

	<p><b>MVC Memo - May 12, 2008 Floodplain Management: Floodway/Flood Fringe Implementation</b></p>	<p><b>Response</b></p>
<p><b>1</b></p>	<p>This memo is to review the policy basis for application of a floodway/flood fringe proposal as part of the Carp River Restoration Plan and how some other Conservation Authorities have chosen to address similar situations.</p>	<p><b>i) Use of the term flood fringe is applicable to the use of two-zone policy as per the Provincial Policy Statement (PPS). While the application of a so-called two-zone policy to this reach of the Carp River was originally identified in the Carp River Watershed/Subwatershed Study, it has since been identified as a "modified one-zone" by the Ministry of Natural Resources and the City of Ottawa.</b></p> <p><b>ii) What is the difference between a two-zone and a "modified one-zone"? One zone policy is the preferred approach to floodplain management in Ontario: simply, new development is directed away from the entirety of the regulatory floodplain. However, by precluding development within the whole floodplain, this approach can create economic and social hardship for communities that historically developed within floodplains. In these instances, consideration may be given to a two-zone approach that divides the floodplain into two areas: the floodway (where depths and velocities are higher and further infill/redevelopment is precluded) and the flood fringe (where depths and velocities are lower and infill/redevelopment can be considered subject to meeting various tests such as the ability to floodproof new structures, availability of ingress/egress during flood conditions and demonstration of no negative impacts upstream or downstream).</b></p> <p><b>Two zones result in a partial filling of the fringe area as floodproofed infill/redevelopment occurs. The whole fringe area defined is not filled because the presence of adjacent existing development generally precludes this. Rather, new structures are floodproofed but some of the lot may remain within the flood fringe (i.e., subject to flooding). There is typically some loss of flood storage that results from this floodproofing of infill development within the fringe but the limited application of two</b></p>

		<p>zones to existing floodprone communities limits the potential for cumulative impacts.</p> <p>iii) While the term "modified one zone" does not appear in the PPS, it has been used to refer to modifications to the regulatory floodplain that nevertheless maintain the same characteristics as the original floodplain - in other words, while there may be changes to the location of the regulatory floodplain, there is no net gain of developable land and no loss of flood storage (as there is with the two-zone application).</p>
2	The Carp River Regulatory (1:100 year) flood plain is wide and shallow with low flow velocities through the Kanata West area (Richardson Side Road to Hazeldean Road).	<p>There is no mention of "wide and shallow" floodplain in the PPS or the Technical Guide - River and Stream Systems: Flooding Hazard Limit (Ministry of Natural Resources, 2002). Further, no definition has been provided for what constitutes "wide and shallow" in the Carp River Watershed/Subwatershed Study or the Kanata West Class EA documents. A review of Figure 6 (from: Post-Development Flow Characterization and Flood Level Analysis for Carp River, Feedmill Creek and Poole Creek, CH2MHill, June 2006) shows that the floodplain upstream of Highway 417 is not unusually wide at all. Likewise, downstream of the 417, where the floodplain becomes comparably wider, it is not significantly wider than the floodplain downstream of Richardson Side Road. Further, on the west side of the river, south of Richardson Side Road, where a significant area of filling is proposed, flooding depths approach 1 meter - which cannot be considered shallow.</p>
3	As part of the Carp River Restoration Plan it is proposed to fill some flood fringe areas of the flood plain above the Regulatory flood plain to allow for residential development while regional stormwater management ponds will be constructed in other areas of the flood fringe.	
4	The application of this floodway/flood fringe concept for flood plain management has been referred to as the two-zone concept and also as a modified one-zone concept. The attributes of the proposal should be the focus	<p>As detailed in item 1, two-zone policy is not interchangeable with "modified one zone" policy. As with any policy, the accurate use of terminology is important to ensure the intent of the policy is met.</p>

