca/health/hphe/air_quality/pdf/finalreport.pdf	Toronto Public Health (Funding from NRCan through Ontario Regional Adaptation Collaborative)
14. Evaluation of the City of Toronto Hot Weather Response Plan Evaluation of the City of Toronto Hot Weather Response Plan	Evaluation of the Hot Weather Response Plan to help identify areas of success and potential improvement in City and community responses to extreme heat and to maximize health benefits of the Plan. http://www.toronto.ca/legdocs/mmis/2010/hl/bgrd/backgroundfile-28173.pdf http://www.toronto.ca/health/heatalerts/pdf/hwr_plan_2009.pdf	Toronto Public Health (in partnership with Health Canada)
15. Air Quality Health Index Outreach	Provides resources to help Toronto residents make decisions to protect health by limiting short-term exposure to air pollution and adjusting activity levels during increased levels of air pollution. It also provides advice on how to improve the quality of the air. http://www.toronto.ca/health/airquality/aqi/toolkit.htm	Toronto Public Health
16. Shade Policy and Guidelines	Complement the Shade Policy for the City of Toronto and to assist all City agencies, boards, commissions and divisions (ABCDs) to provide UVR protection and sun safety measures for their outdoor environments. http://www.toronto.ca/health/resources/tcpc/shade_guidelines.htm	Toronto Public Health Parks, Forestry and Recreation
17. Climate Change and Health Equity Workshop	To initiate conversation among key Toronto stakeholders about how to support built environments that promote good health and are resilient to impacts of climate change, particularly among vulnerable populations.	Toronto Public Health
18. Toronto Food Strategy	Identifying initiatives that help build a healthy and sustainable food system including making food an essential element of the green economy and linking city and countryside. http://www.toronto.ca/civic-engagement/council-briefing/pdf/1-3-41.pdf	Toronto Public Health
19. Healthy Canada by Design	Healthy built environments have the potential to mitigate climate change and promote adaptation as well as promote positive health outcomes such as healthy eating, physical activity and clean air.	Toronto Public Health

20. Flood Warning Forecasting	Improve the existing system to better prepare for flood emergencies and reduce damage to life and property. http://www.trca.on.ca/flood-monitoring/forecast/46658	Toronto and Region Conservation Authority
21. The Wet Weather Flow Master Plan	The primary goal of the plan is to reduce the quantity of runoff, and to improve the quality of stormwater runoff through consideration of water balance and water quality control best practices. http://www.toronto.ca/water/protecting_quality/wwfmp/index.htm	Toronto Water
22. Basement Flooding Protection Program	The City is subsidizing the costs of installing back-water valves and sump pumps on household sewer connections in order to provide additional protection against flooding from sanitary sewers. http://www.toronto.ca/water/sewers/pdf/brochure.pdf	Toronto Water
23. Training Program integrating Environmental Design into Building Design and Construction	Develop Training Program with business, academia, and labour to improve the skill of architects, building and design professionals to incorporate integrated environmental design	Economic Development and Culture
24. Todmorden Mills	Improve Riverbank with planting and managing storm-water run-off	Economic Development and Culture
25. Fort York	Improve storm-water draining	Economic Development and Culture
26. Green Roof Alternatives for Industrial Buildings	Consulting on alternative options to green roofs on industrial buildings, that address benefits to green roofs	City Planning Toronto Building
27. Green Parking Lots	Draft design guidelines for greening surface parking lots have been prepared by City Planning and pilot projects are in progress. http://www.toronto.ca/tfto/parkinglots.htm	City Planning
28. Urban Heat Island Research and Approaches to "cooling" the City	Identification of Toronto's "hot spots", what causes them, and implementing strategies to cool the city. http://www.cleanairpartnership.org/files/Climate%20Change%20Adaptation%20Planning%20in%20Toronto.pdf http://www.cleanairpartnership.org/urban_heat_island	City Planning Clean Air Partnership Toronto Environment Office Toronto Public Health
29. Implementing Water Efficiency Measures within Parks, Forestry and Recreation	Develop a water conservation strategy for the implementation of water efficiency measures. http://www.toronto.ca/environment/initiatives/pdf/presentations/pf_and_r.pdf http://www.toronto.ca/legdocs/mmis/2011/bu/bgrd/backgroundfile-34918.pdf	Parks, Forestry and Recreation

