



Office of the Auditor General / Bureau du vérificateur général

**AUDIT OF THE CARP RIVER WATERSHED STUDY AND
RELATED PROJECTS**

2007

Chapter 16

**VÉRIFICATION DE L'ÉTUDE SUR LE BASSIN HYDROGRAPHIQUE
DE LA RIVIÈRE CARP ET DES PROJETS CONNEXES**

2007

Chapitre 16

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EXECUTIVE SUMMARY

Introduction

This audit was conducted as a result of a report to the Fraud and Waste Hotline. It was not originally identified in the 2007 Audit Plan that was presented to Council.

Audit Objectives

The various reports included in this audit were subject of reports to the Planning and Environment Committee and to Council as the projects progressed, and they were approved by both the Committee and Council. The purpose of this audit is to review the information presented to the Planning and Environment Committee and to Council.

Audit Objective No. 1 – To examine the application of the Two-Zone Concept to the Carp River within the Kanata West Community.

Audit Objective No. 2 – Determine whether the studies, processes and methodologies were consistent and compliant with all relevant policies, procedures, legislation and regulations.

Audit Objective No. 3 – Examine the reports and studies prepared to support the development upstream and adjacent to the proposed channelization near Glen Cairn to determine if the City should be responsible for the channelization work or if others should pay for the work. *Note: Based on legal advice, the results of our audit work on this objective are not provided in this report.*

Audit Objective No. 4 – Examine the reports and studies to discern if the fact that consultants were working both for the City and developers at the same time affected the recommendations in the reports.

Audit Objective No. 5 – Examine the processes followed by the consultants for the developers and by the City in the Class Environmental Assessment (EA) studies, to determine if the processes and methodologies followed accepted practice and the requirements of the Environmental Assessment Act.

Audit Scope

The Audit Scope encompassed the following tasks:

- Review of the legislative framework for the projects, to confirm the requirements that should have been followed in their development;
- Briefing meetings with City staff;
- Collection and review of the background information;

- Review of the reports will be completed to evaluate the methodologies used and the options examined; and,
- The results of the review will be an evaluation of the recommendations to determine whether the interests of the City were adequately considered.

Summary of Findings

Based on the reviews undertaken to date it is concluded that:

1. The Mississippi Valley Conservation Authority (MVCA) representative was the first one to suggest as a viable option for consideration by the City that the Two-Zone Concept could be applied to the Study Area.
2. The City and the MVCA applied the Two-Zone Concept to an area that is undeveloped, which is not normally accepted by other conservation authorities in Ontario, including the Rideau Valley Conservation Authority.
3. It is noted that the Provincial Policy Statement does not contain a specific limitation to the application of the Two-Zone Concept to undeveloped areas. However, the practice by other municipalities and conservation authorities is to discourage such applications. Examination of the Provincial Policy together with the Technical Guides reveals that the intent of the Provincial Policy Statement was not followed in the case of the Carp River.
4. The application of the Two-Zone Concept followed Provincial Policy in principle, but did not take into account the Technical Guides.
5. The Provincial Policy Statement requires that all the hazards be evaluated to determine if the Two-Zone Concept can be applied to a stream reach. The hazards include hydrologic and hydraulic, as well as erosion and geotechnical aspects, such as deep peats and sensitive clays, organic soils, and unstable bedrock such as karst formation areas. The considerations taken into account during the application of the Two-Zone Concept were restricted to the hydrologic and hydraulics aspects, but did not take into account the suitability of the concept to an area of deep peats and sensitive clays.
6. The consideration of the Two-Zone Concept did not take into account the “design with nature” policies of the Official Plan. In our opinion, the application of the Two-Zone Concept in this case seems to have been carried out in isolation, without explicitly taking into account the requirements of the Official Plan with respect to the “design with nature” policies. For example, the decision to apply the Two-Zone Concept took into consideration only hydrologic and hydraulic effects, leaving out other risks such as sensitive clays and organic soils; another example is that the potential effects of the Carp River restoration on sedimentation in downstream reaches has not been addressed.

7. The Servicing Report indicates that to service the low-lying areas along the Carp River it will be necessary to use special housing built forms and/or conventional building design with sump pumps. In addition, the Servicing Report indicates that the submerged inlet condition of the future stormwater management ponds will cause sedimentation with the storm sewers, which could result in a lowering of the level of service from the 100-year storm to the 25-year storm. On this basis, it was found that the application of the Two-Zone Concept results in sub-standard servicing for parts of the developments, as a result of potential sewer backups and basement floor heaving.
8. For the hydrologic and hydraulic analysis of the potential impacts of the application of the Two-Zone Concept, neither the MVCA nor the City provided a clear target maximum increase in water levels and flows.
9. The hydrologic and hydraulic analyses were completed on the basis of the wrong drainage area.
10. The impact of the error in drainage area on the calculated water levels in the Poole Creek is high (about 20 cm) and in the Carp River is low (about 3 cm).
11. The largest effect is on the floodlines of the Poole Creek, where the peak discharge for the 100-year flood is 16% lower than calculated and the water levels differences of 7 cm to more than 20 cm were noted. In the Carp River itself, the effect of the change in flows in the Poole Creek (reduced by approximately 16% at the outlet to the Carp River) are minor for existing conditions, ranging from 0 cm to 3 cm.
12. The effect of the error in the drainage area is compounded by failure to recognize that the hydrologic models underestimated the volumes of runoff produced by the watershed.
13. The hydrologic model underestimates significantly the volume of runoff produced by the watershed. The calibration efforts did not address this discrepancy. The effect of the lack of calibration of the runoff volume is to underestimate the water levels in the Carp River by more than 1.0 m in some locations of the study reach.
14. The hydraulic routing model of the Carp River was calibrated on the basis of hydrographs with too low runoff volumes. Consequently, the calibration must be corrected.
15. The proposed restoration of the Carp River through the Kanata West lands could result in additional sedimentation in downstream reaches. The impact of the additional sediment loads should be quantified. Nevertheless, the low sediment transport capacity of the overall Carp River to its mouth should be carefully considered before improvements are carried out in an upstream reach.
16. Although the City staff on the project tried to review the information produced on behalf of the Kanata West Owners Group (KWOG) as at arm's length as possible, it is evident in the correspondence and reports that the fact that the City was a co-

proponent in the Class EA projects and was a member of the KWOG affected the reviews by the City staff. Examples of correspondence and reports that lead us to our conclusions that staff's review was affected by ownership are listed in the detailed report.

17. The Carp River Watershed/Subwatershed Study report lacks some information that would normally be required, for example, a table summarizing the drainage areas and flows at different parts of the watershed; the conclusion that the Two-Zone Concept can be applied to the Carp River is not fully explained.
18. The "Flow Characterization and Flood Level Analysis" report addresses the area to Richardson Road only, leaving out the remainder of the watershed. Although a basic problem, the report was completed without correcting this.
19. Regarding the same report, it was accepted although not all the comments by the City were fully addressed in the report.
20. The "Post-Development Flow Characterization and Flood Level Analysis" report does not fully address all the comments provided by the City, but it was accepted.
21. It is understood that the City participated in the KWOG as a non-voting member, and as mentioned above, the staff tried to review the information produced by the KWOG at arm's length. However, there might be a conflict of interest on the part of the City by participating on the KWOG and being the approval entity on the same projects.
22. In general terms, the Class EA projects were completed in accordance with the Municipal Class Environmental Assessment.
23. Development in the flood fringe as proposed in the Servicing Report could lead to unanticipated liability to the City, as there are difficulties in meeting the City standards.
24. A consultant worked concurrently for the City of Ottawa in preparing the Carp River Watershed and Subwatershed Plan and for the developers as part of the Kanata West Concept Plan (KWCP). This may place the consultant in possible conflict of interest. This is a case in which disclosure of potential conflict of interest may not be sufficient. The interests of the City and the KWCP proponents should be separate. Notwithstanding that the City was aware that the consultant was working for both, the potential for conflict of interest remains. It is also noted that the City may not have agreed to the consultant being part of both teams if the City was not part of the KWOG. Both the City and the KWCP proponents, as well as other parties, were fully aware of this fact and both agreed that the arrangement addressed the Professional Engineers of Ontario (PEO) Code of Ethics.
25. The Class EA processes were conducted in accordance with the appropriate Class EA Schedule, except for the Carp River et al. restoration project which, given the

potential environmental effects, should have been conducted as a Schedule C project.

Recommendations and Management Responses

Recommendation 1

That the City develop a policy to preserve flood plains as a flood damage reduction measure.

Management Response

Management agrees with this recommendation in principle.

Management would like to address the fact that there are examples in other Conservation Authority watersheds, of implementing a concept where the regulatory flood plain is redefined and riparian storage is maintained in a developing area (i.e., Toronto and Region Conservation Authority- TRCA). The TRCA Valley and Stream Corridor Management Program (October 1994) has policies for “unusually wide flood plain with shallow depths of infrequent flooding”. In section 3.2.2 (2) on page 21 of the policy, it states that alterations to stream corridor boundaries within shallow flood plains may be permitted. The TRCA Valley and Stream Corridor Management Program also notes on page 22 that:

“Within passive or inactive storage areas, re-grading may be permitted that retains existing stage/storage characteristics provided it does not conflict with the policies outlined above.”

Therefore, the TRCA allows redefinition of the regulatory flood plain line to allow new development if flood plain storage is maintained. This is the same concept that is being applied, in the case of the reach of the Carp River, in the Kanata West area. Therefore, if the Carp River was within the TRCA’s watershed, their present policies would allow the development into the flood plain without identifying the area as a Two Zone.

There are also examples of the Ontario Municipal Board (OMB) decisions implementing the Two Zone concept in new development areas (i.e., Amberlakes in Stittsville). Furthermore, the Ministry of Natural Resources (MNR) technical guidelines do not specify or restrict which type of lands the Two Zone concept can be applied to or whether it applies to existing or proposed development.

Notwithstanding the above, a draft Official Plan Amendment (OPA) for new Flood Plain Management policies is currently underway. This document has been circulated to various public agencies and will be presented to Council by Q4 2008.

Recommendation 2

That the City develop a policy for Council approval to apply the Two-Zone Concept only to areas of the City with existing development and not to areas that heretofore are undeveloped.

Management Response

Management agrees with this recommendation in principle.

Development of the lands adjacent to the Carp River was initially characterized as a Two Zone approach. One of the main benefits of the application of the Two Zone concept was the restoration of this reach of the Carp River. Historically, the channel of the Carp River has been straightened and lowered. This restoration will return it to a more natural state.

The Carp River Restoration project proposes re-grading and balanced cut and fill, with the effect that some lands are removed entirely from the flood plain. Since these lands are entirely removed from the floodplain, the Carp River Restoration is better described as a modified one-zone approach. This is the advice provided to the City, by the Ministry of Natural Resources, along with the opinion that the restoration as proposed satisfied the intent of the Provincial Policy Statement's (PPS) Natural Hazards policy. In a letter dated April 26, 2007 David Ramsay, the Minister of Natural Resources, stated "the Ministry believes the objectives of the provincial natural hazards policy have been met in the Carp River Restoration Plan. Furthermore, the flexibility provided by the policy has been appropriately used by the MVCA given the wide shallow floodplain in this urbanizing area."

As mentioned in the previous recommendation, a draft OPA for new Flood Plain Management policies is currently underway and will be presented to Council by Q4 2008.

Recommendation 3

That the City ensure that the evaluation of the flood fringe for development includes examination of all potential hazards, including slope stability and risk incurred by the City as a consequence of reduced design standards.

Management Response

Management agrees with this recommendation, as this is the City's current practice.

As stipulated in the City's Official Plan, each development application is required to submit studies that examine and assess all potential hazards. Included in this submission is a geotechnical study which incorporates a slope stability assessment.

Management disagrees, however, with the comments in the audit that a reduced design standard for development of lands was applied to Kanata West. There is no municipal or provincial standard that requires basements. The applicable standard is the requirement for footing elevations to be designed to maintain at least a 0.3m clearance above the 100-year Hydraulic Grade Line (HGL). This will continue to be a requirement for any development in Kanata West.

Management will be seeking, within the terms of reference for the third party engineering firm, advice on the appropriate timing within the process for examination of geotechnical hazards. See the response to recommendation 11 for a

more complete discussion of the background and scope of the third party review of the Carp River Restoration Environmental Assessment (EA).

Recommendation 4

That the City develop a policy for Council approval to not participate in landowners groups, including selling the subject lands or putting them in a blind trust.

Management Response

Management disagrees with this recommendation.

The City requires the same flexibility as any other landowner in managing real estate. The forced sale or placement in a blind trust, of real property would limit or restrict the City's ability to fulfill programming needs.

The City has endorsed a corporate landlord model within the Real Property Asset Management Branch (RPAM) that operates independently from the approval authorities within the Planning Transit and Environment department.

RPAM participated in the Kanata West Owners Group's (KWOG) meetings as an observer. The City has participated financially but has not signed the KWOG agreement. As a result, City staff has not voted on any direction or matters considered by the KWOG including the Carp River Restoration plan. In this circumstance, management chose to exercise flexibility and was not a direct participant in order to avoid conflict of interest.

Recommendation 5

- a) **That the City ensure that the benefit of additional tax revenues should be measured against the costs of preparing the lands for development, including the cost of the land, and the potential liability exposure by permitting development in lands that do not meet the existing municipal standards.**
- b) **That a cost-benefit analysis be carried out with respect to the additional lands gained by applying the Two-Zone Concept.**

Management Response

Management disagrees with this recommendation.

A cost-benefit analysis cannot be carried out to any reasonable degree of accuracy at this point in time as the key variable inputs cannot be measured, or are simply unknown.

There are three key variables that would need to be determined to validate the recommendation. First, the type and level of development within the impacted area has not been determined. The general uses can range from office/ industrial/commercial development, to low/ medium density residential development, or even to land dedicated for parkland.

Secondly, given that the specific type of development is unknown, any attempt to measure the exposure liability by permitting development on the additional lands gained by applying the Two Zone concept, would be difficult at best to assess.

Finally, given the unknown nature of development, an offset tax revenue cannot be reasonably estimated. Until these key variables are more clearly defined, the recommended cost-benefit analysis would be highly theoretical and speculative, and would be of minimal value to management.

Recommendation 6

That the City require consultants to discuss in detail the potential impacts of discharging sanitary sewer overflow to the proposed stormwater management pond, including confirming that this procedure is acceptable to the Ministry of the Environment.

Management Response

Management disagrees with this recommendation.

The discharging of the sanitary sewer overflow in a storm water management pond as an emergency measure practice when a sanitary pump station experiences a catastrophic failure, has been a standard practice for a number of years. This option is further supported in the City of Ottawa's Sewer Design Guidelines (section 7.2.1.6 - System Reliability and Contingency Planning), when it is feasible to do so. This emergency measure is also noted in the City's draft Storm Water Management Design guidelines and is an accepted measure by the Ministry of Environment by virtue of their issuance of Certificates of Approval, which call for an overflow into storm water ponds. All emergency conduit connections to storm sewers, storage facilities, natural watercourses or surface outfall points are subject to approval by the Ontario Ministry of the Environment.

Recommendation 7

That the City re-evaluate the total suspended solids removal criteria and requests the developers' engineers to address in qualitative terms the potential effects of the river restoration on sedimentation in downstream reaches.

Management Response

Management agrees with this recommendation in principle.

In the Carp River Restoration project, the storm water management ponds will provide for quality control and will augment low flow during dry weather conditions. The Carp River Watershed/Subwatershed study determined criteria that would meet both environmental and functional objectives. Specifically, all development flows would need to be controlled to result in: 80% suspended solids removal in Poole and Feedmill Creeks, and 70% suspended solids removal in the Carp River. In fact, runoff from urban development will contain less sediment than

what is currently coming from farmers' fields, even before suspended solids removal.

Management will include, in the terms of reference for the third party engineering firm, a review of the criteria for suspended solids removal. See the response to recommendation 11 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 8

That the City ensure that the Restoration Project design provides a quantitative estimate of the volume of sediment that will be transported to downstream reaches as a result of the restoration, including a quantitative evaluation of the sediment transport capacity of the downstream reaches.

Management Response

Management agrees with this recommendation.

Accordingly, one of the objectives in the design of the Carp River Restoration project was to achieve a sediment balance in the Carp River within the natural erosion/deposition process. This means there will be no increase in sedimentation in downstream reaches.

In management's opinion, the following statement in the audit: "However, there is only cursory examination of the potential impacts of transferring the sediment that is currently being stored by the river in the restoration reach to the downstream reaches..." incorrectly assumes that the existing sediment in the restoration reach will be transported downstream. In fact, a criterion of the restoration project is to ensure that the design provides for remediation of existing erosion and encourages sediment balance. This includes the removal of existing sediment deposits in localised areas thereby reducing the movement of the sediment downstream. The Carp River, Poole Creek and Feedmill Creek Restoration EA identified the need to monitor sediment movement to ensure impacts to downstream reaches are mitigated, per pages 73, 78, 90, 91 and page 93 (Monitoring Plan).

When preparing the terms of reference for the third party engineering firm, management will include the requirement for confirmation as to whether a sediment balance was achieved, and for advice on the need for quantitative estimates in regard to the volume of sediment and sediment transport capacity (including provision of quantitative estimates if required). See the response to recommendation 11 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 9

That the City require consultants to correct the errors in the hydrology, hydraulics and other parts of the work, resulting from the errors in the drainage area, at no cost to the City.

Management Response

Management agrees with this recommendation.

The consultants are addressing the error in the drainage area and the impacts on hydrology, hydraulics and other aspects. These results, among others, will be used to address recommendation 13. This analysis will be included in the terms of reference for the third party engineering firm review. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 10

That the City require consultants to properly calibrate the runoff model and the hydraulic routing model to represent properly the response of the watershed to the rainfall input, at no cost to the City.

Management Response

Management defers its response to a third party review on the issue of calibration.

Staff did undertake to calibrate the model using what data was available. As detailed on page 138 of the Carp River Watershed/Subwatershed study, various Soil Conservation Service (SCS) storm durations (1 hr, 3 hr, 6 hr, 12 and 24 hr) were reviewed. It was determined that the 12 hour storm best represented the peak flow conditions in the subwatershed area. The type of storm distribution (Chicago vs. SCS) related to the size of the area being modelled, not just the future land use.

As stated in the Flow Characterization and Flood Level analysis, temporary water level gauges were established at Richardson Side Road, Palladium Drive and the Glen Cairn Pond. During the time these monitoring stations were in place, only one large storm was recorded (September 9 2004, -the tail-end of Hurricane Francis). Therefore, only one event was available for calibration/verification.

