

Our File/N/Réf. 04-98-0001
Your File/V/Réf.

DATE 22 June 1998

TO/DEST. The Chair and Members of Regional Council

FROM/EXP. Commissioner
 Planning and Development Approvals Department

SUBJECT/OBJET **FLOOD PLAIN POLICIES**
 RESPONSE TO INQUIRY No. P&E - 3 (98)

INTRODUCTION

At the Planning and Environment Committee meeting of April 14, 1998, Councillor Munter inquired if current policies regarding development in flood plains are adequate given the mounting evidence on climate change and extreme weather events. He also asked whether there were steps the Region could be taking to be more active in preventing future flooding of homes through preventative planning measures.

DISCUSSION

Staff have now completed an initial review of the issue and discussed the concern with the local Conservation Authorities. The inquiry involves examining current standards and policy approaches in light of recent experience, and assessing the ability of these standards and approaches to address climate change and uncertainty.

Current Approach

The current approach is based on Provincial Policy and Standards combined with flood plain information for each watercourse.

Information Previously Distributed

To be listed on Planning and Environment
Committee Agenda of 14 July 1998

Standards and Mapping:

The flood plain standard in Ottawa-Carleton is the 1 in 100 year storm. The 1 in 100 year storm is a frequency-based standard, as opposed to a standard based on an actual flood event such as Hurricane Hazel. A 1 in 100 year frequency based flood standard refers to a storm that has 1% chance of occurring in any given year (as opposed to occurring only once every 100 years). It is calculated using past records of storm events (ideally, 50 years worth of reliable records should be used to calculate a 1 in 100 year storm). It is important to note that over time, the records and calculations are reviewed and trends examined to ensure that the calculations are still credible. An established trend in storm size or frequency could result in an adjustment to the 1 in 100 year storm standard and associated levels.

The 1 in 100 year flood plain has been mapped for the major watercourses in RMOC. Most of the mapping was completed in the 1980's when funding from the Canada-Ontario Flood Damage Reduction program was at its height (the program has now effectively ended). The following list summarizes the current mapping for RMOC and the date it was completed.

Latest Flood Plain Mapping in Ottawa-Carleton

1976	Graham Creek
1978	Bearbrook and Tributaries (City of Gloucester)
1981	Jock River (Rideau River to Richmond)
1982	Rideau River Tributaries (Brassils and Cranberry Creeks)
1984	Rideau River (Rideau Falls to Mooney's Bay)
1984	Sawmill Creek
1984	Watts Creek
1984	Carp River
1984	Mississippi River
1984	Glen Cairn Creek
1984	Cody Creek
1985	Ottawa River
1985	Poole Creek
1989	Shirley's Brook
1989	Kizel Drain
1989	Rideau River (Mooney's Bay to Regional Road 6 near Kars)
1991	Bear Brook (Twp. of Cumberland)
1992	Castor River (north, middle and south in Osgoode and Gloucester)
1994	Constance Creek (West Carleton)
1997	Bear Brook (Gloucester) - flood elevations calculated but mapping not complete
1997	Rideau River (Kars to Burritt's Rapids)
1997	Steven's Creek update (Rideau River to west of North Gower)

In Ottawa-Carleton, the Conservation Authorities have indicated that, although more frequent updating in some areas would be desirable, most of the mapping is still valid. They review the mapping and underlying hydrologic and hydraulic analyses from time to time, particularly if an issue arises over a development area. Mapping may be updated based on analysis from site

specific development applications. It is also reviewed based on recorded experience, such as several years of extreme flooding events.

Policies:

Flood plain policies are designed to ensure that new development is not located in the 1 in 100 year flood plain (Regional Official Plan Policy 11.2.4). There are circumstances where development may occur if there is an approved two zone (floodway/floodfringe) policy in place or in situations, such as existing lots/additions where it is not possible to locate development outside of the flood plain area.

Under their regulations the Authorities may permit development if they are satisfied that there will be no adverse effects on the "control of flooding, pollution or the conservation of land". This type of development requires permits from the Conservation Authority and they use the 1 in 100 year storm standard and apply a margin of safety or freeboard (e.g., requiring that the structure is protected against damages at water levels equal to the estimated 1:100 year flood level plus 30 cm) within the established flood proofing standards. Flood proofing standards are based on Provincial Guidelines and engineering plans are required for development in the flood plain.

