Flood Hazard Area Land Use Management.

Review of Flood Hazard Area Land Use Management in B.C.

Photo 1 - Nechako River Ice Jam Prince George, Dec 2007 - Feb 2008

Fraser Basin Council

Arlington Group Planning + Architecture Inc.

December 2008

Table of Contents

List of Figures

Executive Summary

Legislative changes to the *Land Title Act* and the *Local Government Act* as well as three other provincial statutes, in 2003 and 2004, granted local governments the authority to manage land use in flood hazard areas. Key provisions of these legislative changes included the removal of BC Ministry of Environment approval for subdivisions and floodplain bylaws within flood hazard areas, and the granting of greater authority to local governments with the proviso that provincial guidelines be taken into consideration.

This report documents the results of an initiative by the Fraser Basin Council to determine how these 2003 and 2004 legislative changes with respect to floodplain management have been implemented. Given the importance of floodplain management and the significant changes in roles and responsibilities, the objectives were to document what has been working well, what challenges exist and what improvements are needed with respect to:

- The current flood hazard management approach
- The development of flood hazard management bylaws
- The approval of subdivisions in flood hazard areas
- The disposition of Crown lands in flood hazard areas

Following a scoping/feasibility study in 2007, a detailed survey was prepared and circulated in 2008 to all local governments, Ministry of Transportation Approving Officers, Crown Lands Management Officers (responsible for Crown land disposition in the Integrated Land Management Bureau), flood safety staff in the Ministry of Environment, and applicable private consulting engineers and geoscientists. A total of 106 responses were received, some from each of the province's nine Ministry of Environment regions; from nearly half of the 157 municipalities, and over 40% of the 27 regional districts in B.C. This represents a good cross section from different geographic areas of the province, different jurisdictional sizes, and different types of practitioners.

The high response rate coupled with the number of detailed responses to this questionnaire, indicate both strong interest and dedication to flood hazard management. The responses repeatedly demonstrate that those working in this specialized field are well aware of the importance of risk management and are very concerned that the public interest be protected.

The vast majority of respondents (90%) consider flood hazard management to be an issue in their community or region and almost all of those respondents indicated that it has been an issue for over five years. Four out of five respondents (80%) stated that their local government has a bylaw that regulates construction in flood hazard areas.

Survey respondents have a large amount of experience. The majority indicated that they have been working with flood hazard management for more than ten years (56%), and many have worked in their current position for longer than 10 years (35%).

For all but a few respondents, flood hazard management is an important responsibility that occurs in conjunction with other activities, but is not the primary component of their workload. Flood hazard management occupies no more than 20% of the workload of 89% of all respondents.

The following five tools were used by a majority of respondents, with floodplain mapping cited most frequently:

- Floodplain mapping
- Official Community Plan Goals, Policies and Objectives
- Zoning
- Registration of Covenant
- Engineer's or Geoscientist's Report

A large majority (75%) make use of consultants to address flood hazard management issues. A majority used a Qualified Professional for a building permit or subdivision while a third made use of a consulting study.

A majority of respondents gave a positive rating to nine of the management tools cited in the survey, (i.e., acceptable, good or excellent). Six of the management tools received a positive rating by two thirds or more of all respondents. The following table illustrates the positive ratings of these management tools.

Positive Rating of Management Tools (Excellent, Good Acceptable)

Tool	Tool#	All Respondents	Approving Officers	Regional District Respondents
219 Covenant	#8	78 %	82 %	70 %
Approving Officer	#7	73 %	84 %	50 %
Geotechnical Report	#6	67 %	62 %	70 %
OCP	#2	66 %	64 %	60 %
Provincial Guidelines	#11	66 %	60 %	60 %
Construction Requirements	#5	65 %	54 %	60 %
Zoning Bylaw	#3	58 %	60 %	90 %
Development Permit Areas	#4	57 %	58 %	50 %
Guidance for the Selection of a Qualified Professional	#12	51 %	46 %	70 %
Water Resources Atlas	#15	46 %	40 %	20 %
Floodplain Maps	#13	44 %	38 %	50 %

Notwithstanding the positive rating of most management tools, fewer than one third (32%) of the respondents indicated that the legislation and related management tools were sufficient to adequately manage flood hazards. In this, and other questions where comments were invited, the number of responses was noteworthy. Many were very specific and stated that there were important gaps in managing flood hazards in their jurisdictions.