Management will seek guidance from the third party reviewer on the issue of calibration and whether the steps undertaken, including sensitivity analysis, were reasonable. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 11

That the City require consultants to re-evaluate the results of the subsequent analyses and designs, and to modify them as required, at no cost to the City.

Management Response

Management agrees with this recommendation.

In January 2008, City staff discovered that modeling developed by an external engineering firm on behalf of the City and the Kanata West Owners Group for the

Carp River, Poole Creek and Feedmill Creek Restoration EA contained an error. The engineering firm has confirmed to City staff that an error has, in fact, been made.

The Restoration EA is currently before the Ontario Ministry of the Environment (MOE) as several parties made Part II order requests. In light of this error, the City immediately advised the MOE to refrain from taking any decisions related to this assessment until the impact of the error has been fully assessed.

Currently, the City is in the process of engaging a third party engineering firm to independently review the analysis. The review is expected to take a few months to complete. The terms of reference will include a complete review of all aspects of the technical analysis for the Restoration EA as it relates to flood elevations and water flows and the impacts of any changes on the design. The review will also include the issues referenced in management's earlier responses. Once the results of the review are known, management will advise City Council and MOE of the outcome. Issues related to cost and next steps will be determined at that time.

Recommendation 12

That the City ensure that consultants not be allowed to work on the same project for the City and for the developers, even if the City is fully aware of the fact. This recommendation applies even if the initial assignment is complete.

Management Response

Management agrees with this recommendation in principle.

The Professional Engineers Code of Ethics permits a professional engineer to work for two different employers on the same subject matter where such has been disclosed to both employers. While this does put such professional engineer in a position of having two masters, it is noted that the Code of Ethics provides that the professional engineer's duty to the public transcends his/her other obligations, that the professional engineer's duty to the public welfare is "paramount".

To implement this recommendation would reduce the available number of firms for an assignment, as some may have worked for developers on the same subject matter in the past or may not be willing to be precluded from working for developers in the future. It may also increase the cost of assignments, as the City, not being able to hire a firm that had worked for a developer in the past on an assignment, would always have to hire a firm that is starting fresh. This may also mean that the City is not able to benefit from the expertise of "the best" in the business.

Nevertheless, management concurs having a consultant that has not and will not work for a different employer on the same subject matter is, in most cases, a desirable outcome. Therefore, management supports an amendment to the City's Purchasing By-law to implement this recommendation, subject to exceptions being permitted when authorized by a Deputy City Manager, or by the City Manager for branches that report directly to him. If however, these exceptions become the norm and the

number of consultants available to work on City projects is significantly reduced by the implementation of this recommendation, such that truly competitive bids are no longer possible, staff will seek instruction from Committee and Council to resolve this issue.

Recommendation 13

That the City ensure that a full evaluation of the risk of proceeding with detailed design on a project that is under review by the MOE based on a Part II Order request be submitted to Council for prior approval.

Management Response

Management agrees with this recommendation.

In the future, Council will be notified in advance whenever management proposes to proceed with design while the Ministry of the Environment is reviewing a Part II order request.

Conclusion

The audit revealed that the application of the Two-Zone Concept to the Carp River within the Kanata West area satisfied only in part the requirements of the Official Plan, as it did not address the “design with nature” requirements of the Official Plan. In addition, the studies required to determine whether the Two-Zone Concept should be applied did not completely address the slope stability and soil hazards found in the area.

The studies and reports carried out as part of the development satisfied Provincial Policy and the City’s Official Plan only in part, as noted above. In addition, the technical components of the studies and reports were based on an erroneous drainage area and did not properly calculate the volumes of runoff that are contributed by the drainage areas.

It is our opinion that the consultant was in a possible conflict of interest when the firm worked concurrently on the Kanata West Concept Plan for private interests and the Carp River Watershed Plan Study for the City of Ottawa, notwithstanding that both parties agreed to the arrangement, which is in conformance with the PEO Code of Ethics. The implications of the possible conflict of interest were exacerbated by the fact that the City of Ottawa may be in conflict of interest when the City formed part of a landowners group (the Kanata West Owners Group) located within the City; at the same time, the City had the obligation of reviewing and approving the studies and reports being produced by consultants paid for by the KWOG.

The Class Environmental Assessment studies for Roads, Servicing, and the Carp River Restoration Project followed the Municipal Class Environmental Assessment and complied fully with the Class EA requirements. Part II Order requests were submitted

by members of the public to the Minister of the Environment and are currently under review.

Acknowledgement

We wish to express our appreciation for the cooperation and assistance afforded the audit team by management and staff.

RÉSUMÉ

Introduction

La présente vérification fait suite à la réception d'un rapport adressé à la Ligne directe fraude et abus et ne figure pas dans le plan initial de vérification de 2007 soumis au Conseil municipal.

Objectifs de la vérification

Les divers rapports compris dans la présente vérification ont fait l'objet de comptes rendus présentés au Comité de l'urbanisme et de l'environnement et au Conseil municipal à mesure que les projets progressaient, et ont été approuvés par les deux entités. Le présent exercice avait pour but de vérifier les renseignements présentés au Comité de l'urbanisme et de l'environnement et au Conseil municipal.

Objectif de vérification n° 1 : Vérifier l'application du concept des deux zones à la rivière Carp dans la communauté de Kanata-Ouest.

Objectif de vérification n° 2 : Déterminer si les études réalisées, les processus suivis et les méthodologies employées concordent avec l'ensemble des politiques, procédures, lois et règlements pertinents et y étaient conformes.

Objectif de vérification n° 3 : Examiner les rapports et les études préparés pour appuyer l'aménagement des terrains situés en amont de la canalisation proposée près de Glen Cairn et adjacents à celle-ci afin de déterminer s'il appartient à la Ville ou à une autre entité d'assumer le coût des travaux de canalisation. *Nota : Conformément à une consultation juridique, les résultats de notre vérification concernant cet objectif ne sont pas exposés dans le présent rapport.*

Objectif de vérification n° 4 : Analyser les rapports et les études pour déterminer si les recommandations qu'ils contiennent ont été influencées par le fait que le même cabinet d'experts-conseils travaillait simultanément pour la Ville et pour les promoteurs.

Objectif de vérification n° 5 : Examiner les processus et les méthodologies suivis par les experts-conseils pour le compte des promoteurs ainsi que par la Ville dans les études d'évaluation environnementale (EE) de portée générale afin de déterminer s'ils respectent les pratiques admises et les exigences de la *Loi sur les évaluations environnementales*.

Portée

La vérification englobait les tâches suivantes :

- examen du cadre législatif des projets afin de confirmer les exigences auxquelles leur élaboration devait satisfaire;
- tenue de séances d'information avec le personnel de la Ville;
- recherche et examen documentaires;
- examen des rapports afin d'évaluer les méthodologies employées et les options considérées;
- évaluation des recommandations grâce aux résultats de l'examen afin de déterminer si les intérêts de la Ville ont été adéquatement pris en considération.

Résumé des constatations

En nous fondant sur les examens effectués jusqu'à présent, nous avons constaté ce qui suit :

1. Le représentant de l'Office de protection de la nature de la vallée Mississippi (OPNVM) a été le premier à suggérer qu'il serait possible d'appliquer le concept des deux zones à l'aire à l'étude et que la Ville devrait envisager cette possibilité comme une option viable.
2. La Ville et l'OPNVM ont appliqué le concept des deux zones à un secteur non aménagé, ce qui, normalement, n'est pas accepté par les autres offices de protection de la nature de l'Ontario, y compris l'Office de protection de la nature de la vallée Rideau.
3. Il convient de préciser que la Déclaration de principes provinciale ne comprend pas de restriction spécifique quant à l'application du concept des deux zones aux secteurs non aménagés. Toutefois, la pratique chez les autres municipalités et offices de protection de la nature tend à décourager une telle application. Un examen des principes et des guides techniques de la Province révèle que l'esprit de la Déclaration de principes provinciale n'a pas été respecté dans le cas de la rivière Carp.
4. L'application du concept des deux zones respecte en théorie les principes de la Province, mais ne tient pas compte des guides techniques.
5. La Déclaration de principes provinciale exige, pour déterminer s'il est possible d'appliquer le concept des deux zones à un bief, que tous les dangers soient évalués, ce qui comprend les dangers hydrologiques et hydrauliques de même que le risque d'érosion et les aspects géotechniques tels que tourbes profondes, argiles sensibles, sols organiques ou assises instables (p. ex., zones de formation karstique). Les éléments pris en considération dans l'application du concept des deux zones se sont limités aux aspects hydrologiques et hydrauliques; il n'a pas été tenu compte de la pertinence du concept dans un secteur présentant des tourbes profondes et des argiles sensibles.

6. Il n'a pas été tenu compte, dans l'application du concept des deux zones, des politiques du Plan officiel en matière de « conception en harmonie avec la nature ». À notre avis, le concept des deux zones dans le cas présent semble avoir été appliqué de façon isolée, sans que soient explicitement prises en considération les exigences du Plan officiel relatives aux principes de « conception en harmonie avec la nature ». Par exemple, la décision d'appliquer le concept des deux zones n'a été prise qu'après avoir évalué les effets hydrologiques et hydrauliques du concept, sans égard aux autres risques tels que la présence d'argiles sensibles et de sols organiques. Autre exemple, les effets potentiels de la restauration de la rivière Carp sur la sédimentation dans les biefs en aval ne sont pas mentionnés.
7. Selon le rapport de viabilisation, afin de desservir les terres basses qui longent la rivière Carp il sera nécessaire d'utiliser des formes bâties résidentielles particulières ou des bâtiments de conception ordinaire munis de pompes d'assèchement. En outre, le rapport révèle que la position immergée de la prise d'eau des futurs bassins de rétention des eaux pluviales entraînera une sédimentation dans les égouts pluviaux, ce qui risque d'en réduire la capacité : alors qu'ils sont censés avoir l'efficacité voulue pour assurer une protection contre une crue centennale, ils ne protégeront plus que contre les crues à récurrence de 25 ans. Pour cette raison, il ressort que pour certaines parties de l'aménagement visé, l'application du concept des deux zones résulterait en un service inférieur à la norme en raison de possibles refoulements d'égouts et de gonflement du plancher des sous-sols.
8. Pour les analyses hydrologique et hydraulique des répercussions potentielles de l'application du concept des deux zones, ni l'OPNVM ni la Ville n'ont établi d'objectif clair en ce qui concerne l'augmentation maximale des niveaux et des débits d'eau.
9. Les analyses hydrologique et hydraulique se fondaient sur la mauvaise zone de drainage.
10. L'erreur a donné lieu à un écart important (de l'ordre de 20 cm) dans le calcul du niveau d'eau du ruisseau Poole, et à un écart moins substantiel (de l'ordre de 3 cm) dans le calcul de celui de la rivière Carp.
11. La conséquence la plus grave concerne les limites d'inondation du ruisseau Poole, dont le débit de pointe pour une crue centennale est de 16 p. 100 inférieur à ce qui a été calculé et où les écarts observés pour le niveau d'eau varient de 7 cm à plus de 20 cm. Dans la rivière Carp à proprement parler, les effets de la différence de débit du ruisseau Poole (réduit d'environ 16 p. 100 au point où il se déverse dans la rivière Carp) sont mineurs dans les conditions actuelles, allant de 0 à 3 cm.
12. Les conséquences des erreurs concernant la zone de drainage sont exacerbées par la non-reconnaissance de la sous-estimation, dans les modèles hydrologiques, du volume d'eau de ruissellement produit par le bassin hydrographique.

13. Le modèle hydrologique sous-estime considérablement le volume d'eau de ruissellement produit par le bassin hydrographique. Les efforts d'étalonnage ne sont pas parvenus à corriger la divergence, ce qui a mené à une sous-estimation de plus de 1 m du niveau d'eau de la rivière Carp à certains endroits du bief à l'étude.
14. Le modèle d'acheminement hydraulique de la rivière Carp a été étalonné d'après des hydrogrammes représentant des volumes trop faibles d'eaux de ruissellement. Par conséquent, l'étalonnage doit être corrigé.
15. Les travaux de remise en état proposés pour la rivière Carp dans le secteur de Kanata-Ouest pourraient entraîner une sédimentation supplémentaire dans les biefs situés en aval. Les répercussions de cette charge sédimentaire additionnelle doivent être quantifiées. Quoi qu'il en soit, avant qu'une amélioration soit apportée à un bief situé en amont, une attention particulière devrait être portée à la faible capacité de l'ensemble de la rivière Carp à transporter des sédiments jusqu'à son embouchure.
16. Même si le personnel de la Ville chargé du projet a tenté de vérifier de manière aussi indépendante que possible l'information produite pour le compte du Groupe de propriétaires de Kanata-Ouest (GPKO), il ressort clairement, à la lecture de la correspondance et des rapports, que le fait pour la Ville d'être à la fois copromoteur dans les projets d'EE de portée générale et membre du GPKO a influé sur les examens effectués par le personnel municipal. Les exemples tirés de la correspondance et des rapports qui nous amènent à la conclusion que l'examen du personnel était influencé par l'appartenance de la Ville au GPKO, sont indiqués dans le rapport détaillé.
17. Des renseignements normalement exigés sont absents du rapport de l'Étude sur le bassin et le sous-bassin hydrographiques de la rivière Carp. Par exemple, on n'y trouve pas le tableau résumant les zones de drainage et les débits des diverses parties du bassin, et la conclusion voulant que le concept des deux zones puisse s'appliquer à la rivière Carp n'est pas pleinement justifiée.
18. Le rapport d'analyse de la caractérisation du débit et du niveau des crues ne porte que sur la partie du secteur visé qui s'étend jusqu'au chemin Richardson Side, le reste du bassin hydrographique étant omis. Bien qu'il s'agisse là d'un problème fondamental, le rapport a été achevé sans qu'aucune correction n'y ait été apportée.
19. Ce même rapport a été accepté même s'il n'aborde pas tous les commentaires formulés par la Ville.
20. Le rapport d'analyse de la caractérisation du débit et du niveau des crues postérieure à la réalisation des projets ne traite pas entièrement de tous les commentaires formulés par la Ville, mais a tout de même été accepté.
21. Il est entendu que la Ville participait au GPKO à titre de membre non votant et, comme il a été mentionné en 16, le personnel a tenté de vérifier de manière indépendante l'information produite par celui-ci. Or, la Ville s'est peut-être placée

- dans une situation de conflit d'intérêts en participant au GPKO tout en étant l'autorité responsable de l'approbation des mêmes projets.
22. De façon générale, les projets d'EE de portée générale ont été réalisés conformément au processus prévu dans le document *Municipal Class Environmental Assessment*.
 23. L'aménagement dans la zone de limite de crue tel qu'il est proposé dans le rapport de viabilisation pourrait engager de manière imprévue la responsabilité de la Ville en raison des difficultés à satisfaire aux normes municipales.
 24. Le consultant a travaillé simultanément pour le compte de la Ville d'Ottawa (préparation du Plan du bassin et du sous-bassin de la rivière Carp) et pour celui des promoteurs (préparation du Plan conceptuel d'aménagement de Kanata-Ouest), ce qui pourrait placer le cabinet en situation de conflit d'intérêts. Dans un tel cas, la divulgation du conflit d'intérêts potentiel peut s'avérer insuffisante. Les intérêts de la Ville et des promoteurs du GPKO devraient être distincts. La possibilité de conflit d'intérêts demeure même si la Ville était au courant du double mandat du consultant. Il importe en outre de souligner que la Ville n'aurait peut-être pas accepté que le consultant fasse partie des deux équipes si elle n'avait pas elle-même été membre du GPKO.
 25. Le fait que la Ville et les promoteurs du GPKO, de même que d'autres parties, étaient entièrement conscients de la situation et ont accepté l'entente vient éliminer tout manquement au Code de déontologie.
 26. Les EE de portée générale ont été réalisées conformément au processus prévu à l'annexe appropriée du document *Municipal Class Environmental Assessment*, à l'exception du projet de restauration de la rivière Carp et autres cours d'eau qui, étant donné ses effets potentiels sur l'environnement, aurait dû être mené en vertu de l'annexe C.

Recommandations et réponses de la direction

Recommandation 1

Que la Ville se dote d'une politique de préservation des plaines inondables en tant que mesure de réduction des dommages causés par les inondations.

Réponse de la direction

La direction approuve en théorie la recommandation.

La direction aimerait souligner qu'il existe, sur le territoire d'autres offices de protection de la nature, des exemples de bassins hydrographiques où le concept mis en œuvre dans une zone d'urbanisation consiste à redéfinir la plaine inondable réglementaire sans compromettre la capacité de rétention d'eau des terres riveraines (p. ex., Office de protection de la nature de Toronto et de la région, OPNTR). Le programme de gestion des couloirs de vallées et de cours d'eau (*Valley and Stream*

Corridor Management Program, octobre 1994) de l'OPNTR prévoit des politiques pour les plaines inondables exceptionnellement vastes comportant des dépressions peu profondes rarement inondées. À la page 21 du document, il est stipulé, au point 2) de la sous-section 3.2.2, que la modification des limites du couloir d'un cours d'eau à l'intérieur d'une plaine inondable peu profonde peut être autorisée. Il est également précisé à la page 22 du même document :

« À l'intérieur des zones de rétention passives ou inactives, les travaux de nivellement sont permis pour autant qu'ils préservent les caractéristiques de niveau d'eau et de rétention existantes et qu'ils respectent les politiques énoncées ci-dessus. » [traduction]

Ainsi, l'OPNTR autorise la redéfinition des limites de la plaine inondable réglementaire pour permettre un nouvel aménagement si la capacité de rétention d'eau de la plaine est maintenue. C'est le même concept qui est appliqué au bief de la rivière Carp dans la zone d'urbanisation de Kanata-Ouest. Par conséquent, si la rivière Carp relevait de l'OPNTR, les politiques en vigueur permettraient un aménagement à l'intérieur de la plaine inondable sans définir le secteur comme deux zones.

Par ailleurs, la Commission des affaires municipales de l'Ontario (CAMO) a déjà rendu des décisions autorisant l'application du concept des deux zones dans des secteurs d'aménagement (notamment pour le projet Amberlakes, à Stittsville). En outre, les lignes directrices techniques du ministère des Richesses naturelles ne précisent ni ne restreignent les types de terrains auxquels le concept des deux zones peut être appliqué et n'indiquent pas non plus si celui-ci s'applique aux aménagements existants ou proposés.

Nonobstant ce qui précède, un projet de modification du Plan officiel visant à établir de nouvelles politiques de gestion des plaines inondables est en cours d'élaboration. Le document provisoire a été distribué à divers organismes publics et sera présenté au Conseil d'ici le quatrième trimestre de 2008.

