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Investigating flood risk in an ungauged watershed  
using LiDAR, GIS and HEC TOOLS

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This study was initiated because there is a concern over the predication and recurrence of significant flooding in the town of Oxford, Nova Scotia. The Oxford watershed is ungauged and modelling parameters required for HEC-HMS were derived based on the analogous, gauged, River John watershed. Voronoi polygons were used to distribute precipitation within the watersheds and Soil Conservation Society curve numbers were calculated using LandSat ETM and imagery and soil drainage data. Base flow was calculated using a ratio to peak of 0.11 and recession constant of 0.87. The constant rate of infiltration is 0.074 m/hr. Recurrence intervals calculated for the Oxford watershed show that the September 1999 flood was a 1 in 23 year event and that 10, 25 and 100 year floods have flows of 156 m<sup>3</sup>/s, 197 m<sup>3</sup>/s and 258 m<sup>3</sup>/s respectively. Using these flows, inundation was calculated and flood risk maps were produced using HEC-RAS. This study has developed new and repeatable techniques for simulating flooding events in rural Nova Scotia by using LiDAR intensity and height data as an indicator of friction and selecting an analogous basin for use in the HEC-HMS modelling system. Sensitivity analysis shows that SCS curve number is by far the most important factor in watershed modelling and variations by 10% result in recurrence interval peak flows of between 8% and 10%.