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	and not the terminology used to describe the concept.	
	<b>For the Carp River floodway/flood fringe concept:</b>	
5	The floodway/flood fringe concept was a recommendation in the Carp River Watershed/Subwatershed Study. This study reviewed and analyzed the entire watershed and was completed after extensive public and agency input and review.	<b>This original recommendation was made without sufficient technical analysis as evidenced by the subwatershed study recommendation to undertake further detailed analyses (updated hydrology, hydraulics and floodline mapping) to ensure no negative impacts.</b>
6	Further and more detailed analysis was completed in support of the various Class Environmental Assessments that were completed for the Kanata West lands.	<b>This refers to studies that were found to have a number of errors and oversights by City staff in January 2008 and that have been further impugned by the findings of the City's Auditor General: <a href="http://ottawa.ca/calendar/ottawa/citycouncil/ara/2008/05-08/Carp%20Audit%20APRIL%2022%2008.htm">http://ottawa.ca/calendar/ottawa/citycouncil/ara/2008/05-08/Carp%20Audit%20APRIL%2022%2008.htm</a></b>
7	Any area in the flood fringe that will be used for residential or commercial development will be raised above the Regulatory (1:100 year) flood plain level before development occurs.	<b>As per item 1, this is not a two-zone and the use of the term fringe is inappropriate. As a further example, for true two-zone applications, an actual fringe, defined by a specific flood elevation, is identified - such an elevation has never been identified for the Carp River Restoration. This flood elevation is required to divide the floodplain into the flood fringe (lower flood depths and velocities) and floodway. (Refer to the two-zone applied in the village of Constance Bay, where a fringe based upon a specific flooding depth and elevation was defined within the existing developed area of the village: <a href="http://ottawa.ca/residents/planning/community_plans/completed/constance_bay/images/constance_bay_en.pdf">http://ottawa.ca/residents/planning/community_plans/completed/constance_bay/images/constance_bay_en.pdf</a>).</b> <b>The Carp River floodplain has never been so divided, rather a corridor width was set but on what physical basis other than maximizing developable land from floodplain is not clear.</b>
8	In addition to the other attributes of the Carp River restoration plan, flood plain storage will be maintained within the reach (i.e. all flood	<b>Given the errors and shortcomings identified in the modeling (see items 6 and 9), it has not yet been demonstrated that flood storage has been maintained in the study reach. To suggest otherwise is premature.</b>

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	plain storage lost as a result of filling of the flood fringe lands will be replaced through modifications to the remaining corridor).	<b>It is further evident from the proposed fill and cut areas that flood storage has not been maintained in elevation increments of 0.3 meter.</b>
<b>9</b>	As you are aware, updated hydrologic (flow) and hydraulic (water level) analyses, to assess potential impacts of future development and flood plain modifications, have been completed.	<b>This statement ignores the fact that there have been significant shortcomings and errors identified in the hydrologic/hydraulic modeling (both by City staff and the City's Auditor General) that seriously undermine the recommendations of the work completed to date.</b>
<b>10</b>	Various scenarios have been analyzed and an ultimate future scenario includes the full restoration/flood plain plan, Kanata West in the developed condition with stormwater management following the Master Servicing Environmental Assessment, ultimate future development in the upper Carp River watershed following the City's Official Plan and all future potential encroachments in the flood plain (e.g. Terry Fox Drive extension).	<b>The modeling completed in support of the Carp River Restoration Class EA does not reflect the ultimate future land use scenario: for example, the development of the Fernbank lands (200 hectares), the Carp Road Corridor and the Highway 417 expansion was not accounted for. Also, the stormwater management criteria must be revisited given the various problems identified with the supporting modeling.</b>
<b>11</b>	The target levels, to assess potential impacts and potential increase in flood risk, are contained in the report "Flow Characterization and Flood Level Analysis - Carp River, Feedmill Creek and Poole Creek". The report documents flows and water levels based on the existing development and channel conditions in 2005.	<b>As noted above, these targets are not defensible as the existing conditions modeling is clearly not calibrated/validated. As documented in the 2005 report, City staff recommended against the use of this model for design purposes (see comments fronting "Flow Characterization and Flood Level Analysis - Carp River, Feedmill Creek and Poole Creek, October 2005, CH2MHill). Further, the Auditor General's findings indicate the existing conditions model significantly underestimates runoff volumes, the result being that in some locations water levels may be up to <u>1 meter higher</u> than is documented.</b>
<b>12</b>	The Ministry of Natural Resources (MNR) has confirmed, through a letter dated April 26, 2007, that the "objectives of the provincial natural hazards policy have been met in the	<b>This letter was written several months before the discovery in early 2008 of significant errors in the modeling and a year before the findings of the City's Auditor General were made available.</b>