Recommandation 2

Que la Ville soumette à l'approbation du Conseil une politique visant à restreindre l'application du concept des deux zones aux secteurs de la Ville déjà aménagés et à l'interdire dans les secteurs non encore aménagés.

Réponse de la direction

La direction approuve en théorie la recommandation.

L'aménagement des terres adjacentes à la rivière Carp a initialement reposé sur le concept des deux zones, un des principaux avantages étant la restauration de ce bief de la rivière Carp. Par le passé, le lit de la rivière a été redressé et abaissé. La remise en état permettra de restituer quelque peu au cours d'eau son état naturel.

Le projet de restauration de la rivière Carp propose un nivellement et un déblai-remblai équilibré, qui auraient pour effet de retirer complètement certaines parcelles de terre de la plaine inondable. Puisque ces terres ne feront plus du tout partie de la plaine inondable, il serait préférable de décrire le projet de remise en état de la rivière Carp comme une approche à zone unique modifiée. C'est ce que le ministère des Richesses naturelles a conseillé à la Ville, tout en lui faisant savoir que selon lui, la restauration proposée respecte l'esprit de la politique sur les dangers naturels de la Déclaration de principes provinciale. En effet, dans une lettre datée du 26 avril 2007, David Ramsay, ministre des Richesses naturelles, déclare que « le Ministère estime que le plan de restauration de la rivière Carp respecte les objectifs de la politique provinciale sur les dangers naturels. En outre, la flexibilité qu'offre la politique est utilisée à bon escient par l'OPNVM puisqu'il est question d'une plaine inondable vaste et peu profonde dans un secteur d'urbanisation. » [traduction]

Comme il a été mentionné à la recommandation précédente, un projet de modification du Plan officiel visant à établir de nouvelles politiques de gestion des plaines inondables est en voie d'être élaboré et sera présenté au Conseil d'ici le quatrième trimestre de 2008.

Recommandation 3

Que la Ville veuille à ce que l'évaluation de la zone de limite de crue à des fins d'aménagement comprenne l'étude de tous les dangers potentiels, notamment la stabilité des pentes et les risques auxquels s'exposera la Ville à la suite d'un assouplissement des normes de conception.

Réponse de la direction

La direction approuve la recommandation, puisqu'elle correspond à la pratique actuelle de la Ville.

Comme le stipule le Plan officiel, toute demande d'aménagement doit être accompagnée d'études cernant et évaluant l'ensemble des dangers potentiels, dont une étude géotechnique qui comprend notamment une évaluation de la stabilité des pentes.

La direction désapprouve toutefois les commentaires inclus dans le rapport de vérification selon lesquels des normes de conception moins strictes ont été appliquées pour l'aménagement de Kanata-Ouest. Aucune norme municipale ou provinciale n'exige la construction de sous-sols. La norme applicable est l'exigence voulant que la semelle soit suffisamment surélevée pour laisser un jeu minimal de 0,3 m au-dessus de la ligne piézométrique centennale. Cette exigence sera maintenue pour tout aménagement à Kanata-Ouest.

La direction sollicitera les conseils d'un bureau d'ingénieurs appelé à agir comme tierce partie pour savoir à quelle étape du processus il convient d'évaluer les dangers géotechniques. La réponse à la recommandation 11 donne une explication plus

exhaustive du contexte et de la portée de l'examen, par une tierce partie, de l'évaluation environnementale (EE) relative à la restauration de la rivière Carp.

Recommandation 4

Que la Ville soumette à l'approbation du Conseil une politique empêchant l'administration municipale de participer à des groupes de propriétaires fonciers, laquelle prévoirait notamment la vente des terrains visés ou leur dépôt en fiducie sans droit de regard.

Réponse de la direction

La direction n'approuve pas la recommandation.

La Ville a besoin de la même flexibilité que tout autre propriétaire foncier pour gérer ses biens-fonds. L'obligation pour celle-ci de vendre ses biens immobiliers ou de les confier à une fiducie sans droit de regard limiterait ou réduirait sa capacité de satisfaire à ses besoins en matière de programmation.

La Ville adhère au sein de la Direction de la gestion des biens immobiliers (GBI) à un modèle de propriétaire municipal qui fonctionne indépendamment des pouvoirs d'approbation confiés à Service de l'urbanisme, du transport en commun et de l'environnement.

GBI a assisté aux réunions du Groupe de propriétaires de Kanata-Ouest (GPKO) à titre d'observateur. La Ville participe financièrement au processus, mais n'a pas signé l'entente du GPKO. Par conséquent, le personnel de la Ville n'a pris part à la mise aux voix d'aucune des orientations ou des questions étudiées par celui-ci, y compris le plan de restauration de la rivière Carp. Dans ces circonstances, la direction a choisi d'exercer une certaine flexibilité et n'a pas participé directement aux délibérations du groupe afin d'éviter les conflits d'intérêts.

Recommandation 5

- a) **Que la Ville veille à ce que l'avantage de retirer des recettes fiscales supplémentaires soit comparé aux coûts de préparation des terrains pour l'aménagement, y compris le coût des terrains mêmes, et au risque d'exposition à des poursuites découlant de l'autorisation d'aménager des terrains ne répondant pas aux normes municipales existantes.**
- b) **Qu'une analyse coûts-avantages soit réalisée à l'égard des superficies d'aménagement additionnelles libérées par l'application du concept des deux zones.**

Réponse de la direction

La direction n'approuve pas la recommandation.

À ce stade-ci, il s'avère impossible de réaliser une analyse coûts-avantages ayant un degré raisonnable d'exactitude, car des données essentielles ne peuvent être mesurées ou sont tout simplement inconnues.

Trois données essentielles devraient être définies pour valider la recommandation. Premièrement, le type et le niveau de l'aménagement dans la zone touchée n'ont pas encore été déterminés. Les utilisations générales peuvent varier d'aménagement industriel, commercial ou de locaux pour bureaux, à aménagement résidentiel de faible ou moyenne densité, ou encore à terrain destiné à la création d'un parc.

Deuxièmement, étant donné que le type précis d'aménagement n'est pas connu, il serait à tout le moins difficile d'évaluer les risques d'exposition à des poursuites découlant de l'autorisation d'aménager des terrains libérés par l'application du concept des deux zones.

Troisièmement, puisqu'on ignore encore la nature de l'aménagement, les recettes fiscales compensatoires ne peuvent raisonnablement être estimées. Ainsi, d'ici à ce que ces données essentielles soient définies plus clairement, l'analyse coûts-avantages recommandée serait hautement théorique et spéculative, et aurait epu de valeur pour la direction.

Recommandation 6

Que la Ville exige que les experts-conseils étudient en détail les répercussions potentielles du déversement du trop-plein des égouts sanitaires dans le bassin de rétention des eaux pluviales proposé et qu'ils confirment que le ministère de l'Environnement accepterait une telle procédure.

Réponse de la direction

La direction n'approuve pas la recommandation.

Le déversement, en cas d'urgence, du trop-plein des égouts sanitaires dans un bassin de rétention des eaux pluviales, notamment en cas de panne catastrophique d'une station de pompage des eaux usées, est pratique courante depuis des années.

D'ailleurs, lorsqu'elle s'avère envisageable, cette mesure d'urgence est appuyée par les lignes directrices de la Ville d'Ottawa concernant la conception des égouts (sous-section 7.2.1.6 – Fiabilité du réseau et planification des mesures d'urgence) et énoncée dans la version préliminaire des lignes directrices de conception relatives à la gestion des eaux pluviales. Elle est également approuvée par le ministère de l'Environnement qui délivre d'ailleurs des certificats d'autorisation permettant le déversement du trop-plein des égouts dans un bassin de rétention des eaux pluviales; tout raccordement d'urgence à un égout pluvial, à une installation d'emménagement de l'eau, à un cours d'eau naturel ou à un exutoire de surface doit être approuvé par le ministère de l'Environnement de l'Ontario.

Recommandation 7

Que la Ville réévalue le critère de réduction de la concentration de matières en suspension et exige que les ingénieurs retenus par les promoteurs évaluent en termes qualitatifs les effets potentiels de la remise en état de la rivière sur la sédimentation dans les biefs situés en aval.

Réponse de la direction

La direction approuve en théorie la recommandation.

Dans le cas du projet de restauration de la rivière Carp, les bassins de rétention des eaux pluviales serviront à contrôler la qualité de l'eau et à compenser les faibles débits par temps sec. Le rapport de l'Étude sur le bassin et le sous-bassin hydrographiques de la rivière Carp a établi des critères qui satisferont aux objectifs environnementaux et opérationnels. Précisément, tous les cours d'eau touchés par l'aménagement devraient faire l'objet de mesures de contrôle de la qualité afin d'entraîner le retrait de 80 p. 100 des matières en suspension dans les ruisseaux Poole et Feedmill, et de 70 p. 100 des matières en suspension dans la rivière Carp. En fait, même avant le retrait de matières en suspension, les eaux de ruissellement de l'aménagement urbain contiendront moins de sédiments que celles qui proviennent actuellement des terres agricoles.

La direction intégrera au mandat du bureau d'ingénieurs agissant comme tierce partie un examen des critères de réduction de la concentration de matières en suspension. Voir la réponse à la recommandation 11 pour une explication plus exhaustive du contexte et de la portée de l'examen, par une tierce partie, de l'évaluation environnementale (EE) relative à la restauration de la rivière Carp.

Recommandation 8

Que la Ville veuille à ce que le plan conceptuel du projet de remise en état donne une estimation quantitative du volume de sédiments qui seront transportés vers les biefs en aval en raison des travaux de restauration, y compris une évaluation quantitative de la capacité des biefs en aval à transporter des sédiments.

Réponse de la direction

La direction approuve la recommandation.

Un des objectifs du projet de restauration de la rivière Carp était d'arriver, au moyen du processus naturel d'érosion et de dépôt, à un équilibre sédimentaire dans la rivière Carp, ce qui signifie qu'il n'y aurait aucune augmentation de la sédimentation dans les biefs situés en aval.

La direction estime que l'énoncé « Or, les répercussions potentielles, sur les biefs situés en aval, du transfert des sédiments actuellement emmagasinés par la rivière dans le bief visé par la remise en état n'ont fait l'objet que d'un examen superficiel » [traduction] que l'on peut lire dans le rapport de vérification laisse présumer à tort

que les sédiments existants dans le bief visé par la remise en état seront transportés en aval. En fait, un critère du projet de restauration est de faire en sorte que le plan conceptuel prévoie des mesures pour remédier à l'érosion actuelle et favoriser l'équilibre sédimentaire, ce qui comprend le retrait des accumulations de sédiments à certains endroits précis, réduisant ainsi le mouvement de sédiments en aval. L'EE relative à la restauration de la rivière Carp et des ruisseaux Poole et Feedmill a cerné la nécessité de surveiller le mouvement des sédiments pour veiller à l'atténuation des répercussions sur les biefs en aval, comme on peut le lire aux pages 73, 78, 90, 91 et 93 (Plan de surveillance environnementale).

La direction intégrera au mandat du bureau d'ingénieurs qui agira comme tierce partie la tâche de confirmer l'atteinte ou non de l'équilibre sédimentaire et d'offrir des conseils sur la nécessité de fournir des estimations quantitatives du volume de sédiments et de la capacité du cours d'eau à les transporter (y compris la présentation d'estimations quantitatives au besoin). Voir la réponse à la recommandation 11 pour une explication plus exhaustive du contexte et de la portée de l'examen, par une tierce partie, de l'évaluation environnementale (EE) relative à la restauration de la rivière Carp.

Recommandation 9

Que la Ville exige que le cabinet d'experts-conseils corrige les erreurs que contiennent ses travaux sur les plans hydrologique, hydraulique et autres en raison des erreurs dans la zone de drainage, et ce, sans qu'il en coûte quoi que ce soit à la Ville.

Réponse de la direction

La direction approuve la recommandation.

Le cabinet d'experts-conseils travaille à corriger l'erreur relative à la zone de drainage et ses répercussions sur les aspects hydrologiques, hydrauliques et autres de ses travaux. Les résultats de cet exercice ainsi que d'autres seront utilisés pour répondre à la recommandation 11. Cette analyse sera intégrée au mandat du bureau d'ingénieurs qui sera chargé de l'examen en sa qualité de tierce partie. Voir la réponse à la recommandation 11 pour une explication plus exhaustive du contexte et de la portée de l'examen, par une tierce partie, de l'évaluation environnementale (EE) relative à la restauration de la rivière Carp.

Recommandation 10

Que la Ville exige que le cabinet d'experts-conseils étalonne adéquatement les modèles de ruissellement et d'acheminement hydraulique de sorte qu'ils représentent fidèlement le comportement du bassin hydrographique lors des déversements d'eaux pluviales, et ce, sans qu'il en coûte quoi que ce soit à la Ville.

Réponse de la direction

La direction remet sa réponse à l'examen d'une tierce partie pour ce qui concerne l'étalonnage.

Le personnel a bien tenté d'étalonner le modèle au moyen des données disponibles. Comme il est précisé à la page 138 de l'Étude sur le bassin et le sous-bassin hydrographiques de la rivière Carp, les données de Soil Conservation Service (SCS) sur des tempêtes de durée variée (1 h, 3 h, 6 h, 12 h et 24 h) ont été examinées. Il a été déterminé que la tempête d'une durée de 12 heures était celle qui représentait le mieux les conditions du bassin hydrographique en période de débit de pointe. Le type de répartition des précipitations (Chicago par opposition à SCS) renvoyait à la superficie de la zone modélisée, et pas seulement à la future utilisation du sol.

Tel qu'il est mentionné dans le rapport d'analyse de la caractérisation du débit et du niveau des crues, des indicateurs de niveau d'eau temporaires ont été installés au chemin Richardson Side, à la promenade Palladium et au bassin de Glen Cairn. Pendant la période où ces postes d'observation étaient en place, une seule tempête torrentielle a été enregistrée (le 9 septembre 2004, au passage de la fin de l'ouragan Francis). Par conséquent, l'étalonnage et la vérification ont reposé sur un seul événement d'envergure.

La direction demandera au bureau d'ingénieurs qui sera chargé de l'examen en sa qualité de tierce partie de le conseiller sur la question de l'étalonnage pour savoir si les démarches entreprises, y compris l'analyse de sensibilité, étaient raisonnables. Voir la réponse à la recommandation 11 pour une explication plus exhaustive du contexte et de la portée de l'examen, par une tierce partie, de l'évaluation environnementale (EE) relative à la restauration de la rivière Carp.

Recommandation 11

Que la Ville exige que les experts-conseils réévaluent les résultats des analyses et des plans conceptuels subséquents et les modifient au besoin, sans qu'il en coûte quoi que ce soit à la Ville.

Réponse de la direction

La direction approuve la recommandation.

En janvier 2008, le personnel de la Ville a découvert que la modélisation créée par un bureau d'ingénieurs externe pour le compte de la Ville et du Groupe de propriétaires de Kanata-Ouest aux fins de l'EE relative à la restauration de la rivière Carp et des ruisseaux Poole et Feedmill était erronée. Le bureau en question a confirmé à la Ville qu'une erreur avait bel et bien été commise.

Le ministère de l'Environnement de l'Ontario est présentement saisi de l'EE relative au projet de restauration, plusieurs parties ayant formulé une demande d'arrêté de conformité à la Partie II. Compte tenu de l'erreur, la Ville a avisé le Ministère pour

qu'il reporte toute décision relative à l'EE jusqu'à ce que les conséquences de l'erreur aient été entièrement évaluées.

La Ville a entrepris des démarches pour retenir les services d'un bureau d'ingénieurs qui sera chargé de faire un examen indépendant de l'analyse. L'exercice devrait prendre quelques mois et se déroulera selon un mandat qui prévoira notamment un examen complet de tous les aspects de l'analyse technique réalisée pour l'EE relative au projet de restauration liés à la hauteur des crues et aux débits d'eau, ainsi qu'aux répercussions de tout changement apporté au plan conceptuel. L'examen portera également sur les éléments énoncés dans les réponses de la direction précédentes. Une fois les résultats de l'examen connus, la direction les communiquera au Conseil municipal et au ministère de l'Environnement de l'Ontario. Les questions de coûts et les prochaines étapes seront définies à ce moment-là.

Recommandation 12

Que la Ville veuille à ne pas permettre qu'un cabinet d'experts-conseils travaille à un même projet à la fois pour le compte de la Ville et pour celui du promoteur, et ce, même si la Ville est pleinement consciente de la situation. Cette recommandation vaut même si la tâche initiale assignée par l'une des parties a été réalisée.

Réponse de la direction

La direction approuve en théorie la recommandation.

Le Code de déontologie de l'Ordre des ingénieurs de l'Ontario autorise l'ingénieur à travailler à un même dossier pour deux employeurs distincts si les deux employeurs en question en sont informés. Bien qu'une telle situation oblige l'ingénieur à servir deux maîtres à la fois, il est à noter que le Code de déontologie stipule que le devoir de l'ingénieur envers le public transcende ses autres obligations, que le rôle de l'ingénieur consiste avant tout à veiller au bien-être de la collectivité.

L'application de cette recommandation réduirait le nombre de cabinets disponibles pour une tâche donnée, car certains y auront peut-être déjà travaillé par le passé pour le compte des promoteurs ou ne voudront peut-être pas se voir empêchés d'accepter à l'avenir de nouveaux mandats de ces derniers. Une augmentation des coûts pourrait également s'ensuivre puisque, ne pouvant retenir les services d'un cabinet ayant déjà travaillé à un projet donné pour le compte d'un promoteur, la Ville se verrait chaque fois dans l'obligation de traiter avec un cabinet qui ne connaît rien au dossier. Une telle restriction pourrait également empêcher la Ville de bénéficier de l'expertise des « meilleurs » experts-conseils dans le domaine.

Cela dit, la direction admet qu'il est souhaitable, dans la plupart des cas, que la Ville retienne les services d'un cabinet d'experts-conseils qui n'a pas travaillé, ne travaille pas et ne travaillera pas au même dossier pour le compte d'un autre employeur. Par conséquent, la direction appuie la modification du Règlement sur les achats de la Ville afin d'y appliquer la présente recommandation, pour autant que certaines

exceptions soient permises sous réserve de l'autorisation d'un directeur municipal adjoint, ou du directeur municipal dans le cas des directions qui relèvent directement de lui. Cependant, si ces exceptions deviennent la norme et, qu'en raison de l'application de cette recommandation, le nombre d'experts-conseils disponibles pour travailler sur les projets de la Ville se trouve nettement réduit si bien qu'il est impossible d'obtenir des soumissions réellement concurrentielles, le personnel demandera au Comité et au Conseil des directives afin de résoudre cette question.