30. Water Conservation	Park irrigation systems computer controlled for weather conditions; splashpads are timer controlled; drinking fountains retrofitted; recycle splash pad water for park irrigation	Parks, Forestry and Recreation
31. Green Roof Installation	Regent Park Pool, Warden Corridor Community Centre, Parkway Forest Community Centre, York Community Centre http://www.toronto.ca/greenroofs/pdf/fullreport103105.pdf http://www.toronto.ca/greenroofs/pdf/GreenRoof-supGuidelines.pdf	Parks, Forestry and Recreation
32. Increased Systemic tree pruning services	Systemic maintenance promotes healthy tree growth, reducing long term maintenance costs. Stronger trees are more likely to survive climate stresses such as drought and wind	Parks, Forestry & Recreation
33. Expand parkland naturalization and naturalization of lands surrounding water and wastewater facilities	Decreased storm water runoff. Increased canopy cover in our parks and open spaces, from the existing 30% to over 50%. Reduced use of fossil fuels for maintenance of cut grass.	Parks, Forestry & Recreation Toronto and Region Conservation Authority Toronto Water
34. Increase enforcement of tree protection and planting requirements for private lands during development review	Tree protection during development and education of residents to promote healthy tree growth is necessary for sustaining and increasing the tree canopy.	Parks, Forestry & Recreation City Planning
35. Provide indoor cooling centres & outdoor cooling stations	Provides summer heat escape locations for City dwellers and tourists. http://www.toronto.ca/housing/cooling-centres.htm	Parks, Forestry & Recreation Toronto and Region Conservation Authority
36. Solar Domestic Hot Water	Development of Program to facilitate the approval and installation of solar domestic hot water systems in Toronto	Toronto Building
37. Live Green Toronto	To support neighbourhoods and communities in greening projects, including initiatives that will reduce climate change impacts. http://www.toronto.ca/livegreen/index.htm	Toronto Environment Office (TEO)
38. Home Energy Assistance Toronto	Grants for residents who upgrade their home's insulation(Concluded March 31, 2011) http://www.toronto.ca/livegreen/greenlife_saveenergy_rebates_heat.htm	Toronto Environment Office
39. Improve Future Climate Change Prediction Capabilities	Improved information on expected climate changes will permit better decision-making on adaptation planning.	Toronto Environment

	Models will help develop watershed plans that will aid adaptive management in the Rouge, Don and Humber River watersheds.	Office, Toronto and Region Conservation Authority Toronto Water City Planning
40. Tree Planting	E-Billing promotion; planted a tree for every customer that switched to e-billing. A second project with LEAF planted 2450 trees as part of the Taylor-Massey Project. http://www.toronto.ca/trees/tree_planting.htm	Toronto Hydro
41. 104-745 Ossington Avenue	Introduction of permeable pavers, bio-retention swale (select plant species tolerant to flooding, drought and salt contamination), landscaping, site grading	Toronto Parking Authority
42. Lighter Coloured Pavement	Where permeable pavers are not an option, lighter coloured pavement is used to reduce urban heat island effect. http://www.toronto.ca/environment/initiatives/pdf/presentations/toronto_parking_authority.pdf	Toronto Parking Authority
43. Tree Advocacy	Issues heat warning and works with community agencies to prevent illness and death during periods of extreme hot weather	Toronto Parking Authority
44. Green Roof	Bloor and Gladstone Branch	Toronto Public Library
45. Water Efficiency Plan	Reduce peak demand and average day demand consumption through water efficiency programs for Industrial, Commercial and Institutional customers. http://www.toronto.ca/watereff/plan.htm	Toronto Water
46. Review Urban Flooding Issues Conduct the Don Trunk Sewer & Waterfront Wet Weather Flow Control Projects	To improve ability to design storm drainage infrastructure for extreme runoff events. To identify future policy and program requirements for flood protection. To assess the effects of extreme weather on long term performance of existing and new wet weather flow facilities and attain water quality goals. http://www.torontorap.ca/dotAsset/65144.pdf	Toronto Water
47. Sustainable Sidewalk Field Test and Implementation of New Standards for supporting Healthy Tree Growth by Continuous Soil Trench	Construction of a sidewalk and parking bay using soil cell technology to allow healthy tree growth and utilizing storm water to sustain trees. Possibly an ongoing program-silva cell technology was implemented in other locations	Toronto Water, City Planning, Parks, Forestry and Recreation, Transportation Services, Technical Services

