

Darlene Conway, P. Eng.  
Ottawa, Ontario

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By e-mail:

The Honourable John Gerretsen, Minister of the Environment  
Charles Goulet, P. Eng., District Engineer, Ottawa District Office, MOE  
Mansoor Mahmood, P. Eng., Supervisor, Water and Wastewater, MOE  
Agatha Garcia-Wright, Director, Environmental Assessment, MOE  
Les Pataky, P. Eng., Regional Engineer, Southern Region, MNR  
Dan Marinigh, Director, Lands and Waters Branch, MNR  
David Lindensmith, P. Eng., Senior Project Engineer, Eastern Region, MTO  
Hani Farghaly, P. Eng., Senior Engineer, Design Standards Section, MTO  
John Price, P. Eng., MVC

Dear Sirs and Madam:

Re: MOE Minister's Order (July 21, 2008), Kanata West Class EAs and Concerns with Third  
Party Review of the Carp River Restoration Plan

For those of you who do not know me, I am a Senior Project Engineer with the City of Ottawa. I am, however, providing this submission as a private citizen, the purpose of which is to advise you of some serious concerns I have with one outcome of the Third Party Review (TPR) that is referred to as the "model of record." My specific concerns relate to the apparent selective use of certain parameters (roughness values) that mask the full impacts of post-development flows and floodplain filling on flood levels within and downstream of the restoration reach – the result being that future condition flood levels are considerably underestimated in many locations.

While I have recently been advised that the 2009 model of record is now undergoing various revisions, including a widening of the corridor, the 2009 version has already been used in support of the technical studies for the Fernbank development (200ha) located immediately upstream of Kanata West. City approval of the Fernbank development (OPA 77) is currently under appeal before the Ontario Municipal Board. The OMB is hearing this appeal given the Fernbank development proponents have made use of the integration provision of the Municipal Class EA. At issue are concerns regarding the piece-mealing of the planning of required

infrastructure, the appropriateness of the SWM criteria recommended by the TPR, and problems with the TPR modeling used by the Fernbank proponents.

Perhaps most importantly, the 2009 model of record was endorsed several months ago by City Council and all agencies, giving the impression that after many years of delay, an ultimate solution was in sight, and interim approvals could proceed in advance of re-posting and approval of the Kanata West Class EAs. Based on my recent review, it is my opinion this is not the case: flood levels have been significantly underestimated in many locations, changing the boundary conditions for a number of the Class EA undertakings and demonstrating that the proposed ultimate SWM criteria are inadequate to avoid impacting riparian landowners. Perhaps these issues are being or will be addressed in the additional work that is underway – but this cannot remedy and does not explain the apparent selective revision of modeling parameters to achieve the results documented in the Third Party Review (specifically, Table 3-6). In the mean time, I presume that interim approvals may also continue to occur - meaning that infrastructure could proceed on the assumption that the future flood levels documented in the 2009 TPR report will not be exceeded. As such, I think it is important that approval agencies be apprised of my concerns.

Also, please be advised that I have previously made known my concerns regarding these issues to the City of Ottawa, the Third Party Reviewer and the engineer of record at the time the Third Party Review was completed (I am no longer certain who the current engineer of record is with respect to on-going model revisions).

**Background:**

By way of background, I have over 20 years of experience in water resources engineering in Ontario, having worked in consulting, for two Conservation Authorities (TRCA and NPCA) and these past seven years for the City of Ottawa. Over the last three years or so (up until May 2009), I participated on the Fernbank Community Design Plan Technical Advisory Committee, reviewing and commenting upon the supporting technical studies.

In late 2007/early 2008, I reviewed the modeling supporting the (already posted but under Part II Order requests) 2006 Kanata West Class EAs in anticipation of having to review the Fernbank impact analysis that would make use of this same modeling. From this review, I was the first City staff member to discover the coding error that resulted in the model being unable to read the post-development hydrographs from the entirety of some 700 hectares of development (in other words, the surface runoff generated by Kanata West was not accounted for in the impact analysis).

As you will recall, these errors, in addition to an audit of the file by the City's Auditor General, precipitated a "Third Party Review" of the modeling supporting the Kanata West development and the associated Carp River restoration. The TPR was endorsed by City Council in May 2009. As a private citizen, I provided detailed comments on the terms of reference for the TPR, as well as on the results of the TPR itself. When my comments on the TPR results were disregarded and the TPR report was endorsed by City Council, I requested and was granted removal from the Fernbank file as I could not support the use of the TPR model of record which documented flood level increases of up to 0.28m on private property with no recommendation to seek permission for such an impact from the affected landowners. Given such results, I could also not support the TPR recommendations for the SWM quantity control criteria to be applied to the Fernbank lands. Consistent with the SWM criteria for the Kanata West lands, only 10 year controls were recommended for lands draining directly to the Carp River, notwithstanding the documented post-development flood level increases.