Recommandation 13

Que la Ville veuille à soumettre à l'autorisation préalable du Conseil une évaluation complète des risques auxquels elle s'expose en procédant à la conception détaillée d'un projet que le ministère de l'Environnement de l'Ontario est en train d'examiner par suite d'une demande d'arrêté de conformité à la Partie II.

Réponse de la direction

La direction approuve la recommandation.

À l'avenir, la direction informera à l'avance le Conseil chaque fois qu'elle se propose de concevoir un projet pour lequel le ministère de l'Environnement examine une demande d'arrêté de conformité à la Partie II.

Conclusion

La vérification révèle que l'application du concept des deux zones à la rivière Carp dans le secteur de Kanata-Ouest ne satisfait que partiellement aux exigences du Plan officiel, les principes de « conception en harmonie avec la nature » n'ayant pas été abordés. En outre, les études requises pour déterminer si le concept des deux zones devait être appliqué à cette zone ne tiennent pas entièrement compte des risques relatifs à la stabilité des pentes et à la nature des sols.

Comme nous l'avons mentionné précédemment, les études menées et les rapports préparés aux fins de l'aménagement satisfont en partie seulement à la politique provinciale et au Plan officiel de la Ville. En outre, leurs composantes techniques se fondaient sur la mauvaise zone de drainage et présentaient des calculs inadéquats du volume d'eau de ruissellement que reçoivent les zones de drainage.

Nous estimons que le consultant pouvait se trouver en conflit d'intérêts lorsqu'il travaillait simultanément au Plan conceptuel d'aménagement de Kanata-Ouest pour des intérêts privés et au Plan du bassin et du sous-bassin de la rivière Carp pour le compte de la Ville d'Ottawa, malgré l'accord des deux parties, qui est conforme au Code de déontologie de l'Ordre des ingénieurs de l'Ontario. Les implications de ce possible conflit d'intérêts ont été exacerbées par le fait que la Ville d'Ottawa pouvait elle aussi se trouver en conflit d'intérêts en participant à un groupe de propriétaires fonciers (le Groupe de propriétaires de Kanata-Ouest, GPKO) dont les biens-fonds sont situés

sur son territoire alors qu'elle avait au même moment l'obligation d'examiner et d'approuver les études et les rapports produits par des experts-conseils rémunérés par le GPKO.

Les études d'évaluation environnementale de portée générale pour les travaux de voirie, le raccordement aux services municipaux et le projet de restauration de la rivière Carp ont suivi le processus d'évaluation environnementale municipale de portée générale et satisfont entièrement aux exigences relatives aux EE de portée générale. Des membres du public ont soumis au ministère de l'Environnement des demandes d'arrêté de conformité à la Partie II que celui-ci est en train d'examiner.

Remerciements

Nous tenons à remercier la direction et le personnel de leur collaboration bienveillante et de l'aide qu'ils ont apportée à l'équipe de vérification.

1 BACKGROUND

This audit was conducted as a result of a report to the Fraud and Waste Hotline. It was not originally identified in the 2007 Audit Plan that was presented to Council.

The Office of the Auditor General received information regarding the Carp River Subwatershed Plan Study and the Kanata West Development that indicates that there appear to be irregularities in the manner in which these projects were undertaken and the involvement of the City's Planning Department in the conduct of the studies and their approvals. Based on the information received, we concluded that an audit of the project was warranted.

Figure 1-2 extracted from the 2002 Kanata West Concept Plan Report shows the limits of the Kanata West Study Area.

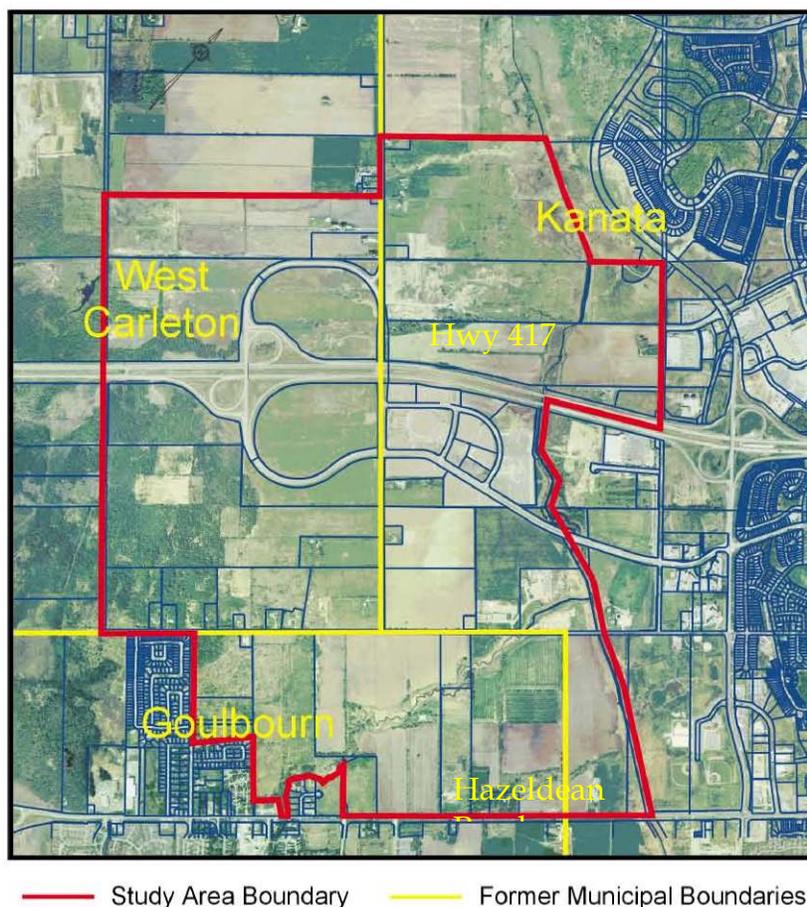


Figure 1-2
Air photo showing study area boundaries and boundaries of the former municipalities of Kanata, West Carleton, and Goulbourn.

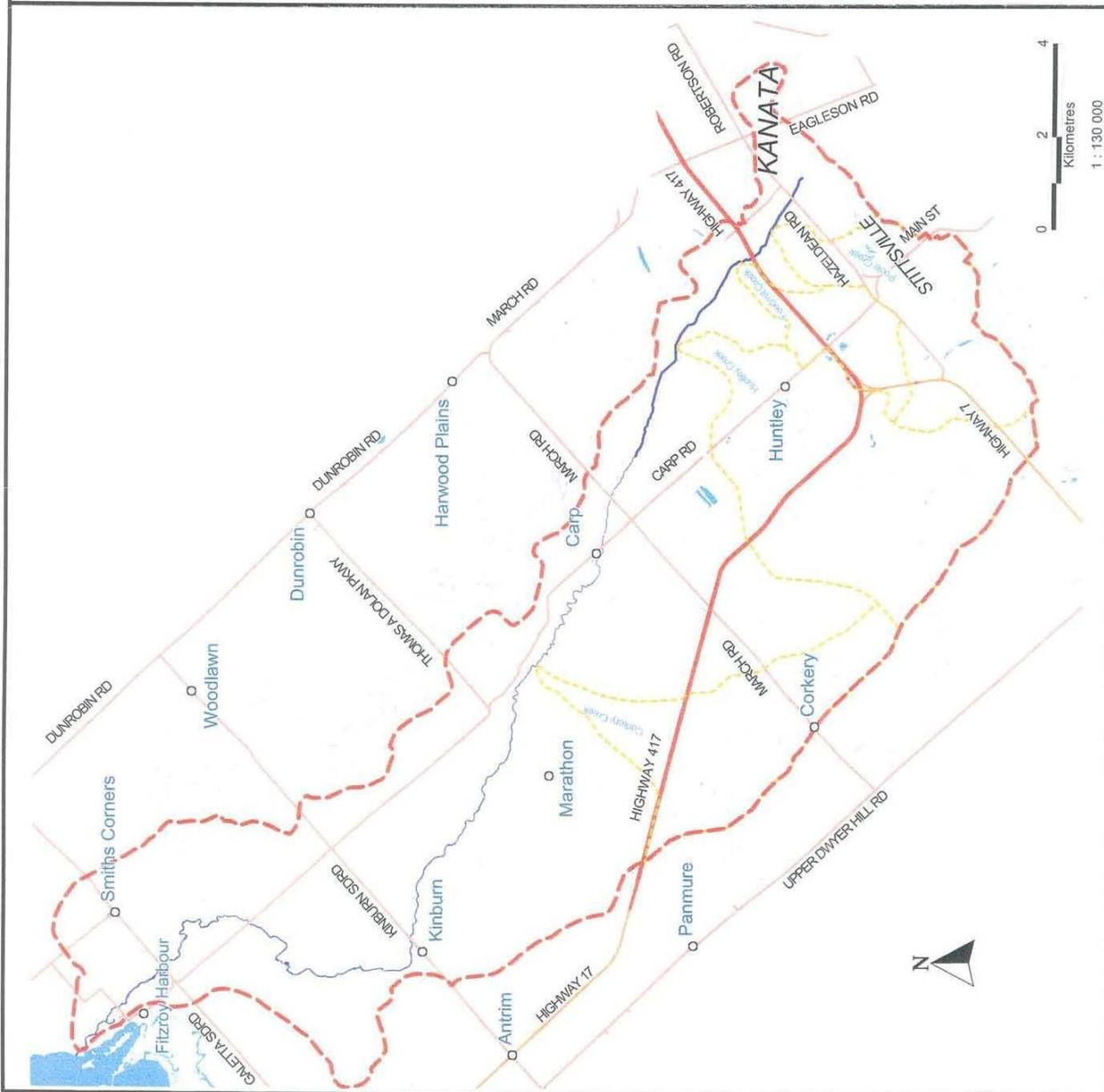
Figure 1.1.1.1
Carp River Watershed
Study Area

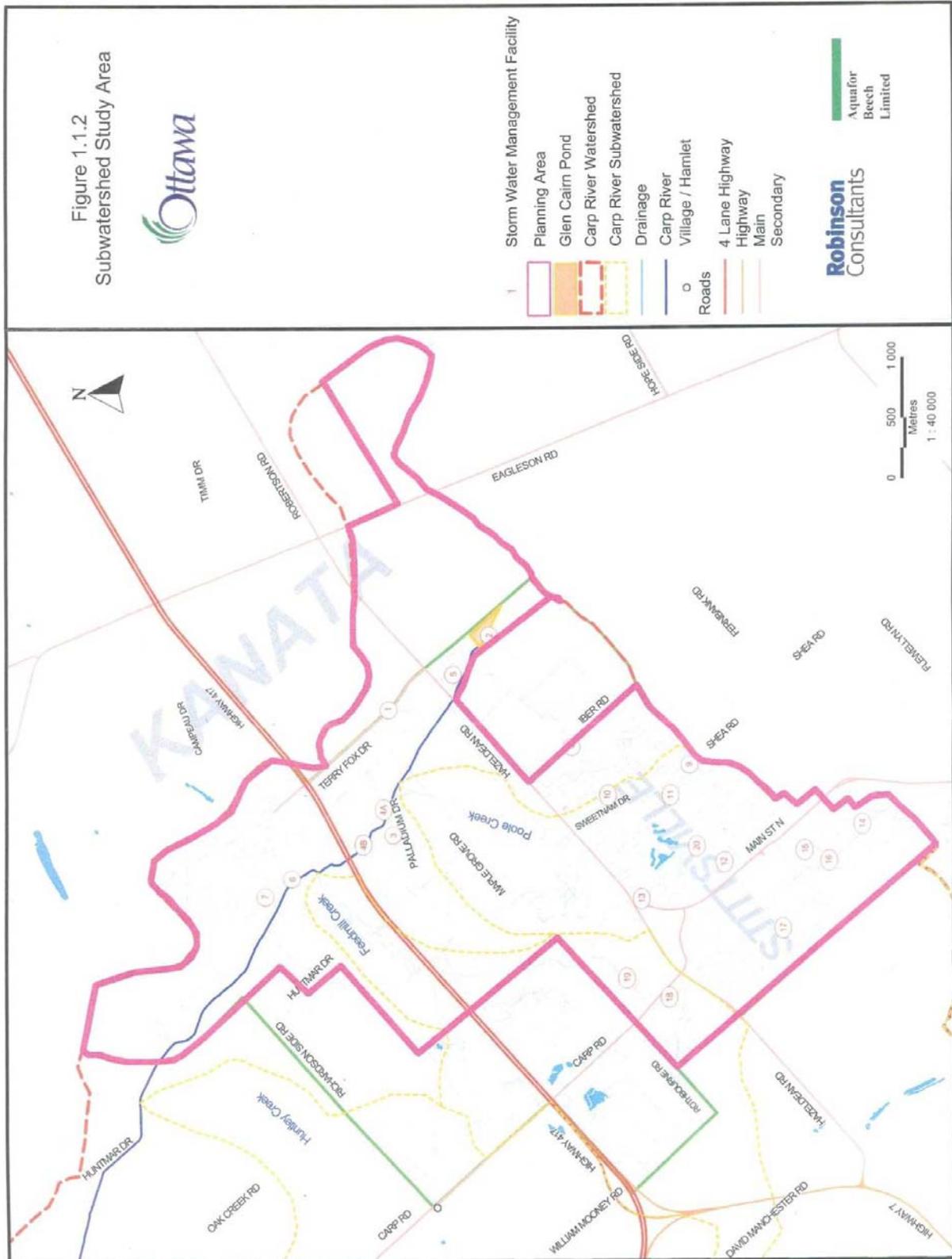


- Carp River Watershed
- Carp River Subwatershed
- Drainage
- Carp River
- Village / Hamlet
- Roads
- 4 Lane Highway
- Highway
- Main
- Secondary

Robinson
Consultants

Aquafor
Beech
Limited





2 AUDIT OBJECTIVES AND CRITERIA

The various reports included in this audit were the subject of reports to the Planning and Environment Committee and to Council as the projects progressed, and they were approved by both the Committee and Council. The purpose of this audit is to review the information presented to the Planning and Environment Committee and to Council.

Audit Objective No. 1 - To examine the application of the Two-Zone Concept to the Carp River within the Kanata West Community.

Criteria: The Official Plan includes the desire by the City to use the Two-Zone policy whenever feasible.

- Was the Two-Zone Concept applied following the Provincial Policy?
- Was the Two-Zone Concept applied correctly?

Audit Objective No. 2 - Determine whether the studies, processes and methodologies were consistent and compliant with all relevant policies, procedures, legislation and regulations.

Criteria: Review the studies in relation to Provincial Policy and the City's Official Plan.

- Compare the procedures used to the Class Environmental Assessment, the Provincial Technical Guidelines, and other similar projects.
- Review the Conservation Authority's regulations and assess whether the projects followed the regulations.

Audit Objective No. 3 - Examine the reports and studies prepared to support the development upstream and adjacent to the proposed channelization near Glen Cairn to determine if the City should be responsible for the channelization work or if others should pay for the work. *Note: Based on legal advice, the results of our audit work on this objective are not provided in this report.*

Audit Objective No. 4 - Examine the reports and studies to discern if the fact that consultants were working both for the City and developers at the same time affected the recommendations in the reports.

Criteria:

- Did the consultants work for both the City and the developers on the same project concurrently?
- Did the consultants assignment with the City terminate before they started work for the developers?

- Did the consultants do anything that resembles conflict of interest?
- Did the consultants follow the Professional Engineers of Ontario guidelines with respect to conflict of interest?

Audit Objective No. 5 – Examine the processes followed by the consultants for the developers and by the City in the Class Environmental Assessment (EA) studies, to determine if the processes and methodologies followed accepted practice and the requirements of the Environmental Assessment Act.

Criteria:

- Were the projects covered under the Class EA document?
- Was the Schedule selected correctly?
- Were the Class EA procedures followed properly?

3 AUDIT SCOPE

The audit scope encompassed the following tasks:

- Review of the legislative framework for the projects, to confirm the requirements that should have been followed in their development;
- Briefing meetings with City staff;
- Collection and review of the background information;
- Review of the reports to evaluate the methodologies used and the options examined;
- Evaluation of the recommendations to determine whether the interests of the City were adequately considered.

The audit began by reviewing the legislative framework for the projects, to confirm the requirements that should have been followed in their development. Collection and review of the background information were undertaken in light of the Audit Objectives and Criteria. A thorough review of the reports was completed to evaluate the methodologies used and the options examined; the studies were evaluated using the expected standard for the type of study and the statutory and policy requirements. The results of the review are an evaluation of the recommendations to determine whether the interests of the City were adequately considered.

3.1 Review Legislative Framework

This review included the legislative requirements for this category of projects, including the Provincial Floodplain Management Policy, the Lakes and Rivers Improvement Act, the policies of the Ministry of Transportation and the Ministry of the Environment as they relate to the project. The requirements of the Class Environmental Assessment for

Municipal Projects, the Delegated Authority policy, the Ontario Water Resources Act and Regulations, the Conservation Authorities Act and Regulations and others were reviewed in light of the project and the proposed solutions.

3.2 Interviews

Interviews were held with City staff involved in the various components of the project to review the same and to obtain copies of the reports and other background data where available. No meetings were held with staff of Real Estate Services.

3.3 Review Background Data

Background data available from the City and other public data was collected and reviewed. This included the Carp River Watershed Study, the Kanata West Concept Plan, the Class Environmental Assessment reports prepared for the Servicing of the Kanata West area, the Carp River Rehabilitation, and the Transportation Study.

In addition, rainfall data was obtained from Environment Canada for 1996, 2002, and 2004; mapping data was obtained from the Mississippi Valley Conservation Authority from their GeoPortal (www.camaps.ca).

3.4 Correspondence Reviewed

The correspondence files for the project maintained by the City were reviewed in detail.

3.5 Documents Examined

Several background reports prepared for the City by several authors were reviewed.

3.6 Carp River Subwatershed Plan

We reviewed the Subwatershed Plan study, including the report, modelling assumptions, hydrology and hydraulic models, and the results. In particular, we examined the recommendations of the report based on the standard practice in Ontario, including the requirements of Provincial policy, including those of the Ministries of Transportation, of Natural Resources, and of the Environment.

3.7 Kanata West Development

We reviewed the proposed development in light of the current standards for flood damage prevention contained in the Provincial policy, the Conservation Authority regulations, and the practice normally accepted in Ontario for development in the flood fringe.

3.8 Class Environmental Assessments

The process used to conduct the Class Environmental Assessments for Roads, Servicing, and the Carp River Restoration was examined against the requirements of the respective Class Environmental Assessment for Municipal Projects.