<p>48. Reduce Stream Erosion and Increase Stream Restoration</p>	<p>Coordinate Procedures among different levels of government to reduce stream erosion and in the long-term aid in stream restoration</p>	<p>Toronto Water, Toronto and Region Conservation Authority, Parks, Forestry and Recreation, Ministry of Natural Resources, Department of Fisheries and Oceans</p>
<p>49. Complete Flood Warning Systems Conduct Lake Ontario Shoreline Planning</p>	<p>To improve existing systems to prepare for flood events Adaptive design for aquatic diversity and flood protection will take into account fluctuations of water level. http://www.trca.on.ca/protect/environmental-assessment-projects/guild-inn-shoreline-regeneration-project.dot</p>	<p>Toronto Water Toronto and Region Conservation Authority</p>
<p>50. Citywide Mandatory Downspout Disconnection</p>	<p>Reduce flooding, and pressure on storm water systems. http://www.toronto.ca/water/pdf/mandatory_downspout_disconnection_program-staff_report.pdf</p>	<p>Toronto Water</p>
<p>51. Uninterrupted Power Supply for Water Treatment Plants</p>	<p>Installed local generation capacity and developed enhanced contingency plans to operate critical water treatment and distribution systems and waste water treatment systems during extended power outages.</p>	<p>Toronto Water</p>
<p>52. Assess Design Standards for Wet Weather Flow Master Plan</p>	<p>Assess new design standards to help identify tradeoffs between storing water on site & getting water off the lot. Establishing & assessing new design standards will reduce property flooding in the long term. http://www.toronto.ca/water/protecting_quality/wwfmmmp/index.htm</p>	<p>Toronto Water</p>
<p>53. Assess Effects of Extreme Weather, Droughts and Heat on Water Quality of Area Watercourses and Beaches</p>	<p>Confirm simulations of recent modelling exercises with real data from Rouge and Humber River watershed studies, to define the extent to which climate change affects water quality.</p>	<p>Toronto Water</p>
<p>54. Bylaw Reducing Construction of New Reverse Slope Driveways</p>	<p>Reduces the risk of private property flooding and the amount of flooding damage during extreme precipitation events</p>	<p>Toronto Water, City Planning Toronto Buildings</p>
<p>55. Source Water Protection</p>	<p>Further studies on the impacts of warmer lake water on algae growth and the possible increase in taste, odour and water quality issues for water treatment plants.</p> <p>Assess the vulnerability of water intakes to spills from sewer breaks and discharge plumes from extreme runoff events. http://www.toronto.ca/legdocs/mmis/2008/pw/bgrd/backgroundfile-13880.pdf http://www.trca.on.ca/protect/water-management/source-protection.dot</p>	<p>Toronto Water Ministry of Environment Regions of Peel, Durham, Halton, Hamilton-Wentworth, and Niagara Toronto and</p>

		Region Conservation Authority
56. New winter weather technologies to improve monitoring for snow and freezing rain conditions Combination ploughing and salting vehicles	These innovations will allow: a) better use of salt; and b) reduced accident claims and service delivery costs in freezing rain episodes expected to increase under climate change	Transportation Services
57. Clean Roads to Clean Air Program	Evaluated removal performance of street sweepers. New street sweepers can operate without water in during winter months which allows roads and the air to be clearer for longer periods of the year. With climate change the time without snow may be longer. http://www.toronto.ca/transportation/environment/index.htm#clean	Transportation Services
58. Replacement of Traffic Controllers	Replacement of traffic signal controllers that have environmental controls (heater and cooling fan) and therefore have a higher heat and cold tolerance.	Transportation Services
59. Upgrade Pavement Heat Tolerance for Expressways and Arterial Roads	Replace pavement on expressways and arterial roads with more heat resilient pavement that reduces the degradation under extreme heat and heavy traffic.	Transportation Services
60. Green Streets OR Green Streets	Transportation Services is sponsoring a Transportation Association of Canada (TAC) project whose goal is to develop a "Green Guide for Roads" document. The guide will be a self-evaluation and decision-making tool for transportation projects based on criteria and guidance that will help incorporate green concepts and environmental stewardship into all aspects of the roadway lifecycle. The guide will encourage the inclusion, within roadway projects, features that are environmentally, financially and socially responsible and thereby contribute to the sustainability of transportation facilities and liveable communities. The tool would be applicable to all types of roads in urban and rural settings, such as freeways/expressways, arterials, collectors, local roads and laneways/alleys. http://www.tac-atc.ca/english/projects/pdf/greenguide-map.pdf http://www.toronto.ca/planning/urbdesign/streetscapemanual.htm	Transportation Services
61. Current "Green Streets" Projects	The various projects are being implemented but will eventually fall under the Green Street: <ul style="list-style-type: none"> • Porous/Permeable Paving Technology • Naturalization/Transformation of boulevards- replace hard surface material with sod and plant materials • Garden Project, support community garden through Neighbourhood Beautification programs 	Transportation Services