Less than half (48%) of respondents indicated that the current legislative requirements are clearly defined. There were several comments that suggested further clarification is needed to better define the roles and responsibilities of different jurisdictions.

It is significant that a large majority answered “no”, “didn’t know” or “not sure” to the following questions:

> *Have the 2003/04 legislative changes improved the effectiveness of flood hazard management?*
>
> *Have the 2003/04 legislative changes made the regulatory environment for flood hazard management more efficient or timely?*

The need for updated floodplain mapping and other technical flood hazard information was a recurring theme, raised in response to many of the questions in the survey. Generally, since the 2003 and 2004 legislative changes, local governments have not undertaken on their own any updates to flood construction levels or flood hazard mapping. This is likely due to a variety of factors including cost and risk considerations, political and methodological challenges. A strong case for a renewed provincial role can be made in this area, even if that role would primarily be to update technical studies, mapping and risk assessments of flood hazards and would not include new regulations.

Land use management in flood hazard areas includes a diversity of roles and responsibilities, as well as a complex array of issues, challenges and uncertainties. Each community and each flood hazard involves its own unique circumstances; however, some commonalities have emerged through this project. Some of the most common and significant findings of this project include the following:

- There is a very high degree of interest and dedication among the respondents of this survey to make good land use management decisions in the interest of protecting public safety and the broader public good
- This level of dedication is sometimes challenged by issues such as liability concerns, political and public support, competing objectives or regulations, and limited technical and information resources
- There remains some uncertainty about the specific roles, responsibilities and allocation of liability of different jurisdictions
- There is uncertainty about consistency of flood hazard management applications from one jurisdiction to another
- Local governments are concerned about a lack of financial resources available for dyke upgrading
- There is concern about external impacts on local jurisdictions, particularly the impact of climate change
- Conflicts or conflicting objectives sometimes arise between different jurisdictions having authority with respect to development with flood hazard areas (i.e. Fisheries and Oceans Canada, BC Ministry of Transportation, BC Ministry of Environment and local governments)
- Local governments and other Approving Officers have a wide range of internal capacity, expertise and access to qualified professionals, nonetheless, there is a need for enhanced technical support, improved information resources and related management tools to better enable local governments and other Approving Officers in fulfilling their flood hazard management roles and responsibilities

- There are particular resource limitations among small communities including available staff time and technical expertise

There are limitations to a survey approach for assessing legislative effects and effectiveness; nonetheless, concerns expressed by respondents here are based on considerable expertise in flood hazard management. There is a strong indication that significant gaps do exist and that the legislative changes have not necessarily resulted in a more efficient and effective approach to land use management in flood hazard areas in BC.

The following are possible next steps to address the issues and concerns raised in the survey responses:

- The province should provide coordination and technical support such as improved information resources and related management tools to better enable local governments and other Approving Officers in fulfilling their flood hazard management roles and responsibilities. Some examples include:
    - More frequent development and maintenance / updating of flood hazard mapping
    - Periodic hydrological studies with entire watersheds as the focus in order to address the potential downstream flood impacts of upstream activities, such as logging and the mountain pine beetle epidemic
    - One comprehensive website that is more user-friendly with up-to-date information resources
- Through detailed evaluations of specific floodplain areas, the province should review the effectiveness of local government's use of existing legislation and the Provincial Guidelines in limiting the increases in flood risks associated with new development and, if necessary, consider new guidelines and regulations to ensure consistency and compliance with provincial standards
- The province should develop provincial guidelines and/or provide a coordination role to address flood hazard issues and management decisions that cross local government jurisdictional boundaries. A provincial government role would be particularly beneficial where there is potential for local flood mitigation policies or practices that would result in transferring flood risk from one property or jurisdiction to another.
- The principles of dialogue and collaboration should be applied to continue to share the wealth of knowledge and experience among flood hazard management practitioners and to continue to identify opportunities to improve flood hazard management policies and practices across the province of British Columbia