3.9 Analysis

The analysis evaluated the background information, the results of the interviews, the engineering and planning recommendations to meet the project objectives of determining if it is reasonable to expect that the City pays for the required flood protection; forming an opinion on whether there might have been conflict of interest evident in the report recommendations; and assessing if the Class EA studies meet the EA Act requirements.

3.10 Review Cost Allocation

Based on the data provided, we will analyse the estimated costs and the actual expenditures, in order to:

- Document all project-related costs;
- Determine if the cost apportionment used meets standard and reasonable cost apportionment basis; and,
- Determine if the City's portion of cost is fair and reasonable.

4 FINDINGS

The results of the analysis and the findings of the audit are presented in this section following the Audit Objectives. For ease of reference, the Audit Objectives and the Criteria used are repeated here and the findings are discussed in relation to the criteria.

4.1 Audit Objective No. 1 - To examine the application of the Two-Zone Concept to the Carp River within the Kanata West Community.

4.1.1 Criteria:

The Official Plan indicates that the City may request the Conservation Authority or where one does not exist, the Ministry of Natural Resources, to give consideration to defining the flood plain as two zones comprising the floodway and the flood fringe; where the two zone approach is applied, development may be considered in the flood fringe, subject to the approval of the City and the Conservation Authority.

4.1.1.1 Was the Two-Zone Concept applied following the Provincial Policy?

The Two-Zone Concept was initially used in Ontario in the early 1980s. The flood fringe was defined at the time as the area between the regulatory flood (Hurricane

Hazel or the Timmins storm) and the 100-year floodline. From the Technical Guides prepared by MNR:

The two zone approach adopted in 1982 used the magnitude of flood as the design criteria to identify the floodway and flood fringe areas. The Floodway was based on the 100 year flood, while the flood fringe was based on the Hazel or Timmins flood. The benefits of this approach was that the 100 year flood represents a sufficiently extreme event to identify a portion of the river that carries the majority of the flow, and it is relatively easy to identify the limits of the floodway. However, in some instances it resulted in a narrow strip of flood fringe land, and it did not reflect the actual risks involved in filling the flood fringe areas.

However, this definition was considered too strict and that it penalized the areas of the Province where the regulatory flood is equal to the 100-year flood. The definition of the flood fringe was modified in the 1988 Flood Plain Management Statement. The Two-Zone Concept based on the floodway and the flood fringe was included in the Flood Plain Planning Provincial Policy Statement issued in 1988 under the authority of the Planning Act, 1983. The Province published Technical Guides for the application of the Two-Zone Concept. The Technical Guide gave direction with respect to the flow velocities and depths that governed the development in the flood fringe.

The Provincial Policy Statement issued in 1996 superseded the 1988 Flood Plain Planning Policy Statement. The Provincial Policy applicable when the Carp River Watershed Studies were started was the 1996 Provincial Policy Statement, amended in 1997, which may permit the use of the Two-Zone Concept as noted below:

3.1 Natural Hazards

3.1.1 Development will generally be directed to areas outside of:

- a. *hazardous lands adjacent to the shorelines of the Great Lakes - St. Lawrence River System and large inland lakes which are impacted by flooding, erosion, and/or dynamic beach hazards;*
- b. *hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards; and*
- c. *hazardous sites.*

3.1.2 Development and site alteration will not be permitted within:

- a. *defined portions of the dynamic beach;*
- b. *defined portions of the one hundred year flood level along connecting channels (the St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence Rivers); and*
- c. *a floodway (except in those exceptional situations where a Special Policy Area has been approved).*

3.1.3 Except as provided in policy 3.1.2, development and site alteration may be permitted in hazardous lands and hazardous sites, provided that all of the following can be achieved:

- a. *the hazards can be safely addressed, and the development and site alteration is carried out in accordance with established standards and procedures;*
- b. *new hazards are not created and existing hazards are not aggravated;*
- c. *no adverse environmental impacts will result;*
- d. *vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies; and*
- e. *the development does not include institutional uses or essential emergency services or the disposal, manufacture, treatment or storage of hazardous substances.*

The Provincial Policy defines *hazardous lands* in rivers and streams as lands that are affected by flooding and/or erosion hazards. Flooding hazards are determined based on the regulatory flood and flood plain mapping, while erosion hazards are based on river erosion and slope and bank stability.

The Provincial Policy defines *hazardous sites* as “property or lands that could be unsafe for development and site alteration due to naturally occurring hazards. These may include unstable soils (sensitive marine clays [leda], organic soils) or unstable bedrock (karst topography).”

The City’s Official Plan current at the time that the Carp River Watershed study was commenced included policies that took into account the Provincial Policy as noted above, and that allowed for the application of the Two-Zone Concept in the City of Ottawa.

Flood fringe (for river and stream systems) are defined in the Provincial Policy as “the outer portion of the flood plain between the floodway and the flooding hazard limit. Depths and velocities of flooding are generally less severe in the flood fringe than those experienced in the floodway. The flood fringe is the area where development and site alteration may be permitted, subject to appropriate floodproofing to the flooding hazard elevation or another flooding hazard standard approved by the Ministry of Natural Resources.”

In general, the Two-Zone Concept has been applied by Conservation Authorities (Toronto Region, Grand River, Upper Thames Region, Rideau Valley and others) to areas of their municipalities where development already existed, to permit further development of these areas. Application of the Two-Zone Concept to permit development in previously undeveloped areas is very rare. With the exception of the Mississippi Valley Conservation Authority, we believe all other Conservation Authorities limit the application of the Two-Zone Concept to areas which have already been developed to some extent.

Correspondence in the City files for the Carp River Watershed and Subwatershed Plan shows that the Two-Zone Concept is acceptable to the Mississippi Valley Conservation

Authority; in fact, the initial mention of the Concept found in the correspondence files was by the Conservation Authority representative, who suggested that the Concept could be applied to the Carp River during a meeting held during the initial stages of the Carp River Watershed Plan study.

The Provincial Policy Statement does not have a definite stipulation of where the Two-Zone Concept can be applied, and provides for determination of the suitability of its application in each specific case. The Technical Guidelines prepared by the Province for the application of the Provincial Policy have guidance with respect to the technical requirements to satisfy the Province, but do not address at all to which type of lands it can be applied, whether with existing or proposed development. It is noted that the Provincial Policy Statement does not contain a specific limitation to the application of the Two-Zone Concept to undeveloped areas. However, the practice by other municipalities and conservation authorities is to discourage such applications. Examination of the Provincial Policy together with the Technical Guides reveals that the intent of the Provincial Policy Statement was not followed in the case of the Carp River.

The 2005 Provincial Policy Statement, now current, has similar Natural Hazard policies as the 1997 version.

The Ministry of Natural Resources published a series of Technical Guides in support of the 1997 Provincial Policy Statement. The Technical Guides provide information on the methods and procedures to use when applying the Two-Zone Concept.

On the basis of the review of the Provincial Policy and the Official Plan of the City of Ottawa, it can be concluded that the Two-Zone Concept was applied following the Provincial Policy. However, it is noted that the Technical Guide on Hazardous Lands states that Policy 3.1.3 was intended to provide some flexibility to municipalities in implementing Policy 3.1.1. The document states that:

"...the overall intent is to direct development away from these areas in order to lessen the risks associated with hazardous lands, however, it is recognized that there are some circumstances where flexibility may be exercised provided that a number of conditions are met."

The Technical Guide then continues:

"It is tempting to contemplate development in areas where structures could almost eliminate risk. But past experience shows that many protection works and structures don't last, are expensive and can create new hazards, aggravate existing hazards on adjacent properties, cause environmental damages or destroy natural systems that protect other areas, and cost more than they are worth."

In this case the structure is the engineered fill that is proposed to be placed on the flood plain. Although it could be more effective than a dike or other similar protection structure, it is expensive and can create new hazards, aggravate existing hazards on adjacent properties, and cause environmental damages.

On the basis of the MNR Technical Guide, as discussed in the previous paragraphs, we conclude that the intention of the Two-Zone Concept was not followed, because the Two-Zone Concept was used to remove 28 ha from the 100-year flood plain to permit development in a previously undeveloped area. Other lands which are located outside of the flood plain and are adjacent to the Kanata West area, west of the western limit of the Kanata West area, could have been examined for development, rather than forcing development onto the flood plain by means of the Two-Zone Concept.

The Kanata West Concept Plan (KWCP) in its initial conception did not have a reference to development in the flood fringe of the Carp River. Later submissions of the KWCP plans started to show the flood fringe area as developable. The reports do not contain sufficient information to confirm when the change occurred, but as noted previously, the idea appears to have originated with the Mississippi Valley Conservation Authority (MVCA).

In general terms in most other municipalities in Ontario, based on an Internet search of policies and official plans, the Two-Zone Concept is applied to infill situations, where development already exists in the area and it is desired to complete the development of the area. The only municipality we could find that currently uses the Two-Zone Concept for an area not previously developed is the City of Ottawa.

The application of the Two-Zone Concept in the Carp River had the objective of increasing the land area available for urban development. As will be discussed in subsequent sections of this report, the proposed development in the flood fringe could require sub-standard drainage and foundation drain provisions. This is a serious concern for the City, as development not meeting the current standards may result in additional liability to the City.

4.1.1.2 Was the Two-Zone Concept applied correctly?

Since 1954 the Province of Ontario has successfully reduced flood damages by using prevention rather than structural flood reduction means. A very important component of the flood damage reduction effort has been the delineation of the Regulatory flood line and the application of Fill and Construction Regulations under the Conservation Authorities Act. The Regulatory flood varies depending on the area of the Province under consideration; in Eastern Ontario, including the City of Ottawa, the Regulatory flood is defined as the flood having a 1% probability of being equalled or exceeded in any one year (commonly termed the flood with a return period of 100 years). The river or stream requires its channel and the flood plain to be able to convey flood waters; the

flood plain, although it may be used rarely by the river, forms an integral part of the flood conveyance capacity of the watercourse.

Encroachment of development in the flood plain tends to reduce the hydraulic capacity of the stream and its flood plain. Although it is possible to design measures to replace the lost hydraulic capacity, it is an established fact that the most economical means to reduce flood damages is to keep development out of the flood plain.

In addition to the local flooding potential created by placing new development in the stream flood plain, the changes to the flood plain and the flood storage provided by the flood plain can affect the flow rates and water levels in downstream and upstream reaches.

Therefore, given the option of developing in a modified flood plain or the option of developing in higher ground located out of the flood plain, it is prudent to choose the latter option.

The 1997 Provincial Policy states that “development will generally be directed to areas outside of hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards.” This is the interpretation that most conservation authorities have used. For example, the Toronto Region Conservation Authority has a strict record of not permitting development in the flood fringe; similar policies are evident in other conservation authorities.

The 1997 Provincial Policy states that development and site alteration may be permitted in hazardous lands, provided that (a) the hazards can be safely addressed; (b) no new hazards are created; (c) existing hazards are not aggravated; (d) no adverse environmental impact will result, and (e) vehicles and people have a safe way to enter and leave the site.

The application of the Two-Zone Concept in the Study Area addressed only the flooding hazard. However, due to the nature of the soils in the Study Area, we consider that the criteria for permitting development in the flood fringe should take into consideration the following aspects:

- a) Effect of flooding on the developments; for example, backwater from the Carp River into the storm sewer systems.
- b) Effect of flooding in the Carp River on the foundation and basement conditions in the Study Area.
- c) Effect of the presence of organic soils and sensitive clays in the areas within the flooding hazard, and their possible reaction to the fill that is proposed to raise the lands above the flooding hazard.

- d) Effects of the organic soils and sensitive clays on the stability of the development itself. This includes the buildings, roads and structures.

The extent of the Natural Hazard was not addressed specifically in evaluating the application of the Two-Zone Concept to the Study Area. We noted that there was no geotechnical investigation done for the filling required to raise the grades within the flood fringe. The studies contained geotechnical investigation data for the lands within the tableland, but not within the existing Carp River floodplain.

Correspondence in the project file indicates that some of the consultants involved had raised, unofficially, their concern with the capacity of the native soils to support the depths of fill proposed for the flood fringe. We could not find any specific discussion of the potential effect on the deep clay deposits of the fill required to raise the flood fringe area to a level above the regulatory flood level. As such, it is not possible to ascertain whether this could create slope stability problems. However, we consider that this aspect should be investigated further before any development on the flood fringe is approved by the City.

Geotechnical information in the Servicing Report indicates that the flood plain of the Carp River is underlain by peat. Page 31 of the Servicing Report indicates that eroded channels (i.e., Carp River and tributaries) exist within these soil associations that drain water within reach of the banks. The report indicates that these channels contain significant deposits of muck and peat reflecting the perched water tables within the subject area.

Is this peat deposit large and deep enough to be considered a natural hazard? It is not possible to reach a conclusion from the information available. However, it is noted that this issue was not fully investigated in the engineering reports reviewed. In our opinion, this is a concern that must be fully investigated prior to development on the flood fringe being allowed to proceed.

Recommendation 1

That the City develop a policy to preserve flood plains as a flood damage reduction measure.

Management Response

Management agrees with this recommendation in principle.

Management would like to address the fact that there are examples in other Conservation Authority watersheds, of implementing a concept where the regulatory flood plain is redefined and riparian storage is maintained in a developing area. (i.e. Toronto and Region Conservation Authority- TRCA). The TRCA Valley and Stream Corridor Management Program (October 1994) has policies for “unusually wide flood plain with shallow depths of infrequent flooding”. In section 3.2.2 (2) on page 21 of the policy, it states that alterations to stream corridor boundaries within

shallow flood plains may be permitted. The TRCA Valley and Stream Corridor Management Program also notes on page 22 that:

“Within passive or inactive storage areas, re-grading may be permitted that retains existing stage/storage characteristics provided it does not conflict with the policies outlined above.”

Therefore, the TRCA allows redefinition of the regulatory flood plain line to allow new development if flood plain storage is maintained. This is the same concept that is being applied, in the case of the reach of the Carp River, in the Kanata West area. Therefore, if the Carp River was within the TRCA’s watershed, their present policies would allow the development into the flood plain without identifying the area as a Two Zone.

There are also examples of the Ontario Municipal Board (OMB) decisions implementing the Two Zone concept in new development areas (i.e. Amberlakes in Stittsville). Furthermore, the Ministry of Natural Resources (MNR) technical guidelines do not specify or restrict which type of lands the Two Zone concept can be applied to or whether it applies to existing or proposed development.

Notwithstanding the above, a draft Official Plan Amendment (OPA) for new Flood Plain Management policies is currently underway. This document has been circulated to various public agencies and will be presented to Council by Q4 2008.

Recommendation 2

That the City develop a policy for Council approval to apply the Two-Zone Concept only to areas of the City with existing development and not to areas that heretofore are undeveloped.

Management Response

Management agrees with this recommendation in principle.

Development of the lands adjacent to the Carp River was initially characterized as a Two Zone approach. One of the main benefits of the application of the Two Zone concept was the restoration of this reach of the Carp River. Historically, the channel of the Carp River has been straightened and lowered. This restoration will return it to a more natural state.

The Carp River Restoration project proposes re-grading and balanced cut and fill, with the effect that some lands are removed entirely from the flood plain. Since these lands are entirely removed from the floodplain, the Carp River Restoration is better described as a modified one-zone approach. This is the advice provided to the City, by the Ministry of Natural Resources, along with the opinion that the restoration as proposed satisfied the intent of the Provincial Policy Statement’s (PPS) Natural Hazards policy. In a letter dated April 26, 2007 David Ramsay, the Minister of Natural Resources, stated “the Ministry believes the objectives of the provincial natural hazards policy have been met in the Carp River Restoration Plan.

Furthermore, the flexibility provided by the policy has been appropriately used by the MVCA given the wide shallow floodplain in this urbanizing area.”

As mentioned in the previous recommendation, a draft OPA for new Flood Plain Management policies is currently underway and will be presented to Council by Q4 2008.

Recommendation 3

That the City ensure that the evaluation of the flood fringe for development includes examination of all potential hazards, including slope stability and risk incurred by the City as a consequence of reduced design standards.

Management Response

Management agrees with this recommendation, as this is the City’s current practice.

As stipulated in the City's Official Plan, each development application is required to submit studies that examine and assess all potential hazards. Included in this submission is a geotechnical study which incorporates a slope stability assessment.

Management disagrees, however, with the comments in the audit that a reduced design standard for development of lands was applied to Kanata West. There is no municipal or provincial standard that requires basements. The applicable standard is the requirement for footing elevations to be designed to maintain at least a 0.3m clearance above the 100-year Hydraulic Grade Line (HGL). This will continue to be a requirement for any development in Kanata West.

Management will be seeking, within the terms of reference for the third party engineering firm, advice on the appropriate timing within the process for examination of geotechnical hazards. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration Environmental Assessment (EA).

4.2 Audit Objective No. 2 - Determine whether the studies, processes and methodologies were consistent and compliant with all relevant policies, procedures, legislation and regulations.

4.2.1 Criteria:

4.2.1.1 Review the studies in relation to Provincial Policy and the City’s Official Plan.

Based on the discussion in the previous section it can be concluded that the studies generally followed Provincial Policy. The same can be said with respect to the procedures, legislation, and regulations. However, the reports and correspondence also show that the application of the Provincial Policy followed the letter but not necessarily the intent of the policy.

The Two-Zone Concept is recognized in the Official Plan of the City of Ottawa, and the manner in which it was approached generally conformed to the Official Plan policies. However, application of the Concept does not appear to have taken completely into account other Official Plan policies, as noted below.

The Official Plan (OP) contains policies aimed at strengthening ecosystem planning and design. The OP indicates that the City will undertake watershed and subwatershed plans in priority areas, to identify environmental features and conditions, and to recommend measures to mitigate the impacts of existing and proposed land use activities. Development proponents will be expected to use “design with nature” principles, that is, maintain and use natural characteristics and features.

The application of the principles require use of several tools, which include requirements to complete environmental impact statements, tree preservation and protection plans, wellhead protection plans, groundwater impact assessments, erosion and sediment control plans, and stormwater site management plans, among others.

Specifically, the OP states that “The quality of the environment is also protected through review of development applications. Policies in Section 4.7 on development review use a “design with nature” approach, where the features of a site are incorporated into the design of the proposed development. This approach entails measures such as retention of vegetation, consideration of wildlife habitats, and respect for natural drainage patterns. Other practices accommodate natural features that pose potential risks, such as flood plains and unstable soils.”