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	Carp River Restoration Plan" and "the flexibility provided by the policy has been appropriately used by the MVC given the wide shallow flood plain in this urbanizing area".	
13	Several other Conservation Authorities in the Province were contacted to discuss how they deal with wide and shallow flood plains and what types of flood plain modifications they have supported. It must be noted, however, that local Conservation Authority policies are formulated based on local watershed conditions and issues. Thus, comparisons between individual Conservation Authorities policies have to be undertaken carefully.	
14	The situation reflects what was described in a decision of the Mining and Lands Commissioner in 1983:	
15	The Act provides for the establishment of areas of jurisdiction on a watershed basis and programs are authorized under the Conservation Authorities Act in respect of such watersheds. It may well be that some authorities have more resources than others to implement their programs and a comparison of the decisions in individual cases between conservation authorities would not be sound in law by reason of the fact that each conservation authority is, by the Act, treated as an entity and the resources, policies, programs and decisions of conservation authorities are not necessarily	<p><b>In the same decision referenced (Odorico vs. The Halton Region Conservaton Authority, Dec.1, 1983), the tribunal noted: <u>"In conclusion the tribunal is not aware of any policy of flood plain management under which the construction of residential property, particularly new residential construction, in a portion of the flood plain subject to three feet of flooding in the event of a regional storm should be permitted"</u> (emphasis added).</b></p> <p><b>Portions of the Carp River floodplain proposed to be filled approach 1 meter of depth in flooding (south of Richardson Side Road), hardly to be characterized as "shallow."</b></p>

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	identical. (MLC decision Victor Odorico vs. The Halton Region Conservation Authority, Dec.1, 1983, (www.omlc.mnr.gov.on.ca)	
16	It must also be stated that development or encroachments in the Regulatory flood plain is not an issue to be taken lightly. It is the exception and not the general practice of any Conservation Authority. However, in certain situations, with appropriate justification, appropriate analysis and addressing specific criteria, municipalities in conjunction with their local Conservation Authorities have supported modifications to the Regulatory flood plain to achieve local objectives. A number of examples are provided below.	<p><b>Based upon the history of development in the upper Carp River watershed, filling in the floodplain appears to be more the rule than the exception as per these developments that have involved filling in the floodplain:</b></p> <ul style="list-style-type: none"> <li><b>i) Glencairn (1970s);</b></li> <li><b>ii) Scotia Bank Place (1990s);</b></li> <li><b>iii) Hazeldean Housing Co-op (1990s);</b></li> <li><b>iv) West Creek Meadows (mid-90s);</b></li> <li><b>v) Terry Fox Drive extension (2000s);</b></li> <li><b>vi) 20 Frank Nighbour Place (2000s);</b></li> <li><b>vii) Sensplex (2004);</b></li> <li><b>viii) Smart Technologies (2006); and now</b></li> <li><b>ix) Kanata West.</b></li> </ul>
17	<b>Essex Region Conservation Authority*</b> : The Essex Region is located in the Windsor and Leamington area and is generally very flat and flood water have been known to flow overland directly into Lake Erie. For their watershed:	
18	The Regulatory flood plain can be a kilometre in width and the floodplain from Lake St. Clair can extend inland from shore up to a kilometre.	<b>Essex Region’s watershed is <u>very</u> flat compared to the Carp River watershed and the lake effect flooding extends far inland. <u>These conditions are very different from the flooding conditions in the upper Carp River.</u></b>
19	The Conservation Authority has completed floodway/flood fringe studies for all the watercourses conveying flow to Lake St. Clair. These studies resulted in the definition of hydraulic floodways for these watercourses	<b>Because of the very flat topography, Essex Region is relatively unique. Precluding development from the whole floodplain would severely limit new development so the definition of fringe areas has not been limited to existing floodprone communities. However, floodway/flood fringe limits have been defined based upon specific depths and velocities - for example, fringe depths are generally less than 0.5 meter. A flood fringe</b>