62. Road Narrowing	Narrowing of roads (pavement width) depending on the road classification categories and traffic operations requirements to increase green boulevards (green space and trees) and widen sidewalks.	Transportation Services
63. Tree Planting	Plant trees every year since 2005 on streets that have undergone construction	Transportation Services
64. Increased planning regulations/guidelines to support healthy trees	For example, expanded implementation of new standards for supporting healthy tree growth by continuous soil trench systems in commercial areas. Extending the life of trees from 6 years to 35 years in commercial areas, increasing shade, reducing energy demand for cooling. http://www.toronto.ca/trees/private_trees.htm	Transportation Services City Planning Parks, Forestry & Recreation
65. Increased Street Tree Planting	Reduce urban heat island effect and reduce storm water run-off	Transportation Services, Parks, Forestry & Recreation
66. Climate Change Engineering Vulnerability Risk Assessment of Several Culverts	Reduce risk of infrastructure failure due to extreme weather; improved design standards; avoid disruption to the public and avoid significant insurance claims. http://www.toronto.ca/teo/pdf/forum_proceedings.pdf	Transportation Services Toronto and Region Conservation Authority
67. Tommy Thompson Park Natural Area Enhancement	Wetland creation, shoreline restoration, meadow enhancement, invasive species management and creation of essential habitats. http://www.trca.on.ca/protect/lake-ontario-waterfront/ttp-master-plan-implementation.dot	Toronto and Region Conservation Authority
68. Don Mouth Naturalization and Port Lands Flood Protection Project EA	Land rehabilitation to improve fluvial structure of the Don and Don Narrows which is critical to be able to handle high flow associated with extreme rain events. http://www.trca.on.ca/dotAsset/25695.pdf http://www.trca.on.ca/protect/environmental-assessment-projects/don-mouth-naturalization-and-port-lands-flood-protection-project/	Toronto and Region Conservation Authority
69. Species Recovery Planning Expanding Regional Watershed Monitoring and Reporting to include climate change	Develop species recovery areas to aid in the survival of species threatened by climate change (and other stressors). Expanding the scope of the existing monitoring program to evaluate the changes arising from climate change to terrestrial and aquatic systems. http://www.toronto.ca/legdocs/mmis/2007/pg/bgrd/backgroundfile-6419.pdf	Toronto and Region Conservation Authority Toronto Zoo
70. Expand Sustainable Technologies Evaluation Program (STEP) to monitor green building	Provide data and analysis to support implementation of roof top gardens, permeable pavement, bio retention swales, rainwater harvesting systems, erosion and sediment control ponds and bio filtration systems all of which will help adapt to extreme rain and droughts expected under climate change. http://www.trca.on.ca/dotAsset/50123.pdf	Toronto and Region Conservation Authority MOE Toronto Water Other regional

technologies		municipalities
71. GTA Collaborative Group on Climate Change	Convene a group of staff from regional municipalities to share information on climate change science and adaptation actions to reduce duplication of efforts and enhance synergistic cooperation. http://www.toronto.ca/legdocs/mmis/2010/ex/bgrd/backgroundfile-32902.pdf	Toronto and Region Conservation Authority
72. Green Roof	Victoria Park, Eglinton West Subway Platform http://www.toronto.ca/environment/initiatives/pdf/presentations/ttc.pdf http://www3.ttc.ca/Service_Advisories/Construction/Victoria_Park_Station_Bus_Terminal_Replacement1.jsp	Toronto Transit Commission
73. Cool Roof	Wilson Carhouse Addition http://www.toronto.ca/environment/initiatives/pdf/presentations/ttc.pdf http://www.ttc.ca/postings/gso-comrpt/documents/report/f3430/TTC_Environmental_Plan_-_Initiatives_and_Implementation.pdf	Toronto Transit Commission
74. Green Roof	Australasia building http://www.torontozoo.com/conservation/greenroof.asp	Toronto Zoo
75. Green Roof	Tundra Trek (polar bear holding) http://www.torontozoo.com/ExploretheZoo/tundratrek.asp	Toronto Zoo
76. Wetland Restoration	Re-colonization of habitat in Rouge Park tableland http://www.trca.on.ca/dotAsset/37780.pdf	Toronto Zoo

Another useful website: **Detailed Listing of Green Initiatives and their Environmental Benefits for GHG Reduction Claims during the period of 2001 to 2011**

<http://www.toronto.ca/legdocs/mmis/2009/pe/bgrd/backgroundfile-23953.pdf>