In our opinion, the application of the Two-Zone Concept in this case seems to have been carried out in isolation, without explicitly taking into account the requirements of the Official Plan with respect to the “design with nature” policies. For example, as noted previously, the decision to apply the Two-Zone Concept took into consideration only hydrologic and hydraulic effects, leaving out other risks such as sensitive clays and organic soils; other examples could be the relatively shallow manner in which the potential effects of the Carp River restoration on sedimentation in downstream reaches has been addressed.

4.2.1.2 Compare the procedures used to the Class Environmental Assessment, the Provincial Technical Guidelines, and other similar projects.

Class Environmental Assessment procedures per the Planning Act were initially used for the environmental assessment of the projects. However, the manner in which the process was used did not meet the requirements to allow the process to proceed based on the Plan of Subdivision process. Consequently, the process was changed to the Class EA process for Master Plans, based on Schedule B of the Municipal Class Environmental Assessment.

Examination of the application of the Class EA procedures for Municipal Projects to the Kanata West Master Servicing Study, Stantec Consulting Ltd & CCL/IBI Group, completed June 2006 disclosed that the study followed the procedures required in the Municipal Class Environmental Assessment.

The City of Ottawa and Kanata West Landowners' Group (KWOG) were co-proponents in the Class EA process. In this regard, we found it unusual to have the municipality and developers as co-proponents for proposed development projects. We could not find any other situations in which this has been done for development projects. Nonetheless, as far as we can determine the arrangement is allowed by law. However, we consider that it poses some problems, as described below.

The first and most important concern with the City of Ottawa being a part of KWOG is that it may cause a conflict of interest. The City belongs to a group that is interested in maximizing its profits from the development and sale of their lands. At the same time, the City is in charge of approving the studies, reports, and designs proposed by the same group. In this respect the City tried to separate the two functions, by assigning the Real Estate Division to represent it in the KWOG and having the Planning and Infrastructure Approvals Divisions as the approving bodies. Unfortunately, experience in this and other situations show that there are limitations to this type of separation. Definitely, the best position is for the City to maintain at all times a fully arms-length relationship with developers.

The correspondence shows that City staff worked diligently to review the submissions by the developers and their consultants. Based on the correspondence, it would appear that City staff made the appropriate demands of the developers, to make sure that the City's interests were covered. However, our review of the submissions by the developers and their consultants has disclosed some aspects that may have not been accepted if there had been complete separation of applicant and reviewers.

Examples of correspondence and reports that lead us to our conclusions that staff's review was affected by ownership include the following:

1. The Carp River Watershed/Subwatershed Study report lacks some information that would normally be required, for example, a table summarizing the drainage areas and flows at different parts of the watershed; the conclusion that the Two-Zone Concept can be applied to the Carp River is not fully explained.
2. The "Flow Characterization and Flood Level Analysis" report addresses the area to Richardson Road only, leaving out the remainder of the watershed. Although a basic problem, the report was completed without correcting this.
3. Regarding the same report, it was accepted although not all the comments by the City were fully addressed in the report.

4. The “Post-Development Flow Characterization and Flood Level Analysis” report does not fully address all the comments provided by the City, but it was accepted.
5. The fact that the consultant was allowed by the City to work on the Kanata West Development Plan while simultaneously preparing the Carp River Watershed/Subwatershed Plan. Under normal circumstances the consultant would have provided information to the developers’ consultants, but would not work directly as the developers’ consultant.

The Carp River Watershed Study report lacks some information that would normally be provided in reports of this type, such as specific recommendations; the hydrology and hydraulic analysis were accepted after a number of iterations of submissions and comments, but may not have been accepted under different circumstances.

The Flow Characterization and Flood Level Analysis Report, addressing the existing Carp River hydrology and hydraulics, which was reviewed very thoroughly by City staff. However, a review of the summary of comments by the City and the corresponding responses by the consultant shows that a number of issues were not completely addressed in the version of the report issued in 2005. A major drawback of the said report is that the downstream study limit was defined as the Richardson Road, when it should have included the entire watershed. This oversight was subsequently corrected in the post-development report; nevertheless, the analysis should have been part of the Flow Characterization report.

A second concern, not less important than the first, is that the City is being observed by developers in other parts of the City, where the City does not have a pecuniary interest. It would be only human nature for those developers to expect the same treatment as the KWOG. Consequently, decisions made in the framework of the Kanata West Concept Plan implementation will affect for a long time the decisions that are made in other parts of the City.

At one point in the process the City considered selling the City-owned land within the Kanata West area (Maple Grove Operations facility). Review of the correspondence indicates that around June 2002, this subject was discussed internally, with the conclusion that the lands could be disposed of provided that the need is rationalized, and noting that the Facility Rationalization project would address the site. In 2004 the matter was discussed again during a meeting convened by Planning and Development Services, this time in the context of possible use of the land for a stormwater management facility. The 2004 correspondence indicates that Public Works and Services may be asked to leave the site within 8-10 years to allow use of the property as a stormwater management area; Comprehensive Asset Management was asked to prepare a synopsis of the matter, including the operational ramifications of leaving the

site. In 2007, the “Surface Operations Branch Facility Rationalization and Consolidation Plan” concluded that the facility should be maintained.

Review of the documents shows that the required notifications and points of public contact were carefully arranged and met or exceeded the Class EA requirements. In the case of this project, the consulting team arranged for:

- Notice of Study Commencement;
- Three public meetings; and,
- Notice of Completion.

In addition, the reports indicate that Government agencies were notified and were involved in the process by means of progress reports and other meetings.

One aspect that is missing in the appendices to the Class EA reports is the inclusion of relevant agency and other contact correspondence, including records of the public meetings and minutes of meetings. This is standard practice in submissions for public review. Furthermore, when members of the public and other interested parties asked specifically for copies of the correspondence, there is indication that the City and KWOG decided to not provide these documents to the public at that time. The correspondence shows that the City decided to not provide the documents, although it is standard practice to be as open as possible in the proceedings. The City should have provided the relevant correspondence.

Evaluation Criteria and Weightings were based on Water, Wastewater and Transportation Master Plans prepared by the City for the Official Plan in the late 1990s. We have no concerns with this methodology, as it is widely accepted and used in Ontario for project evaluation and ranking of alternatives solutions.

Recommendation 4

That the City develop a policy for Council approval to not participate in landowners groups, including selling the subject lands or putting them in a blind trust.

Management Response

Management disagrees with this recommendation.

The City requires the same flexibility as any other landowner in managing real estate. The forced sale or placement in a blind trust, of real property would limit or restrict the City’s ability to fulfill programming needs.

The City has endorsed a corporate landlord model within the Real Property Asset Management Branch (RPAM) that operates independently from the approval authorities within the Planning Transit and Environment Department.

RPAM participated in the Kanata West Owners Group's (KWOG) meetings as an observer. The City has participated financially but has not signed the KWOG agreement. As a result, City staff has not voted on any direction or matters considered by the KWOG including the Carp River Restoration plan. In this circumstance, management chose to exercise flexibility and was not a direct participant in order to avoid conflict of interest.

Recommendation 5

- a) **That the City ensure that the benefit of additional tax revenues should be measured against the costs of preparing the lands for development, including the cost of the land, and the potential liability exposure by permitting development in lands that do not meet the existing municipal standards.**
- b) **That a cost-benefit analysis be carried out with respect to the additional lands gained by applying the Two-Zone Concept.**

Management Response

Management disagrees with this recommendation.

A cost-benefit analysis cannot be carried out to any reasonable degree of accuracy at this point in time as the key variable inputs cannot be measured, or are simply unknown.

There are three key variables that would need to be determined to validate the recommendation. First, the type and level of development within the impacted area has not been determined. The general uses can range from office/ industrial/commercial development, to low/medium density residential development, or even to land dedicated for parkland.

Secondly, given that the specific type of development is unknown, any attempt to measure the exposure liability by permitting development on the additional lands gained by applying the Two Zone concept, would be difficult at best to assess.

Finally, given the unknown nature of development, an offset tax revenue cannot be reasonably estimated. Until these key variables are more clearly defined, the recommended cost-benefit analysis would be highly theoretical and speculative, and would be of minimal value to management.

4.2.1.2.1 Sanitary Sewer System

A review of the Alternatives Concepts indicates that the sanitary service system was restricted to one gravity option and two pumping options. It is not clear in the report why the gravity outlet assumes that the trunk sewer would be a tunnel constructed along the Hwy 417 corridor. In addition, it was noted that the gravity option was given relatively lesser extent of attention, as only one tunnel alignment was examined. The report is not clear about why no other alignments for a tunnel were examined.

4.2.1.2.2 Internal Servicing Alternatives

Two sanitary pumping stations are required to satisfy phasing needs for construction of the overall development area and to produce a cost effective initial phasing scheme. However, the report indicates that all alternatives support phased development. In the end, the report recommends a single pumping station.

The report also considers as alternatives the improvements to Signature Ridge pumping station or its complete replacement.

The report recommends that the overflow could be provided by permitting, during emergency conditions, overflow of sanitary sewage to an adjacent (proposed) stormwater management pond. The report does not provide sufficient information on the circumstances when the overflow would be permitted, and does not indicate whether such action would be acceptable to the Ministry of the Environment.

The City has advised that a similar arrangement was used in the Leitrim Pumping Station, which was approved in 2001 and constructed in 2002. We note, however, that the MOE requirements are not necessarily the same at present. It is evident that additional work would be required before this option is finalized.

Recommendation 6

That the City require consultants to discuss in detail the potential impacts of discharging sanitary sewer overflow to the proposed stormwater management pond, including confirming that this procedure is acceptable to the Ministry of the Environment.

Management Response

Management disagrees with this recommendation.

The discharging of the sanitary sewer overflow in a storm water management pond as an emergency measure practice when a sanitary pump station experiences a catastrophic failure, has been a standard practice for a number of years. This option is further supported in the City of Ottawa's Sewer Design Guidelines (section 7.2.1.6 - System Reliability and Contingency Planning), when it is feasible to do so. This emergency measure is also noted in the City's draft Storm Water Management Design guidelines and is an accepted measure by the Ministry of Environment by virtue of their issuance of Certificates of Approval, which call for an overflow into storm water ponds. All emergency conduit connections to storm sewers, storage facilities, natural watercourses or surface outfall points are subject to approval by the Ontario Ministry of the Environment.

4.2.1.2.3 Stormwater Management Alternatives

The stormwater management alternatives examined were developed in the Carp River Watershed Plan. During the study, refined alternatives were examined, consisting

mainly of different combinations of detention ponds and storm sewer configurations, but based on the Watershed Plan Concepts.

The corresponding part of the report does not discuss the effect of the proposal to allow sanitary pumping station emergency overflow to one of the stormwater management ponds. The report should discuss this possibility in the stormwater management section of the report. (See above recommendation).

Although one of the objectives of the stormwater management system is to try to maintain the infiltration in the Study Area similar to existing conditions, the study does not address options for maintaining permeability values similar to existing, such as Low Impact Development (LID) alternatives. LID solutions try to replicate the hydrology of the watershed by promoting infiltration close to the source, rather than attempting to use a centralized stormwater management facility.

The criteria for stormwater quality treatment to the Carp River are equivalent to a normal level or level 2 based on the MOE Stormwater Management Planning and Design Manual. Level 2 means that the facilities are designed to remove on a long term basis 70% of suspended solids in storm water. Based on the fact that the Carp River has difficulty in transporting sediment, we conclude that these criteria and the Carp River requirements are incongruent. Based on the Carp River conditions, we would have expected stricter suspended solids removal requirements.

The stormwater quality criteria in the MOE Stormwater Management Planning and Design Manual are based on protection of fisheries, and the level of protection that each type of fisheries habitat requires. From that perspective, level 2 may be the correct criteria. However, the criteria for sediment removal should be more stringent given that the Carp River has very low ability for sediment transport.

The Servicing Report indicates that to service the low-lying areas along the Carp River it will be necessary to use special housing built forms and/or conventional building design with sump pumps. In addition, the Servicing Report indicates that the submerged inlet condition of the future stormwater management ponds will cause sedimentation with the storm sewers, which could result in a lowering of the level of service from the 100-year storm to the 25-year storm.

The report notes that there will be a need to impose special design requirements for development in areas adjacent to the Carp River, in which the designs will be allowed to not meet the City's design standards. Lower standards in this case include a lower level of basement flood protection and the possibility of needing partial depth basements, no basements, or sump pumps. The concern that this raises is the possibility of increased liability to the City in case of basement flooding or damage to structures due to high water levels.

Another issue found is that the report indicates that in a number of locations the outlet storm sewers will be submerged, which could lead to additional sedimentation in the storm sewer pipes. The consultant indicates that the loss of 25% of the pipe section due to sedimentation would reduce the capacity of the system from the 100-year storm¹, which is the design storm for the overall system, to the 25-year storm. We are of the opinion that the net effect is that the City relaxes its own standards to accommodate development in the flood fringe, thereby accepting liability that it does not need to accept. In this regard, our observation is that the system will require more frequent maintenance than other systems in order to preserve the overall system capacity. The effect of the overall design requirements is to transfer additional liability to the City.

Recommendation 7

That the City re-evaluate the total suspended solids removal criteria and requests the developers' engineers to address in qualitative terms the potential effects of the river restoration on sedimentation in downstream reaches.

Management Response

Management agrees with this recommendation in principle.

In the Carp River Restoration project, the storm water management ponds will provide for quality control and will augment low flow during dry weather conditions. The Carp River Watershed/Subwatershed study determined criteria that would meet both environmental and functional objectives. Specifically, all development flows would need to be controlled to result in: 80% suspended solids removal in Poole and Feedmill Creeks, and 70% suspended solids removal in the Carp River. In fact, runoff from urban development will contain less sediment than what is currently coming from farmers' fields, even before suspended solids removal.

Management will include, in the terms of reference for the third party engineering firm, a review of the criteria for suspended solids removal. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

4.2.1.2.4 Water Supply and Distribution

Two major alternatives were examined to service the Kanata West area, namely a new source treatment distribution system, or expansion of the existing distribution system.

We found no concern with respect to the water supply system proposed.

¹ The probability that a given storm event or peak flow exceeds a given value is measured in annual probabilities, that is the probability in any one year that the event will be exceeded. The inverse of the annual probability is termed the return period. Consequently, the peak flow that has a probability of 1% of being equaled or exceeded is termed the 100 year event. The 25 year event has an annual probability of 4%.

4.2.1.2.5 *Carp River Restoration Project*

The June 2006 Carp River, Poole Creek and Feedmill Creek Restoration Class EA was conducted in coordination with the Servicing and Transportation Class Environmental Assessments. The notifications and public and agency involvement were carried out jointly.

In reviewing the methodology used, it is noted that the Restoration Project accepts the limits of flood fringe to be developed based on the results of the Carp River Watershed and Subwatershed Plan, which stated that those limits were based on preliminary hydrology and hydraulic work. We believe that it would have been prudent to confirm the proposed width of the flood fringe based on the results of the work carried out during the restoration design, including the Flow Characterization and Flood Level reports. Given that the Carp River Watershed Plan Report correctly indicates that the proposed floodway width should be reassessed in subsequent more detailed analyses, we consider that it would have been prudent to start the proposed restoration analysis by examining the effects of providing different floodway widths.

The methodology used to address concerns regarding the possibility of increased sediment loads being discharged from the restoration reach to downstream reaches as a consequence of the said restoration is completely qualitative. Since the purpose of the river restoration is to reduce the amount of sediment that can be deposited in the subject reach, it follows that more sediment will be transported to downstream reaches than at present. It is our opinion that the City could be exposed to the liability for future watercourse improvements in downstream reaches, as it could be argued that those potential watercourse improvements were necessary due to increase sedimentation stemming from the Restoration Project.

The Carp River report plus correspondence from MVCA show that the flood fringe development is being allowed in exchange for restoration of the river. In the analysis, the benefits to the river of restoring it were taken into account, and considerable effort was placed on the evaluation of the benefits. However, there is only cursory examination of the potential impacts of transferring the sediment that is currently being stored by the river in the restoration reach to downstream reaches. Improvements to the sediment transport capacity of the river should start at the mouth of the river; otherwise the enhanced sediment transport capacity of an upstream reach will contribute to additional sedimentation in the downstream reaches.

A significant question that remains with respect to the Carp River restoration is whether the improvements will really improve fisheries values. If they do, what is the trade-off with respect to the potential degradation of downstream reaches as a result of the enhancements to an upstream reach? In addition, the reason why the channel started to collect sediment in the first place is not fully addressed. If the cause of the sediment is not corrected, the river restoration works will be much less effective, and may be lost

altogether after a few years, particularly if sediment continues to be transported to downstream reaches which do not have adequate sediment transport capacity.

Recommendation 8

That the City ensure that the Restoration Project design provides a quantitative estimate of the volume of sediment that will be transported to downstream reaches as a result of the restoration, including a quantitative evaluation of the sediment transport capacity of the downstream reaches.

Management Response

Management agrees with this recommendation.

Accordingly, one of the objectives in the design of the Carp River Restoration project was to achieve a sediment balance in the Carp River within the natural erosion/deposition process. This means there will be no increase in sedimentation in downstream reaches.

In management's opinion, the following statement in the audit: "However, there is only cursory examination of the potential impacts of transferring the sediment that is currently being stored by the river in the restoration reach to the downstream reaches..." incorrectly assumes that the existing sediment in the restoration reach will be transported downstream. In fact, a criterion of the restoration project is to ensure that the design provides for remediation of existing erosion and encourages sediment balance. This includes the removal of existing sediment deposits in localised areas thereby reducing the movement of the sediment downstream. The Carp River, Poole Creek and Feedmill Creek Restoration EA identified the need to monitor sediment movement to ensure impacts to downstream reaches are mitigated, per pages 73, 78, 90, 91 and page 93 (Monitoring Plan).

When preparing the terms of reference for the third party engineering firm, management will include the requirement for confirmation as to whether a sediment balance was achieved, and for advice on the need for quantitative estimates in regard to the volume of sediment and sediment transport capacity (including provision of quantitative estimates if required). See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

4.2.1.2.6 Technical Guidelines

The hydrology and hydraulics generally followed the technical guidelines, but there are a number of issues with the modelling and the conclusions. A major concern is the mistake in delineation of the drainage area, which started in the Carp River Watershed Plan Study, and filtered through all other subsequent studies and designs.

Hydrotechnical modelling consists of the hydrologic modelling – used to determine peak flow and runoff volume estimates – and the hydraulic modelling – used to determine water surface levels.

During the course of this audit, the City was requested to provide the digital versions of the hydrotechnical models. Subsequently, the City was asked to provide additional data, and requested the consultants to provide it. The City should have the data produced by the consultants and should not need to request that data from the consultants.