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	that could be 35-60 meters in width.	<b>based upon hydraulic criteria has never been defined for the Carp River restoration reach.</b>
<b>20</b>	The areas outside of these floodways are defined as flood fringe. The flood fringe areas can be filled and developed. In these scenarios flood plain storage is not replaced and full subdivisions in the flood fringe areas have been supported by the local municipality and Conservation Authority.	<b>As a receiver, Lake St. Clair is relatively insensitive to increased flood levels resulting from a loss of flood storage, hence, development in these fringe areas does not pose the same risks as filling within the floodplain of the Carp River. The Carp River, both within the restoration reach and downstream in the rural area, is sensitive to water level increases from the loss of flood storage that occurs with filling in the floodplain.</b>
<b>21</b>	<b>Credit Valley Conservation*</b> : (CVC) is located west of Toronto and Region Conservation Authority (TRCA) and the watercourses within their watershed generally have well developed valley systems (confined). CVC staff stated that the Carp River system would be analogous to some of their headwater areas where the topography is flat and flood plains could be unconfined. In some of these headwater areas:	<b>A review of a number of subwatershed studies available on CVC’s website (<a href="http://www.creditvalleycons.com/">http://www.creditvalleycons.com/</a>) provides no examples of policies or recommended works that are comparable to what is being proposed for the upper Carp River. The CVC studies consistently indicate development is to be directed away from the regulatory floodplain. While there are examples of headwater streams being deepened and/or relocated, these are much smaller systems than the Carp River and the purpose is not to create additional developable land from floodplain but to deepen the receiving stream to allow for conventional storm drainage servicing while at the same time improving and/or maintaining all stream functions.</b>
<b>22</b>	If identified through a Subwatershed Study, the modification of the Regulatory flood plain is supported to allow for the creation of a sustainable natural system in urbanizing areas.	
<b>23</b>	The watercourse is reviewed at the system level through the Subwatershed Study and the requirements of the watercourse and flood plain/valley system are determined. Natural watercourse/valley corridors are replicated using natural channel design principles. This procedure has been used in	<b>As detailed in the Credit Valley Subwatershed Study (Huttonville Creek, Springbrook Creek, Churchville Tributary) (available here: <a href="http://www.creditvalleycons.com/bulletin/downloads/sub78a8b/Sub78a8bFinalReport05.pdf">http://www.creditvalleycons.com/bulletin/downloads/sub78a8b/Sub78a8bFinalReport05.pdf</a>), there is an example of a stream (Springbrook Creek) proposed to be deepened. The total drainage area where the work is proposed is only 325 hectares, a very small fraction of the drainage area of the Carp River to Richardson Side Road (5500 hectares). <b>More significantly, the purpose of this deepening is to permit storm drainage servicing of</b></b>

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	developing areas such as Brampton and has involved large tracts of land (e.g. between Concession roads). One example involved an area of over 1500 hectares where the watercourse was being relocated and a valley system created.	<b>this drainage area, not to create additional developable land within the stream's floodplain. In comparison, the Carp River Restoration is <u>not</u> being undertaken to provide any storm servicing benefits, that is, the project does not involve any significant deepening of the channel invert. Rather, as currently proposed, the City is faced with acquiring significant lengths of submerged storm sewers that will likely result in increased operation and maintenance costs due to sediment build-up in the submerged storm sewers.</b>
24	CVC does not use the terminology Two-Zone concept to describe this type of flood plain modification.	<b>The terminology two-zone is not applied because this is not a two-zone application. <u>This example is not comparable to what is proposed for the Carp River Restoration.</u> It refers to the relocation/recreation of much smaller headwater stream systems.</b>
25	<b>Central Lake Ontario Conservation*</b> : The Central Lake Ontario Conservation Authority (CLOCA) watershed is located east of the TRCA. In their watershed there are applications of Two-Zone and Special Policy areas for floodplain management.	
26	In Oshawa, supported by an analysis and study, the Goodman Creek Two Zone Policy allows for infill development and redevelopment within a defined flood fringe of the Regulatory floodplain. This area is within a large floodplain caused by a backwater behind a railway embankment. New developments (e.g. commercial blocks of land) have been approved in the defined flood fringe by filling the sites above the regional flood elevation, and providing compensating flood storage in the floodway. Opportunities to floodproof existing	<b>By the description, this appears to be an appropriate application of two-zone policy in an area of existing development as it allows for infill and redevelopment within a defined flood fringe of the regulatory floodplain. <u>This example is not comparable to what is proposed for the Carp River Restoration.</u></b>