Most of this new development or re-development occurs on existing lots (new subdivisions or lots created by severance do not generally have building envelopes in the flood plain). For example, between 1991-1996, the RVCA issued approximately 80 permits for new construction (does not include additions/replacements but could involve accessory buildings) in areas they regulate. The MVCA issued permits for 142 projects but this includes additions/replacements as well as accessory buildings. The SNRCA have issued 19 permits for construction since 1994 (the year in which their regulations came into existence). A more detailed breakdown would require examining individual permit files to describe the nature of the permit.

It is important to note that policies such as the protection of wetlands and other natural environments, use of design with nature techniques, and provisions related to sub-watershed and site management plans also make an important contribution to flood control objectives by preventing increases in flood flows and buffering the impact of development.

Is the Approach Adequate?

The approach used in Ottawa-Carleton conforms to provincial policies and standards and provides adequate protection in circumstances within the control of municipalities and regulatory agencies. New lots are not being created in situations where safety and property damage would be a concern under the 1 in 100 year storm. The recent events on the Mississippi River exceeded 1 in 100 year levels in some areas of the watershed but the MVCA indicated that flood proofing requirements (including the margin of safety) prevented damage in those situations where permits had been required.

There are obviously situations where damage may occur, primarily areas with development that pre-dated regulations and flood plain mapping. Dealing with these situations involves remedial, as opposed to preventative, measures. There are flood risk areas in Ottawa-Carleton and remedial strategies have been proposed in some of these areas at various times. In some cases, the

strategies may not have been fully implemented for a number of reasons including costs and concerns over potential impact on properties. In addition, the approach does not necessarily account for extreme events in excess of the 1 in 100 year flood and the margin of safety.

Future Trends

Over the past several years, the climatic context for flood plain policies has been changing. Several extreme weather events combined with concern over climate change has prompted some examination of approaches to natural hazards. For example, the Ministry of Natural Resources has initiated a process to review flood standards and criteria in light of climatic change and recent flood events. The first step in the process is to gain a better understanding of the climate change issue and its implications for Ontario. A recent conference in Ottawa sponsored by Natural Resources Canada also examined the implications of extreme weather events on planning for natural hazards and emergency measures. The implications of recent events on water quality have also been discussed at the Water Quality Committee (see attached excerpt from the May 7 meeting).

The climate change issue also has implications for flood forecasting in the sense that current models are geared towards predicting flood patterns based on historical storm patterns. The models are designed to address early spring frontal systems with relatively lower rain intensities and longer durations than the localised cells of high intensity, large volume rainfall (e.g. last year's event in the northwest portion of the Mississippi watershed). The ability to deal with these events is limited by the ability to forecast them in advance, and the lack of streamflow forecast models that can produce reliable flow and water level predictions for such events.

Potential Action

A fundamental change in the policy approach and standards would be difficult to justify in the short term for several reasons:

- the 1 in 100 year storm standard can be adjusted as climatic conditions change, although changes should be based on several years data and an established trend;
- there is a margin of safety in the process of delineating flood hazards and estimating flood levels; accordingly a factor of safety (freeboard) is applied in the regulatory policies to provide protection for events exceeding the estimated 1 in 100 year levels;
- for larger events, it may be more a question of extent of the area flooded as opposed to depths of the flood (in other words, although a 1:200 year event is half as likely to occur in any given year as a 1:100 year event, the expected water levels for a 1:200 year event would not be twice the height above "normal" as a 1:100 year event) ; and
- given the complexity of the issue and the past concerns with flood plain policy approaches, it would be difficult for RMOC to develop and defend a different standard that is not supported by Provincial Policy (there is now an initiative examining the issue at the provincial level). It would also require a change in Conservation Authority regulations which, at present, require approvals from the Province.

While a fundamental change in the approach and the standards would be difficult to pursue and justify, several adjustments could be examined to improve the system in the face of uncertainty.