4.2.1.2.6.1 Hydrologic Modelling

Hydrologic modelling of the Carp River was carried out using various methods. The initial method was the use of software called QUALHYMO, which can model continuous precipitation records; other software used included XPSWMM and SWMM, which are similar programs.

QUALHYMO is a hydrologic model developed for modelling of quantity and quality of storm runoff in watersheds. As originally intended, the model was developed for planning-level modelling, that is for evaluation of watershed management options. The model permits only a fairly long time step (one hour duration), which makes the software suitable for long term continuous simulations (i.e., simulations of meteorological data and precipitation conditions as input) to generate hydrographs for a succession of years. In addition, the version of the model used in the Carp River Watershed Plan study uses a calculation time step of one hour; this makes the model appropriate for modelling of medium to large watersheds, where the response time of the watershed is several hours. In this respect, we consider that the application of the model in the Carp River Watershed Plan study was appropriate for the evaluation of the overall watershed.

Application of QUALHYMO to the assessment of the impact of development in the upper watershed was not appropriate, as the model's time step is too coarse to permit evaluation of the impacts of the urban development on the lower watershed. We would have selected a hydrologic model which allows use of a finer time step, such as HEC-HMS or other similar program.

In addition, the choice of design storm may not have presented the most serious case for evaluation of the effects of flooding in the Carp River Watershed Study. The SCS Type-II rainfall distribution is appropriate for use in watersheds with medium to long reaction times. However, the Chicago Storm distribution is more appropriate for use in urban environments, which have much more direct response to rainfall.

The Carp River Watershed – Subwatershed Study does not provide a table summarizing the overall Watershed drainage area or the Subwatershed drainage areas.

In fact, the report only contains one reference to the size of the drainage area. This makes for difficult evaluation of the data regarding peak flows, runoff volumes, etc. Similarly, the report does not discuss the proportion of the overall watershed that is comprised by the Subwatershed Study Area, although it does note that the urbanized area of the watershed is concentrated in the subwatershed.

Drainage area is the most important parameter in estimating flood flows in a watercourse. Of all the parameters that enter the calculations, it is usually one of the easiest to estimate accurately; it is also the parameters that must be estimated with most care, being directly proportional to the magnitude of peak flows and runoff volumes.

A major concern with respect to the hydrologic and hydraulic analyses carried out as part of the Carp River watershed studies is that the Jock River Hydrology Study indicates that the drainage area for the Carp River was not delineated correctly. As a result, approximately 575 ha that in fact drain to the Jock River were assumed, in the Carp River Watershed Plan Study and subsequent studies and calculations, to drain to the Carp River. In the context of the Kanata West Concept Plan and the subwatershed study carried out for the same, 575 ha represent a change in drainage area of 15.6% at the Carp River crossing of Richardson Road. For the Poole Creek watershed, however, the change in drainage area is a more dramatic 32%.

As part of this audit we reviewed the Poole Creek watershed boundaries using 1:10,000 scale Ontario Base Mapping, and confirmed that the watershed divide exists as indicated in the Jock River Hydrology Study Report.

The potential effects of the over-estimated drainage area on the results of the Carp River Watershed Study and the subsequent studies and reports can be summarized as follows:

- a) The calculated peak flows will be lower than with the incorrect drainage area. The same applies to the runoff volumes.
- b) The delineated flood plain will be lower and narrower; although conservative, this is incorrect.
- c) The calculated effect of changes to the river floodway will be different.
- d) The effect of offline storage on flows will be smaller for high flow levels.

As part of this audit the potential effect of the watershed drainage area error was calculated. As would be expected, the largest effect is on the floodlines of the Poole Creek, where the peak discharge for the 100-year flood is 16% lower than calculated and the water levels differences of 7 cm to more than 20 cm were noted. In the Carp River itself, the effect of the change in flows in the Poole Creek (reduced by approximately 16% at the outlet to the Carp River) are minor for existing conditions, ranging from 0 cm

to 3 cm. As explained below, the effect of the error in the drainage area is compounded by failure to recognize that the hydrologic models underestimated the volumes of runoff produced by the watershed.

Review of the 2005 Flow Characterization and Flood Level Analysis Report shows that the recorded water level hydrographs contain substantially more runoff volume than the calculated runoff volumes. The recorded water levels are approximately 0.5 m to 0.7 m higher than the calculated water levels at the Palladium level logger, and 1.0 m to 1.3 m at the Glen Cairn level logger. This indicates that the hydrologic model seriously underestimated the runoff volumes. One of the reasons for these differences in runoff volume is the infiltration model.

Examination of the XPSWMM model results used for the Flow Characterization and Flood Level Study of existing conditions of the Carp River revealed several instances in which the model output states significant runoff volume discontinuities in the model, substantially more than the range of discontinuity in the calculations. This explains in part the runoff volume discrepancy between the model results and the measured results for the September 2004 flood used for calibration of the hydraulic routing model.

The same XPSWMM model shows that the runoff produced by the sub-catchments within the upper Carp River watershed was routed in the Carp River using the XPSWMM model. The reason this is notable is that the resulting hydrograph, already including the effect of routing, was routed again through the Carp River using the hydraulic routing model.

These two problems combined are part of the reason that the calculated water levels in the HEC-RAS model would be substantially lower than measured. In our opinion, changing the values of the roughness coefficients in the HEC-RAS model had no chance of producing a reasonable result.

4.2.1.2.6.2 Hydraulic Modelling

Modelling using the computer program HEC-RAS, or equivalent, is the standard recommended by the MNR Technical Guidelines for the calculation of water surface profiles. The program uses as one of its inputs the peak flow calculated as part of the hydrologic modelling, and calculates the water surface levels based on the assumption that the flow is steady, that is, it does not change with time.

The characteristics of the Carp River within the Study Area, of low gradient and relatively wide flood plain, are appropriate for routing of the flood hydrograph using a dynamic wave model, such as the HEC-RAS Unsteady Model or FLDWAV. These programs calculate water surface levels as part of the hydraulic routing of the flood hydrograph.

The water levels calculated using HEC-RAS Unsteady Flow model are not usually considered as accurate as those calculated HEC-RAS Steady Flow due to the manner in which the model views the sections. Consequently, comparison of water levels from two unsteady flow calculations should be verified using the routed flows from the unsteady flow calculations, but based on steady flow water surface profile calculations.

The MNR Technical Guides indicate as follows:

The present practice, introduced in 1988 for the selection of the floodway and flood fringe areas, replaced the rigid 100 year criterion with a more flexible approach based on the critical flood depth and velocity values. It recognizes the fact that the impact of encroachment caused by filling and/or development in a flood fringe area can result in:

- increases in upstream flood levels;
- increases in downstream flows;
- increases in downstream velocities; and,
- change in the timing of flows.

It is up to the municipality and the Conservation Authority to define the allowable increases in upstream flood levels, downstream flows and velocities, and change in the timing of flows.

The extent of the floodway is to be determined based on local watershed conditions, such as critical flood depth and velocity, existing and proposed development, and the potential for upstream or downstream impacts. Generally, flow depth in excess of 1 m and/or flow velocities above 1 m/s can create significant hazards for developments.

We found that there was no specific definition of the acceptable increases or changes, and that there is no discussion of the rationale for their selection. The assessment requires that the acceptable increases in water levels in the upstream and downstream reaches and within the study reach be defined based on the anticipated impacts.

No specific criteria were determined before the examination of the effects of changes to the flood plain began. Normally the results of the existing conditions analysis would be examined to determine constraints and opportunities which lead into the criteria for acceptance of the extent of changes to the flood plain. Instead, the methodology used appears to have been to examine the changes in flows and water levels and to determine if they are acceptable. The Ministry of Natural Resources would not be the only party responsible for setting the criteria, as the Provincial Policy Statement gives that responsibility to the City.

If the established criteria such as no increase in peak flows and velocities, no loss in riparian storage, and no increases in downstream flows and velocities were used, the

proposed flood plain modifications do not meet them. There are increases in peak flows and velocities, there is loss of riparian storage, and there are increases in downstream flows and velocities. This would be an extreme application of the criteria.

Calibration of the Hydrologic and Hydraulic computer models is a requirement of the Technical Guides to augment the reliability of the models used to assess the effects of restrictions on the watercourse resulting from the application of the Two-Zone Concept.

When documenting historical floods, two or more sources of information should be cross-referenced to augment the reliability of the flood estimate.

Only one estimate of historical flood was used for calibration. In reviewing the report discussion, it was noted that there was no specific discussion of effect of hysteresis of the rating curve for storage in the flood plain, during the rising limb of the hydrograph, as flow enters storage, and the receding limb as storage is released from storage. This is one reason for some of the difficulties found by the consultants in calibrating some of the flood routing model parameters.

The City staff member reviewing the report correctly states that calibration was done using only one event and based on water levels only. Part of the calibration of an unsteady state hydraulic model requires calibration of the volume of the hydrographs. The consultants' calculations did not appear to have taken into account the hydrograph volume in the model calibration effort. This could be another source of error, in particular the fact that the calibration required the use of model parameters well outside of the range of values normally applied to similar river reaches. Being an empirical parameter, the values of the Manning's n are based on flow rates and water levels measured and calibrated in river reaches.

In addition to the above comments, we noted that the calibrated model was not verified by comparing the results to a separate recorded flood. This is standard methodology in the process of calibration and verification.

Sensitivity analyses were carried out as part of the Flow Characterization and Flood Level Analysis for existing and post-development conditions. However, we consider that the sensitivity analysis is not valid because the values are out of range, most probably as a result of not calibrating the volume of the flood in the study reach. As noted in the previous section, Hydrologic Analysis, the volumes of runoff were significantly underestimated in the hydrologic model, resulting in substantial differences in the measured and calculated water level hydrographs.

Calculations done during the course of this audit to assess the impact of these modelling shortcomings showed that increasing the runoff volumes by 50% resulted in increased peak water levels of 0.5 m, with the Manning's n values in the model set at

values 50% lower than those indicated by the calibration of the peak water level as done in the study. It is our opinion that the reduced n values are more appropriate for the river reaches than the multiplied values used to try to calibrate the peak flow only. This demonstrates that the calibration of the unsteady flow model must start with proper calibration of the runoff volume in the hydrograph.

As noted in the discussion on the hydrologic modelling, based on our review of the hydrologic model outputs, it appears that hydrographs which already included the routing effect of the river were routed using the hydraulic model, thus compounding the attenuation of the hydrographs.

It is not clear why the Fernbank development was not taken into consideration in the calculation of the future land use conditions in the Flood Characterization studies done in 2005 and 2006 or in subsequent studies and design work. In our opinion, the effect of this development should have been taken into account in the calculations, particularly as it was designated as Future Urban Area as shown in the 2001 Official Plan Schedule B – Urban Policy Plan as a result of an OMB Order in August 2005. Given that studies are currently underway for the Fernbank Community Plan, we recommend that the consultants for that work be required to investigate the effects of that development on the Carp River with respect to peak flows and runoff volumes.

The hydraulic model of the watercourse did not include the existing developments at the Sensplex and Smart Technologies. However, it is noted that only the parking areas in these developments encroach into the flood plain, which is acceptable if the depths of flooding are not excessive.

We noted that the analyses were done without taking into account the potential effects of ice on water levels. Given the severe winter conditions in the Ottawa area, it is prudent to anticipate that ice accumulation in the Carp River could result in serious backwater problems in some areas of the river. We would have expected that this aspect be addressed, at least in a qualitative manner.

From the description in the reports, it is understood that the flood fringe will be filled to raise the entire area above the regulatory flood level. Provided that all requirements for encroaching on the flood fringe are satisfied, placing fill is an acceptable method of providing flood protection, as the development in the flood fringe would be completely removed from the flood plain. However, there are a number of concerns with the overall “floodway-flood fringe” solution, as has been already discussed in this report.

The flood plain is an integral component of the watercourse, which it uses to accommodate flood flows that exceed the capacity of the stream channel. Constriction of the flood plain by development increases the risk of flooding in the subject reach and those upstream and downstream of it.

Recommendation 9

That the City require consultants to correct the errors in the hydrology, hydraulics and other parts of the work, resulting from the errors in the drainage area, at no cost to the City.

Management Response

Management agrees with this recommendation.

The consultants are addressing the error in the drainage area and the impacts on hydrology, hydraulics and other aspects. These results, among others, will be used to address recommendation 13. This analysis will be included in the terms of reference for the third party engineering firm review. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 10

That the City require consultants to properly calibrate the runoff model and the hydraulic routing model to represent properly the response of the watershed to the rainfall input, at no cost to the City.

Management Response

Management defers its response to a third party review on the issue of calibration.

Staff did undertake to calibrate the model using what data was available. As detailed on page 138 of the Carp River Watershed/Subwatershed study, various Soil Conservation Service (SCS) storm durations (1 hr, 3 hr, 6 hr, 12 and 24 hr) were reviewed. It was determined that the 12 hour storm best represented the peak flow conditions in the subwatershed area. The type of storm distribution (Chicago vs. SCS) related to the size of the area being modelled, not just the future land use.

As stated in the Flow Characterization and Flood Level analysis, temporary water level gauges were established at Richardson Side Road, Palladium Drive and the Glen Cairn Pond. During the time these monitoring stations were in place, only one large storm was recorded (September 9 2004, –the tail-end of Hurricane Francis). Therefore, only one event was available for calibration/verification.

Management will seek guidance from the third party reviewer on the issue of calibration and whether the steps undertaken, including sensitivity analysis, were reasonable. See the response to recommendation 13 for a more complete discussion of the background and scope of the third party review of the Carp River Restoration EA.

Recommendation 11

That the City require consultants to re-evaluate the results of the subsequent analyses and designs, and to modify them as required, at no cost to the City.

Management Response

Management agrees with this recommendation.

In January 2008, City staff discovered that modeling developed by an external engineering firm on behalf of the City and the Kanata West Owners Group for the Carp River, Poole Creek and Feedmill Creek Restoration EA contained an error. The engineering firm has confirmed to City staff that an error has, in fact, been made.

The Restoration EA is currently before the Ontario Ministry of the Environment (MOE) as several parties made Part II order requests. In light of this error, the City immediately advised the MOE to refrain from taking any decisions related to this assessment until the impact of the error has been fully assessed.

Currently, the City is in the process of engaging a third party engineering firm to independently review the analysis. The review is expected to take a few months to complete. The terms of reference will include a complete review of all aspects of the technical analysis for the Restoration EA as it relates to flood elevations and water flows and the impacts of any changes on the design. The review will also include the issues referenced in management's earlier responses. Once the results of the review are known, management will advise City Council and MOE of the outcome. Issues related to cost and next steps will be determined at that time.

4.2.1.3 Review the Conservation Authority's regulations and assess whether the projects followed the regulations.

The projects were done with full disclosure of the processes and methodologies to the Conservation Authority, and they were subject to the approval of the Conservation Authority. Our review of the CA Regulations indicate that the Conservation Authority's regulations were followed, although as noted previously, the Mississippi Valley Conservation Authority appears to be the only conservation authority in Ontario that accepts application of the Two-Zone Concept to a development in reaches of a watercourse where no previous development exists.

Our review of the Provincial Policy Statement (both the 1997 and 2005 versions) disclosed that the project generally followed the MNR and MMAH policies. The application of the Two-Zone Concept is part of provincial policies. However, as discussed previously in this report, the Two-Zone Concept was not applied correctly, as the assessment did not take into account all the aspects that constitute risk, such as slope stability and the presence of peats in the area; furthermore, in our opinion the Two-Zone Concept was applied in an area where there was no definite need for it.

4.3 *Audit Objective No. 3 - Examine reports and studies relating to the Glen Cairn channelization to determine if the City should be responsible for paying for the work or if cost should be shared.*

Note: Based on legal advice, the results of our audit work on this objective are not provided in this report.

4.4 Audit Objective No. 4 - Determine if the fact that consultants were working for the City and developers resulted in conflict of interest.

4.4.1 Criteria:

4.4.1.1 Did the consultants work for both the City and the developers on the same project concurrently?

With the exception of one consultant, there is no evidence that consultants worked concurrently for the City and developers on the same project. The various consultants' assignments related to the project are shown below:

| Consultants | Assignment | Client |
|---------------------|--|------------------------|
| Consultant A | Kanata West Concept Plan Transportation Master Plan | Landowners group |
| Consultant B | Kanata West Concept Plan Servicing Study | Landowners group |
| Consultant C | Fernbank Community Plan | Developers |
| Consultant D | Routing Studies | Landowners group |
| Consultant E | Carp River Restoration EA | Landowners group |
| Consultant F | Kanata West Concept Plan | Landowners group |
| Consultant F | Carp River Watershed Plan Study | City of Ottawa |
| Consultant G | Glen Cairn Sub-divisions Servicing Study | Developers |
| Consultant H | Flood Plain Mapping in 1983 | Conservation Authority |
| Consultant I | Kanata West Concept Plan | Landowners group |

It appears that the City was aware throughout that the consultant had been retained to assist the Landowners group with the Kanata West Concept Plan, while the consultant was still working on the Carp River Watershed Plan Study for the City. Normally such an arrangement would be scrutinized and discouraged; however, in this case, the fact that the City itself was in a similar position appears to have softened the City's stance in this respect.

4.4.1.2 Did the consultant's assignment with the City terminate before they started work for the developers?

The consultant worked for the City of Ottawa on the Carp River Watershed and Subwatershed Study and on the Kanata West Concept Plan, while the Carp River study was still in progress. Although much of the work had been completed on the Carp

River Study, it was not delivered to the City until 2004, two years after the Kanata West Concept Plan was completed.

4.4.1.3 Did the consultant do anything that resembles conflict of interest?

The fact that the consultant was working on these two closely related projects essentially at the same time gives the impression of conflict of interest. One would expect that the goals and objectives of the City of Ottawa are not identical to the goals and objectives of a group of developers. Although the City was part of the owners group, it is our opinion that the consultant should not have been representing both the proponent and the approving authority.

We conclude that the situation constituted at least a potential conflict of interest, as the consultant placed themselves in a situation in which they had to answer to two masters.

4.4.1.4 Did the consultant follow the Professional Engineers of Ontario guidelines?

The Professional Engineers of Ontario provides the following guidance with respect to conflict of interest:

What is conflict of interest?

As professionals, engineers must be aware of what would constitute a conflict of interest and how to avoid it.