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	homes in the flood fringe is accomplished by allowing filling (without compensating flood storage) and redevelopment.	
27	A similar analysis and study is underway for another watercourse reach upstream of Highway 401 in Oshawa.	
28	CLOCA has generally supported/allowed other examples of modifications to the Regulatory floodplain to allow new development based on a cut and fill balance and hydraulic analysis. For this scenario the terminology Two-Zone is not employed and the CLOCA often requires all filling and grading to be undertaken (through a permit issued by the Conservation Authority) before site plan approval is granted.	<b>The terminology two-zone is not applied because these examples are clearly not two-zone applications (see item 1).</b>
29	<b>Nottawasaga Valley Conservation Authority*</b> : The Nottawasaga Valley Conservation Authority (NVCA) is located north of the TRCA and drainage is ultimately to Georgian Bay.	
30	In the Town of Collingwood on the Pretty River upstream of a diked section of the river, flood proofed new development (including a 300 lot subdivision) is being implemented in a spill zone.	<b>Spill zones are special cases where floodwaters may flow (or “spill”) from one watershed into another in flat areas near the watershed divide. <u>Spill zones are not comparable to the flooding conditions in the Carp River where the restoration and filling are proposed.</u></b>
31	NVCA has permitted a balanced cut and fill on the Wilson Drain in the Town of Alliston after a secondary plan study was undertaken supporting the development.	<b>A balanced cut and fill implies no net increase in developable land, i.e., for any areas removed from the floodplain by filling an equivalent area of new floodplain is created. <u>This is not the case for the proposed Carp River Restoration.</u></b>

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32	NVCA has supported, in some circumstances, floodplain modification for new development through a cut and fill balance to replace floodplain storage.	<b>No examples are provided to gauge the scope of modifications allowed. Most CAs will allow minor modifications to the floodplain - characterized more by "nipping and tucking" than wholesale creation of developable land from floodplain.</b>
33	For a reach it is acceptable to NVCA to replace floodplain storage on a return period basis as is being implemented for the Carp River.	<b>Given the various problems identified with the modeling, it has yet to be adequately demonstrated that the Carp River Restoration has achieved this requirement.</b>
34	<b>Conservation Halton*</b> : The Conservation Halton watershed is located west of CVC.	
35	Within the Conservation Halton watershed, major floodplain alterations (including placement of fill to create, or enlarge, a building lot) and major watercourse alterations are generally not permitted.	<b><u>This is very different from MVC's approach to floodplain management, at least in the upper Carp watershed, where floodplain encroachments to increase developable land have been permitted numerous times (see item 16).</u></b>
36	Such alterations, however, may be considered where justification is provided through a subwatershed study, an Environmental Assessment or similar comprehensive study and are subject to conformity with municipal planning documents.	<b>Consideration of alterations via a subwatershed study does not imply that the intent of provincial floodplain policy – that new development is to be directed away from natural hazards – can be dispensed with, only that alterations may be considered within a subwatershed context that accounts for such concerns as avoiding cumulative impacts (loss of flood storage, etc.). There is little or no evidence that the cumulative impact on flood levels from the placement of fill in the upper Carp River floodplain has ever been adequately considered.</b>
37	In the cases of these floodplain modifications, to protect against cumulative impacts, the existing watercourse characteristics of travel time and stage-storage and stage-discharge must be maintained.	<b>This is a standard requirement - which has yet to be adequately demonstrated for the Carp River Restoration (see item 8).</b>
38	Conservation Halton has supported floodplain modifications in developing areas.	<b>Same as item 32.</b>

**\*Note: Staff from all CAs referenced were contacted via e-mail and/or telephone. CVC, NVCA, and ERCA provided information regarding their floodplain policies. Responses from Conservation Halton and CLOCA were not received in time for this submission.**