- Review and update the estimates of the magnitude of the 1 in 100 year flood and associated water levels. This should be done on a 10 or fifteen year cycle but funding is an issue. If data and scientific understanding of climate change implications establish a basis, 1 in 100 year flow estimates could be revised by a selected factor and flood levels could be recalculated.
- An additional safety factor could be added by increasing freeboard requirements. While this would not involve changing standards, approaches, or mapping, it would still require some justification, likely through some review of flood level estimates as noted in the previous point.
- Efforts to examine the issue at the provincial level could be monitored and used to evaluate approaches in Ottawa-Carleton.
- Funding provided for flood plain mapping could be reviewed and increased where necessary. There are some watercourses where additional mapping would be appropriate, and some areas where mapping should be updated. Funding from senior governments has been reduced significantly (in 1997, the Province approved only \$370,000 worth of funding for all technical studies including flood plain mapping by all Conservation Authorities). Senior governments could be lobbied for additional funding, and the Conservation Authority budgets could be reviewed to ensure that adequate resources for technical updates and enforcement are in place, particularly in areas experiencing development pressure. Similarly, ongoing review of the resources for stream gauge networks (an important warning factor for impending flood situations and protection of development already at risk) would be prudent.

CONCLUSION

Current approaches to flood plain planning in RMOC meet Provincial Standards and have been effective in terms of preventive measures and ensuring that new development and construction is not susceptible to damage, and does not create hazardous situations, under the 1 in 100 year storm standard. This standard remains generally applicable and appropriate, particularly if efforts are made to monitor and update the estimates of the flows and magnitude of the 1 in 100 year storm. A fundamental change in the standard and/or policy approach would, given the implications on planning policies and regulatory approach, require extensive review and discussions with provincial officials and the residents of Ottawa-Carleton.

However, there are options that would improve our ability to deal with uncertainty. These will also require some additional analysis and review of funding provisions for flood plain mapping and modelling. This is an ongoing activity, and staff will review the issue with the Conservation Authorities in the context of the 1999 budget, and will monitor discussions at the provincial level with respect to standards and policy approaches.

Approved by
N. Tunnacliffe, MCIP, RPP

**ATTACHMENT - EXCERPT FROM MAY 6 SURFACE WATER QUALITY
COMMITTEE MEETING MINUTES**

98.05.3 Spring Flooding Information and Implications for Water Quality (CA's)

- Mississippi Valley Conservation Authority
 - severe flooding
 - stream gauge frequency analysis 1 in 200 year storm
 - gauge upstream of the Village of Lanark excess of 500 year return (limited length of record)
 - what drove the flood was the smaller watercourses
 - raingauge most northerly recorded 64 mm in 5 hours
 - all flow gauges were off scale
 - Clyde peaked first at 168 m³/second
 - Appleton 268 m³/second
 - Mississippi Lake maximum 12 cm - 100 year water level
 - flooding for the most part was limited to sparsely populated areas
 - number of septic systems flooded
 - MVCA will recommend that their municipalities write or update emergency plan
 - flood standards are 1 - 100 year level
 - No long term water quality impacts anticipated

- South Nation River Conservation Authority
 - 1 - 50 year peak
 - banks full
 - did not get the rain volumes received in the Mississippi Valley
 - 1000 cms
 - no problems or water quality issues
 - suggest a plan be put in place to identify and remove point sources of pollution
 - can not keep cutting back on planning and prevention; what happened in the Mississippi could happen on any watercourse

- Rideau Valley Conservation Authority
 - 1 - 5 year peak flow
 - water quality implications not out of the ordinary

- Ministry of Natural Resources
 - significant Ministry resources were deployed to assist in flood relief in Mississippi Valley; army was also assisting
 - aerial surveys clearly indicated flood mitigation properties of wetlands

D. O'Grady has a copy of the Taylor Report (done in 1984 provincial policy on flood plain criteria - see attached summary) if anyone is interested. Water Quality Committee discussed examination of watersheds we have and up-to-date mapping of today's standards for effects of a 200 year storm on the Ottawa River or Rideau River. CA's to develop a concept for 1999 Budget and report back at the next meeting.