*The definition of professional misconduct in the Regulation made under the **Professional Engineers Act** clearly describes the problem. Section 72(2) defines professional misconduct as: "failure to make prompt, voluntary and complete disclosure of an interest, direct or indirect, that might in any way be, or be construed as, prejudicial to the professional judgment of the practitioner in rendering service to the public, to an employer or to a client". Additionally, section 77 of Regulation, which comprises the Code of Ethics, states: "A practitioner shall act in professional engineering matters for each employer as a faithful agent or trustee, and shall regard as confidential, information obtained by the practitioners as to the business affairs, technical methods or processes of an employer, and avoid or disclose a conflict of interest that might influence the practitioner's actions or judgment."*

Potential conflicts of interest are most likely to arise in:

- *presenting testimony;*
- *appearance before boards, tribunals and commissions;*
- *situations where engineers can work for more than one client on the same project or interrelated projects;*
- *situations where engineers leave organizations to join a competitor, or start their own firms*

It is our opinion that the consultant was in a possible conflict of interest when the firm worked concurrently on the Kanata West Concept Plan for private interests and the Carp River Watershed Plan Study for the City of Ottawa, notwithstanding that both parties agreed to the arrangement, which is in conformance with the PEO Code of Ethics.

Recommendation 12

That the City ensure that consultants not be allowed to work on the same project for the City and for the developers, even if the City is fully aware of the fact. This recommendation applies even if the initial assignment is complete.

Management Response

Management agrees with this recommendation in principle.

The Professional Engineers Code of Ethics permits a professional engineer to work for two different employers on the same subject matter where such has been disclosed to both employers. While this does put such professional engineer in a position of having two masters, it is noted that the Code of Ethics provides that the professional engineer's duty to the public transcends his/her other obligations, that the professional engineer's duty to the public welfare is "paramount".

To implement this recommendation would reduce the available number of firms for an assignment, as some may have worked for developers on the same subject matter in the past or may not be willing to be precluded from working for developers in the future. It may also increase the cost of assignments, as the City, not being able to hire a firm that had worked for a developer in the past on an assignment, would always have to hire a firm that is starting fresh. This may also mean that the City is not able to benefit from the expertise of "the best" in the business.

Nevertheless, management concurs having a consultant that has not and will not work for a different employer on the same subject matter is, in most cases, a desirable outcome. Therefore, management supports an amendment to the City's Purchasing By-law to implement this recommendation, subject to exceptions being permitted when authorized by a Deputy City Manager, or by the City Manager for branches that report directly to him. If however, these exceptions become the norm and the number of consultants available to work on City projects is significantly reduced by the implementation of this recommendation, such that truly competitive bids are no longer possible, staff will seek instruction from Committee and Council to resolve this issue.

4.5 Audit Objective No. 5 - Determine if the processes and methodologies followed accepted practice and the requirements of the EA Act.

4.5.1 Criteria

4.5.1.1 Was the project covered under the Class EA document?

City staff intended to use Delegated Authority to approve three Class Environmental Assessment studies for Roads, Servicing, and Carp River Restoration Project in the Planning Area known as Kanata West, but City staff does not have the authority to approve the Class EA projects. This concern was resolved when the Ministry of the Environment advised the City that the Environmental Assessment Act requirements would not be met if the City proceeded under the Planning Act and not the Municipal Class Environmental Assessment.

Based on our review of the Municipal Class Environmental Assessment, the projects were covered under the Class EA document.

4.5.1.2 Was the Schedule selected correctly?

According to the Municipal Class Environmental Assessment, projects can be classified into three schedules, depending on the project complexity and the potential environmental effects. Schedule A projects have low potential effects and can proceed to construction without further approval (although this does not exempt the project from approvals under the Ontario Water Resources Act, the Conservation Authorities Act, and others); Schedule B projects are more complex or have greater potential environmental impacts; and, Schedule C projects require substantial environmental studies and submission of an Environmental Study Report.

In the case of the Carp River watershed, the projects were analyzed based on Schedule B of the Municipal Class Environmental Assessment. Based on our review of the Municipal Class EA, we concur with the selection of the Schedule for the Servicing Report and the Transportation Report, as they were both dealt with as Master Plans.

The Municipal Class EA in the introduction to the Schedules states in part as follows:

“The following schedules are intended to assist proponents in understanding the status of various projects. The types of projects and activities listed are generally to be categorized into Schedules A, B and C with reference to the magnitude of their anticipated environmental impact. In specific cases, however, a project may have a greater environmental impact than indicated by the Schedule and in such instances the proponent may, at its discretion, elevate the project to a higher Schedule.”

Based on the anticipated environmental effects on the Carp River, we believe it would have been more appropriate to conduct the study under Schedule C. In effect, based on

the deliverables and the number of points of contact with the public and agencies, it could be said that the process followed a process that is similar to that specified in Schedule C, including the production of an Environmental Study Report.

4.5.1.3 Were the Class EA procedures followed properly?

We concluded that the procedures of the Class EA were followed correctly, except that the Notice of Completion was issued before the City and the KWOG had received the sign-off from the Ministry of Transportation, the Ministry of the Environment, and the Ministry of Natural Resources. We consider that the City and KWOG should have worked further with these agencies to satisfy their concerns, before submitting the documents for public review. In the end, the three Ministries were satisfied, but the closure letters were not included in the reports.

The correspondence shows that the Class EA reports are currently subject to Part II Order requests. The Environmental Assessment Act makes provision during the 30-day review period for members of the public to submit a request to the Minister of the Environment to issue a Part II Order, directing the proponent to undertake an individual environmental assessment. The MOE evaluates the Part II Order requests and may or may not issue a Part II Order, depending on the merits of the request and the information provided by the proponent to justify the use of the Class Environmental Assessment process rather than carrying out an individual environmental assessment. At last review in mid-September 2007, the MOE had not reached a conclusion.

The files also show that the consultants proceeded with the detailed design of the Carp River Restoration Project, although the Part II Orders have not been cleared by the MOE. Although there is no specific restriction to carrying out detail design for a project under Part II Order review, there is a financial risk to the City for its share of cost as part of the KWOG which may be lost if the Part II Order requests are accepted by the MOE.

Recommendation 13

That the City ensure that a full evaluation of the risk of proceeding with detailed design on a project that is under review by the MOE based on a Part II Order request be submitted to Council for prior approval.

Management Response

Management agrees with this recommendation.

In the future, Council will be notified in advance whenever management proposes to proceed with design while the Ministry of the Environment is reviewing a Part II order request.

5 CONCLUSION

The audit revealed that the application of the Two-Zone Concept to the Carp River within the Kanata West area satisfied only in part the requirements of the Official Plan, as it did not address the “design with nature” requirements of the Official Plan. In addition, the studies required to determine whether the Two-Zone Concept should be applied did not completely address the slope stability and soil hazards found in the area.

The studies and reports carried out as part of the development satisfied Provincial Policy and the City’s Official Plan only in part, as noted above. In addition, the technical components of the studies and reports were based on an erroneous drainage area and did not properly calculate the volumes of runoff that are contributed by the drainage areas.

It is our opinion that the consultant was in a possible conflict of interest when the firm worked concurrently on the Kanata West Concept Plan for private interests and the Carp River Watershed Plan Study for the City of Ottawa, notwithstanding that both parties agreed to the arrangement, which is in conformance with the PEO Code of Ethics. The implications of the possible conflict of interest were exacerbated by the fact that the City of Ottawa may be in conflict of interest when the City formed part of a landowners group (the Kanata West Owners Group) located within the City; at the same time, the City had the obligation of reviewing and approving the studies and reports being produced by consultants paid for by the KWOG.

The Class Environmental Assessment studies for Roads, Servicing, and the Carp River Restoration Project followed the Municipal Class Environmental Assessment and complied fully with the Class EA requirements. Part II Order requests were submitted by members of the public to the Minister of the Environment and are currently under review.

6 ACKNOWLEDGEMENT

We wish to express our appreciation for the cooperation and assistance afforded the audit team by management and staff.

Appendix A– Excerpts of Provincial Policy Statements (with Comments)

The Two-Zone Concept was initially used in Ontario in the early 1980s, and the flood fringe was defined at the time as the area between the regulatory flood (Hurricane Hazel or the Timmins storm) and the 100-year floodline. From the Technical Guides prepared by MNR:

The two zone approach adopted in 1982 used the magnitude of flood as the design criteria to identify the floodway and flood fringe areas. The Floodway was based on the 100 year flood, while the flood fringe was based on the Hazel or Timmins flood. The benefits of this approach was that the 100 year flood represents a sufficiently extreme event to identify a portion of the river that carries the majority of the flow, and it is relatively easy to identify the limits of the floodway. However, in some instances it resulted in a narrow strip of flood fringe land, and it did not reflect the actual risks involved in filling the flood fringe areas.

However, this definition was considered too strict and that it penalized the areas of the Province where the regulatory flood is equal to the 100-year flood. The definition of the flood fringe was modified in the 1988 Flood Plain Management Statement. The Two-Zone Concept was included in the Flood Plain Planning Provincial Policy Statement issued in 1988 under the authority of the Planning Act, 1983. The 1988 Provincial Policy stated:

It is the policy of the Province of Ontario that:

- 5.1 For portions of flood plains that could potentially be safely developed with no adverse impacts, the Conservation Authorities in Ontario, or where no Conservation Authorities exist, the Ministry of Natural Resources, in cooperation with the watershed municipalities have the option of selective application of the two zone (floodway-flood fringe) concept.*
- 5.2 New development in the floodway is to be prohibited or restricted.*
- 5.3 The extent of the floodway is to be determined based on local watershed conditions, such as critical flood depth and velocity, existing and proposed development, and the potential for upstream and downstream impacts.*
- 5.4 New development that may be permitted in the flood fringe be protected to the level of the regulatory flood.*
- 5.5 Where the two zone concept is proposed to be applied or is considered to be a plausible option, municipalities include policies in their official plans that explain the intent of the two zone concept and development potential of the flood fringe versus the floodway.*
- 5.6 Where the two zone concept is applied, the flood fringe be zoned in conformity with the official plan designation, and that flood hazard and requirements for floodproofing be recognized in the planning document.*

- 5.7 *Where the two zone concept is applied, the floodway be appropriately zoned to reflect its prohibitive or restrictive use.*

The Province published Technical Guides for the application of the Two-Zone Concept. The Technical Guide gave direction with respect to the flow velocities and depths that governed the development in the flood fringe.

The Provincial Policy Statement issued in 1997 superseded the 1988 Flood Plain Planning Policy Statement. The Provincial Policy applicable when the Carp River Watershed Studies were started was the 1996 Provincial Policy Statement, amended in 1997, which, as was discussed previously, may permit the use of the Two-Zone Concept as noted below:

3.1 Natural Hazards

3.1.1 *Development will generally be directed to areas outside of:*

- d. hazardous lands adjacent to the shorelines of the Great Lakes - St. Lawrence River System and large inland lakes which are impacted by flooding, erosion, and/or dynamic beach hazards;*
- e. hazardous lands adjacent to river and stream systems which are impacted by flooding and/or erosion hazards; and*
- f. hazardous sites.*

3.1.2 *Development and site alteration will not be permitted within:*

- d. defined portions of the dynamic beach;*
- e. defined portions of the one hundred year flood level along connecting channels (the St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence Rivers); and*
- f. a floodway (except in those exceptional situations where a Special Policy Area has been approved).*

3.1.3 *Except as provided in policy 3.1.2, development and site alteration may be permitted in hazardous lands and hazardous sites, provided that all of the following can be achieved:*

- f. the hazards can be safely addressed, and the development and site alteration is carried out in accordance with established standards and procedures;*
- g. new hazards are not created and existing hazards are not aggravated;*
- h. no adverse environmental impacts will result;*
- i. vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies; and*
- j. the development does not include institutional uses or essential emergency services or the disposal, manufacture, treatment or storage of hazardous substances.*

The City's Official Plan current at the time that the Carp River Watershed study was commenced included policies that took into account the Provincial Policy as noted above, and that allowed for the application of the Two-Zone Concept in the City of Ottawa.

Flood fringe (for river and stream systems) are defined in the Provincial Policy as “the outer portion of the flood plain between the floodway and the flooding hazard limit. Depths and velocities of flooding are generally less severe in the flood fringe than those experienced in the floodway. The flood fringe is the area where development and site alteration may be permitted, subject to appropriate floodproofing to the flooding hazard elevation or another flooding hazard standard approved by the Ministry of Natural Resources.”

In general, the flood fringe has been applied by Conservation Authorities (Toronto Region, Grand River, Upper Thames Region, Rideau Valley and others) to areas of municipalities where development already existed, to permit development of these areas. Application of the Two-Zone Concept to greenfield developments is, at best, rare. With the exception of the Mississippi Valley Conservation Authority, we believe all other Conservation Authorities limit the application.

The Provincial Policy does not have a definite stipulation of where the Two-Zone Concept can be applied. The Technical Guidelines prepared by the Province for the application of the Provincial Policy have guidance with respect to the technical requirements to satisfy the Province, but does not address at all to which type of lands it can be applied, whether with existing or new development.

The 2005 Provincial Policy Statement, now current, has similar Natural Hazard policies as the 1997 version.

3.1 Natural Hazards

3.1.1 *Development shall generally be directed to areas outside of:*

- a. *hazardous lands adjacent to the shorelines of the Great Lakes - St. Lawrence River System and large inland lakes which are impacted by flooding hazards, erosion hazards and/or dynamic beach hazards;*
- b. *hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards; and*
- c. *hazardous sites.*

3.1.2 *Development and site alteration shall not be permitted within:*

- a. *the dynamic beach hazard;*
- b. *defined portions of the one hundred year flood level along connecting channels (the St. Mary's, St. Clair, Detroit, Niagara and St. Lawrence Rivers);*
- c. *areas that would be rendered inaccessible to people and vehicles during times of flooding hazards, erosion hazards and/or dynamic beach hazards, unless it has been demonstrated that the site has safe access appropriate for the nature of the development and the natural hazard; and*
- d. *a floodway regardless of whether the area of inundation contains high points of land not subject to flooding.*

3.1.3 *Despite policy 3.1.2, development and site alteration may be permitted in certain areas identified in policy 3.1.2:*

- a. *in those exceptional situations where a Special Policy Area has been approved. The designation of a Special Policy Area, and any change or modification to the site-specific policies or boundaries applying to a Special Policy Area, must be approved by the Ministers of Municipal Affairs and Housing and Natural Resources prior to the approval authority approving such changes or modifications; or*
 - b. *where the development is limited to uses which by their nature must locate within the floodway, including flood and/or erosion control works or minor additions or passive non-structural uses which do not affect flood flows.*
- 3.1.4** *Development shall not be permitted to locate in hazardous lands and hazardous sites where the use is:*
- a. *an institutional use associated with hospitals, nursing homes, pre-school, school nurseries, day care and schools, where there is a threat to the safe evacuation of the sick, the elderly, persons with disabilities or the young during an emergency as a result of flooding, failure of floodproofing measures or protection works, or erosion;*
 - b. *an essential emergency service such as that provided by fire, police and ambulance stations and electrical substations, which would be impaired during an emergency as a result of flooding, the failure of floodproofing measures and/or protection works, and/or erosion; and*
 - c. *uses associated with the disposal, manufacture, treatment or storage of hazardous substances.*
- 3.1.5** *Where the two zone concept for flood plains is applied, development and site alteration may be permitted in the flood fringe, subject to appropriate floodproofing to the flooding hazard elevation or another flooding hazard standard approved by the Minister of Natural Resources.*
- 3.1.6** *Further to policy 3.1.5, and except as prohibited in policies 3.1.2 and 3.1.4, development and site alteration may be permitted in those portions of hazardous lands and hazardous sites where the effects and risk to public safety are minor so as to be managed or mitigated in accordance with provincial standards, as determined by the demonstration and achievement of all of the following:*
- a. *development and site alteration is carried out in accordance with floodproofing standards, protection works standards, and access standards;*
 - b. *vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies;*
 - c. *new hazards are not created and existing hazards are not aggravated; and*
 - d. *no adverse environmental impacts will result.*

The Ministry of Natural Resources published the Technical Guides in support of the Provincial Policy Statement. The Technical Guides provide information on the methods and procedures to use when applying the Two-Zone Concept.

On the basis of the review of the Provincial Policy and the Official Plan of the City of Ottawa, it can be concluded that the Two-Zone Concept was applied following the

Provincial Policy. However, we believe that the spirit of the Two-Zone Concept was not followed, because the Concept was used to extract 28 ha from the flood plain without a clear justification for developing a greenfield area.

The Kanata West Concept Plan initially did not have a reference to development in the flood fringe of the Carp River. After a couple of submissions, the KWCP plans started to show the flood fringe area as developable. The report does not contain sufficient information to confirm when the change occurred.

Development of the flood fringe, when applied in other communities, has been used to enhance the natural beauty of public access spaces along the river. This application to the Carp River will benefit the developers (residential land value) while increasing the risk to lives and property.

The MNR Technical Guides indicate as follows:

The present practice, introduced in 1988 for the selection of the floodway and flood fringe areas, replaced the rigid 100 year criterion with a more flexible approach based on the critical flood depth and velocity values. It recognizes the fact that the impact of encroachment caused by filling and/or development in a flood fringe area can result in:

- *increases in upstream flood levels*
- *increases in downstream flows*
- *increases in downstream velocities*
- *change in the timing of flows.*

It is up to the municipality and the Conservation Authority to define the allowable increases in upstream flood levels, downstream flows and velocities, and change in the timing of flows. There was no specific definition of the acceptable increases or changes, or the rationale for their selection.

The extent of the floodway is to be determined based on local watershed conditions, such as critical flood depth and velocity, existing and proposed development, and the potential for upstream or downstream impacts. Generally, flow depth in excess of 1 m and/or flow velocities above 1 m/s can create significant hazards for developments.

We note that the Provincial Policy Statement indicates as follows:

Notwithstanding the above flood plain policies, new development will not be permitted to locate in the flood plain where the use is:

- *associated with the manufacture, storage, disposal and/or consumption of hazardous substances or the treatment, collection and disposal of sewage, which would pose an unacceptable threat to public safety if they were to escape their normal containment/use as a result of flooding or failure of floodproofing measures;*

- *associated with institutional services, such as hospitals, nursing homes and schools, which would pose a significant threat to the safety of the inhabitants (i.e., the sick, the elderly, the disabled or the young), if involved in an emergency evacuation situation as a result of flooding or failure of floodproofing measures; and*
- *associated with services such as those provided by fire, police and ambulance stations and electrical sub-stations, which would be impaired during a flood emergency as a result of flooding or failure of floodproofing measures.*

Where new development identified in Public Safety Policy is not considered to pose an unacceptable risk to public safety, a higher level of flood protection and/or additional floodproofing precautions above the flood standard level, may still be required due to the sensitive nature of the development.