In June 2009, the Fernbank plan (OPA 77) and supporting technical studies were endorsed by City Council and posted for the required review period. A local NGO, The Friends of the Greenspace Alliance (FGA), appealed the plan. Given that the development proponents made use of the integration provision of the Municipal Class EA, the appeal will be heard before the Ontario Municipal Board (currently scheduled for July 2010).

In October 2009, FGA asked if I would appear as an expert witness for their appeal and I elected to do so as a private citizen. In this capacity, I have reviewed the modeling supporting the Fernbank plan that is essentially the TPR model of record with revised hydrographs input to reflect the post-development condition for the Fernbank lands. I had had no access to this post-development modeling prior to November 2009 (i.e., the earlier concerns I raised with the TPR were based strictly on a review of the documented results in the TPR report, dated March 2009).

I would note that the OMB recently released a decision dismissing a motion by one of the respondents to dismiss the FGA appeal outright (**Attachment 1**). One issue considered by the Board was whether or not the concerns expressed by the appellant (about piece-mealing of the planning of required infrastructure, the appropriateness of the SWM criteria, and problems with the TPR modeling used by the Fernbank proponents) were "mere apprehension," in other words, not properly before the Board. The Board decision notes:

"Matters might have been different, if there had been an indication that the concerns were a mere apprehension. However, the Board is satisfied that the concerns expressed by the Court in the *Robinson Case*, the attention devoted to the subject in previous

Board hearings, and *the Affidavits of the two FGA experts go beyond what the Board usually treats as mere apprehension.*” [emphasis added]

(As noted above, I am one of the FGA experts referenced in the decision.)

Although I have numerous other concerns with the Third Party Review, I will focus this submission specifically on the assignment of roughness (Manning’s ‘n’) values in the post-development model of record. This cover letter provides a summary of my concerns. More detailed information is provided in the attached **Appendix**.

**Roughness values:**

The Manning’s ‘n’ value is a modeling parameter used to reflect how “rough” the channel and floodplain of a watercourse is. Higher roughness (‘n’) values generally result in higher flood levels.

The existing Carp River floodplain is generally bereft of any significant riparian vegetation in the study reach (see **Figure 1** attached), hence, a key objective of the restoration plan is to increase riparian cover, which would be expected to result in higher roughness values for the floodplain. However, in the model of record, the roughness values are significantly lower in the post-development condition: for the channel, values have been reduced to 0.035 (from 0.0525 to 0.060 existing) and for almost 50% of the restoration reach, overbank values have been reduced to 0.04 (from 0.06 to 0.09 existing). Given the proposed future plantings and the effect of natural succession over time, it is my opinion that roughness values should generally be greater in the post-development condition, not significantly reduced as in the TPR model of record.

Further, roughness values have been significantly increased through most of the bridge structures, again, compared to the values that were assigned in the existing conditions model. In two cases, at Hazeldean Road and Palladium Drive, roughness values of 0.187 and 0.100, respectively, have been assigned. These are values reflective of a floodplain with stands of timber, not a (relatively) smooth low flow channel through a bridge structure.

**Revised model run results:**

I revised the future condition model such that all roughness values were made equivalent to the existing condition values. This allowed for an “apples to apples” comparison of existing condition flood levels with the future condition of increased peak flows and runoff volumes resulting from full build-out, and some 28 hectares of floodplain filling. The results of this

exercise are provided in **Table 1**, attached. **Figure 2** provides a location plan of the reach from which model cross-sections can be referenced.

As indicated, flood levels for the revised future model (compared to the TPR model of record) are lower upstream of Hazeldean Road (in the order of 15cm) and about the same upstream of Palladium Drive. Without the high roughness values through the bridge sections, this would be anticipated given larger future structures at Hazeldean and Maple Grove Roads. However, the revised future levels increase considerably downstream of Palladium Drive all the way to Richardson Side Road with a resultant flood level upstream of Richardson of 93.87m or 0.38m higher than what has been documented as the existing condition flood level in the TPR report. There are also increases in flood levels at the Highway 417 structures (up to 11 cm above existing), whereas the TPR documented considerable future flood level decreases at the 417. As summarized in **Table 1**, revised future condition peak flows rise considerably at every location (near 40% in many locations). Accordingly, revised flood levels also rise at every location within the study reach in future (except upstream of Hazeldean Road due to the improved crossing) - in many locations more than 30cm and in most locations more than 15cm.

