

CUMMING COCKBURN & ASSOCIATES LIMITED

Consulting Engineers

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December 7, 1983

Mississippi Valley Conservation Authority
Box 268
Lanark, Ontario
K0G 1K0

Attention: Mr. A. Burt,
General Manager

Gentlemen:

Re: Mississippi River
Floodplain Mapping Study

We are pleased to submit herewith our report prepared for the above noted study. This report describes in detail the methodology established to undertake the investigation and the results of the hydrologic and hydraulic analyses.

We are most appreciative of having had the opportunity to assist the Conservation Authority with their floodplain management program. If we can be of any assistance with the interpretation of the content of this report, please do not hesitate to contact the undersigned at your convenience.

Yours very truly,

CUMMING-COCKBURN & ASSOCIATES LIMITED,



A handwritten signature in black ink, appearing to read "B. R. Plazek".

B.R. Plazek, P. Eng.

BRP:lj
enc.

100 metres. Using the weir flow equation ($C = 2.63$), a combined stage discharge curve was established and is presented in Figure 4.6. To determine the tailwater condition at the control structure, multiple profile runs were made along the South Branch of the Ottawa River. The established rating curve (Section No. 7370) for the South Branch at its upstream end is given in Figure 4.6.

From a comparison of the two established curves, it is apparent that there is a significant tailwater effect at the control structures. The effect becomes more pronounced as the flood elevation on the Mississippi River increases. Use of the weir flow equation at the control structure was, therefore, overestimating the spill into the South Branch. The effect is noted on the discharge curve (Section 7370) as presented on Figure 4.6. In view of this, the spill from the Mississippi River was based on the rating curve for the South Branch. The established flow distribution is given in Table 4.1.

The second spill on the Mississippi River would be just downstream of Carleton Place (Section 46955). The estimated spill of 2.5 cms is based on the use of Manning's equation ($n = .085$, $S = .01$, $L = 14$ m, 0.3 m depth). The flow would re-enter the main channel approximately 1000 metres downstream.

c) Carp River at Glencairn

On the Carp River in Glencairn a spill area was found at the Castlefrank Road crossing. At this site the capacity of the culvert is exceeded under the major storm events and spill would occur in a southerly direction. At this site the road slopes in a southerly direction. Therefore, spill occurs prior to the level of the water reaching the top of the roadway at the culvert. The estimated spill as interpreted from the HEC 2 printouts is in the order of 10 cms., for the

1:100 year storm event. Based on the available topographic information, it appears that the spill would re-enter the main channel in the vicinity of the Carp detention basin. However, additional mapping is required in order to identify the flow path and severity of the flooding associated with the spill flow.

A second spill area was also found in Glen Cairn upstream of Rickey Place. As shown on Drawing CG2, spill would be in a southerly direction. Additional mapping is required in order to define the direction and limits of the flooding. The estimated spill is 5.0 cms based on the use of Manning's equation ($n = .04$, $s = .001$, $L = 55$ m, 0.22 depth). It should be noted that containment of the flow to the main channel could be achieved by increasing the height of the southerly channel bank by a maximum depth of 0.6 m.

4.4 Flow Simulations

Utilizing the developed models, backwater profiles were computed for the 1:5, 1:10, 1:25, 1:50 and 1:100 year (Regional) events. Detailed results of the HEC-2 analyses which form part of this report are submitted under separate cover.

Results of the backwater computations indicated that on Watts Creek the presence of a CNR railway crossing (refer to Section 5080, Sheet No. W4) had a significant impact on the floodlines upstream of the structure. As approved by the Mississippi Valley Conservation Authority, this potential storage was accounted for in the determination of the upstream flood elevations for all storm events. The reduction in flood elevation resulting from the reservoir routing ranged from a maximum of 1.9 m for the 1:100 year event to a zero increase for the 1:5 year event. Detailed results of the HYMO and HEC-2 analysis were submitted under separate cover to the Conservation Authority (ref. letter dated November 11, 1983) and form part of this report.

6.0 DISCUSSION AND RECOMMENDATIONS

Both the hydrologic and hydraulic systems that function within the study watersheds were examined using the most upto-date computational methods to determine the criteria on which the Mississippi Valley Conservation Authority will regulate development within the subject basins.

Based on the results of these analyses, the following is recommended:

1. In order for the Authority to provide a margin of safety for future development along the study drainage systems, it is recommended that the extent of hazard land as delineated by the established flood and fill lines on the prepared 1:5000 and 1:2000 scale mapping be accepted by the Mississippi Valley Conservation Authority.
2. To ensure that any proposed change to the existing hydrological and/or hydraulic systems within the subject hazard land does not have any adverse effects on the computed magnitude of flooding resulting from the occurrence of a Regional Storm, it is recommended that the developed model be updated to incorporate the proposed changes and used to recompute the water surface profiles. The results of these analyses would also be used to help assess the environmental effects associated with the construction activity.
3. Results of the hydraulic analysis indicate that a spill area exists on Watts Creek immediately upstream of the Old Highway 17, and on the Carp River at the Castlefrank Road Crossing and upstream of Rickey Place. It is recommended that a more detailed analysis be conducted at these sites to better define the flood condition at each.

4. Results of the hydraulic analysis indicate that a number of areas exist along the study systems (refer to Section 4.5) where a flood hazard exists. It is recommended that a detailed analysis of alternative flood mitigative schemes be completed at these sites.