

bodies also however face risk from riverine flooding; a precautionary and sustainable development approach should therefore take place to ensure community viability for many generations (Berke & Conroy, 2000). In Ontario, areas have been mapped to determine flood risk, and development has been restricted through non-structural land use planning policy mechanisms. In recent years, the province has delegated the responsibility for representing the provincial interest for plan input and review to conservation authorities (Conservation Ontario, 2001). Through the development and application of land use planning and regulatory policies, conservation authorities play an integral part in the municipal land use planning process.

Floodplain policies are generally prohibitive. Due to the nature of the flooding hazard, development may however occur in certain areas of a floodplain if strict conditions are met. In Ontario, these areas are referred to as the “flood fringe” and the type of planning employed in such a mechanism is called the “two zone concept” of floodplain

1. How is the two zone concept of floodplain management applied by conservation authorities in Southern Ontario?
2. What are the strengths and weaknesses of the two zone concept of floodplain management as applied in Southern Ontario?

The research evolved from an internship with the Rideau Valley Conservation Authority (RVCA) in 2014 and may support further two zone concept policy development by this conservation authority.

answering the research question

To answer the research questions, a multiple case study approach was employed. Through a literature review, components that make a high-quality natural hazard plan were examined (Baer, 1997; Berke & Godschalk, 2009). An evaluation framework was developed to compare planning documents that contained policies regarding the two zone concept to floodplain planning. Studies by Berke and Godschalk (2009), and Saunders, Grace, Beban and Johnston (2015); as well as, natural hazard mitigation policy development guidelines by the Queensland Department of State Development, Infrastructure and Planning in Australia (2014), and the US Federal Emergency Management Agency (2008) were utilized to develop the evaluation framework. Planning documents released by Conservation Halton (2011), Credit Valley Conservation (2010), Kettle Creek Conservation Authority (2008), Otonabee Conservation (2012), and Toronto and Regional Conservation Authority (2014) were selected for this evaluation.

Through plan evaluation, the planning document released by Toronto and Region Conservation Authority (2014) met 74% of the criteria identified in the evaluation framework. This was due to its inclusion of strong goals and objectives, clear introduction of the two zone concept, and clear policies that address flood fringe lands within the watershed as well as being fully compliant with the updated 2014 Provincial Policy Statement. In contrast, Kettle Creek Conservation Authority (KCCA) (2008) received the lowest score of all the five planning documents analyzed, with a score of 32%, as it did not clearly introduce the two zone concept and did not present a strong technical background for the policies within the policy document reviewed. Overall, most of the plans reviewed scored lowest for monitoring and evaluation, due to inadequate or lack of mechanisms to track the planning program after implementation, and internal consistency, due to the lack of cross-referencing from the public input components of the plans, such as goals and objectives, to policies. Overall, plans also scored low for the fact base evaluation component due to the lack of referencing to municipal land use documents and referencing and/or inclusion of floodplain studies and technical criteria within the document.

From the evaluation, a set of recommendations were formulated to support improvements of existing two zone plans used by conservation authorities in Southern

Ontario, as well as to support new policy development. Some of the recommendations are general, while others are specific to certain planning documents analyzed, which are listed in the table below.

Table ES-1: A table showing the list of recommendations formulated through the evaluation and analysis of two zone concept plans within Conservation Halton (2011), Credit Valley Conservation (2010), Kettle Creek Conservation Authority (2008), Otonabee Conservation (2012), and Toronto and Region Conservation Authority (2014) planning and regulations documents. Some of the recommendations only apply to specific planning documents, as shown in the table.

Recommendation	Application
1 Include a brief discussion of the studies and technical criteria used to determine floodway and flood fringe delineation.	General
2 Present floodproofing requirements within the planning document.	General
3	