Based upon these results, I can only presume that the roughness values through the bridges were increased to take advantage of the future improved road crossings: by artificially forcing higher flood levels upstream of certain bridges, this provided an attenuating (dampening) effect on peak flows and a change in timing of the flood wave in the upper end of the reach that will not in reality occur (i.e., based upon typical roughness values that should apply). This, in combination with reducing channel/overbank roughness values in many locations, ensured that the significant water level increases at Richardson Side Road could be reduced. Also, it would appear that the intent was to keep any larger flood level increases within the study reach, in an area where there was deemed to be "no increase in flood risk," while also ensuring that flood levels at the 417 were not increased, rather reduced.

With respect to flood levels at the 417, I understand that future work on the existing structures will mitigate the substandard clearance to the 100 year flood level that currently exists. Nevertheless, I presume MTO is interested in understanding the apparent assumptions behind the future flood levels documented in the Third Party Review.

**Table 1** also summarizes the difference in flood levels between the TPR future model and my revised future model ('n' values made equivalent to existing conditions). It is interesting to note that for the TPR future model (see column A) the maximum flood level increases above existing (0.20m and greater) are restricted to the reach between Palladium Drive and Hazeldean Road.

The majority of land in this reach is owned by the City of Ottawa or developers, who are aware of the increased flood levels and presumably have no concerns (I am not aware if the Sensplex and Smart Technologies properties, also located in this reach and impacted by flood level increases are aware of such). Everywhere else in the reach, flood level increases as per the TPR future model do not exceed 0.12m, and at the 417 structures, flood levels are reduced up to 0.18m below existing. Compare this to column B (future revised) where flood level increases (over existing) are shown everywhere except upstream of Hazeldean. Most concerning is between Future Campeau Drive and Richardson Side Road where future revised flood levels exceed TPR future flood levels by about 0.30m. This increase impacts riparian landowners/future developers downstream of the Kanata West limit, as well as assumed boundary conditions for infrastructure such as the Signature Ridge pumping station overflow, storm outlets/HGL's, etc.

I would note that in the modeling that I reviewed in late 2007, the future condition roughness values in all locations (channel, overbank and through the bridge sections) were equivalent to existing condition values. In other words, it would seem the roughness values were changed at some point after the hydrograph errors came to light in early 2008 - when flood levels were then shown to rise throughout the reach, including at the 417 structures. As a result, I now find it difficult not to question the timing and rationale of the roughness value changes.

In my opinion, the approach taken to assign roughness values in the future condition is not acceptable. The apparent selective revision of this parameter is even more concerning given the lack of calibration and validation of the modeling and the TPR's recommended dependence on "adaptive management." (I can find no reference to the use of "adaptive management" in MNR's Technical Guide: River and Stream Systems: Flooding Hazard Limit, the document that sets the bar for the preparation of floodlines). While the TPR suggests the model of record provides for a "worst case scenario," it would appear that a "worst case scenario" has not been applied to the selection of future roughness values. While it may be good news that flood levels immediately downstream of the flood prone Glen Cairn community may ultimately be somewhat reduced as a result of the improved structures, there has apparently been no accounting of the impacts of the resulting increased peak flows and flood levels on downstream lands (due not only to lack of sufficient SWM controls but also to the loss of flow routing behind improved structures), nor the potential impact on various Class EA undertakings (storm outlets/HGL, pumping station overflows, etc.). There has been no allowance for the effects of increased roughness resulting from proposed riparian plantings.

Based upon 20 years of professional practice, in eastern and southern Ontario, I would have to characterize this project as unprecedented in its apparent casual disregard for long-established provincial floodplain policies, technical guidelines, and basic riparian rights that preclude any public body from legally authorizing the increase of flood levels on private property without permission – regardless if that increase does not represent an “increase in flood risk” by someone’s estimation. The apparent selective revision of post-development/restoration roughness values is just the latest problem to come to light.

In summary, it is my professional opinion that these findings seriously undermine the TPR model of record: future flood levels were underestimated in many locations and the recommended SWM criteria are not defensible. Notwithstanding the model of record is apparently being revised (again), it has already been used in support of an additional 200 hectares of development (Fernbank) that is currently under appeal to the OMB. I am also concerned about the potential impacts on infrastructure that may proceed in the interim, considering the future 100 year flood level remains “in flux,” as it were. For these reasons, if you find the information I have documented concerning, I urge you to follow up with the appropriate parties.

Regards,

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cc:

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