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## WATER RESOURCES

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### Hydrology Analysis and Flood Plain Mapping

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#### **Cobourg Hydrologic and Hydraulic Study**

*Clients and Location: Ganaraska Region Conservation Authority (GRCA) and Cobourg, Ontario*

In conjunction with the preparation of master servicing plans for the rapid growth taking place in the Town of Cobourg, a need was recognized to update both the hydrology and hydraulic models for the four major creek systems within the municipal boundaries. The original models had been prepared over 20 years ago and do not reflect landuse changes or improved mapping available. The four watersheds, which are Cobourg, Midtown, Brook and Massey, were included in this study. The regulatory floodlines of the four watersheds were drawn based on the updated modeling results and new digital terrain mapping prepared as part of this overall study.

**GREENLAND** was retained by the GRCA in 2006 to assist with the completion of new hydrology models and prepare the Cobourg Creek hydraulic study - including the updating of the flood plain mapping. Hydrology models were prepared for Cobourg and Midtown Creeks with calibration completed for Cobourg Creek. The results of this calibration were then used to establish parameters for landuse and soil moisture conditions to prepare the other three creek models. **Visual OTTHYMO™** models were prepared based on the updated topographic and landuse information with flow estimates for the 2 to 100 year design storms and the Regional Storm. A hydraulic model, **HEC-RAS**, was developed for each creek to simulate the regulatory flood elevation based on the flows derived from the hydrology model. All bridge crossing were updated from municipal records to reflect recent changes and improvements. Cross sections were obtained by cutting sections in the new digital terrain model and imported into the hydraulic model using **HEC-GeoRAS**. The flood plain maps were drawn based on the hydraulic model results utilizing new mapping prepared from the Light Detection and Ranging (**LiDAR**) survey.

This study used a state-of-the-art approach to the preparation of the flood plain maps utilizing the Digital Elevation Model (DEM) map based on the LiDAR survey. HEC-GeoRAS was applied to derive the HEC-RAS geometric input and generate flood plain polygons automatically. With the aid of the LiDAR DEM and the GIS tool, it was possible to include much more detailed information more quickly and easily than the previous manual method in the modeling exercises and the results of the floodlines were expected to be more accurate.



In-line Structure on Cobourg Creek



LiDAR DEM map with Regional Storm Flood Plain of Cobourg Creek