1. Introduction and Background

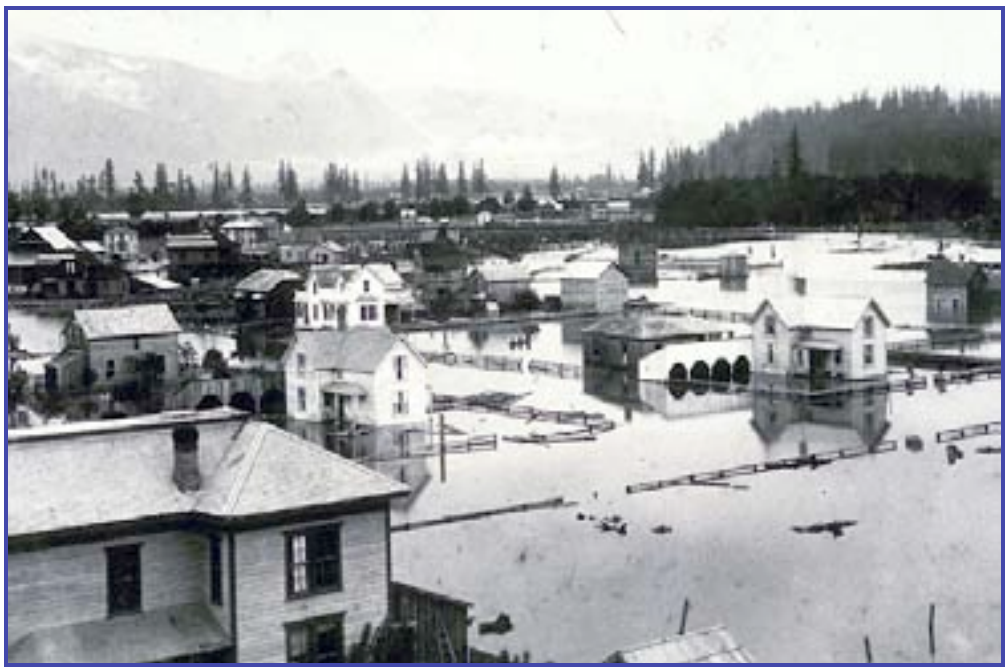


Photo 2 - Fraser River flood, Chilliwack, 1894

Legislative changes to the *Land Title Act* and the *Local Government Act* as well as three other provincial statutes in 2003 and 2004 granted local governments the authority to manage flood hazards. See Appendix A for a summary of these legislative changes.

- Flood Hazard Statutes Amendment Act, 2003 (Bill 56). In force January 1, 2004
- Miscellaneous Statutes Amendment Act (No.2), 2004 (Bill 54). In force May 20, 2004
- Changes to the Land Title Act (Bill 56)
- Changes to the Local Government Act, Section 910 (Bills 56 and 54)
- Changes to the Dyke Maintenance Act (Bill 56)
- Changes to the Drainage, Ditch & Dyke Act (Bill 56)
- Changes to the Ombudsman Act (Bill 56)

A key provision of these changes was the removal of the requirement for BC Ministry of Environment approval for subdivisions and floodplain bylaws within flood hazard areas. Approving Officers were granted the authority to require an engineering report and covenant on land subject to flood hazards similar to the authority held by building inspectors. In addition, the grounds for an Approving Officer to refuse a subdivision were broadened to include flooding and erosion.

A previous requirement for Ministry of Environment approval for floodplain bylaw approval was removed. Local government bylaws in flood hazard areas were allowed to proceed provided that Provincial Guidelines are taken into consideration. The Provincial Guidelines are designed to reduce or prevent injury, human trauma and loss of life, and to minimize property damage during flooding events. A detailed 72-page document,

Flood Hazard Area Land Use Management Guidelines, (May 2004), covers various flood hazard management tools, including Official Community Plans, local bylaws, subdivision approval, flood covenants, Crown land dispositions and their application to different types of hazards and land uses. Also included are floodplain mapping and implementation measures such as standard forms and definitions. In addition to floodplain maps, the Ministry of Environment and the Fraser Basin Council prepared a set of Flood Hazard Maps for the province. These maps and embedded databases provide local governments with access to map polygons, reports and other information on flood hazards.

Authority was given for local governments to establish minimum setbacks from watercourses and dykes, specify minimum flood levels for habitable dwellings, businesses and the storage of goods susceptible to damage by floodwaters, and specify structural support necessary to protect buildings. Approval of exemptions to a local bylaw to manage floodplain hazards was authorized provided the exemption is consistent with Provincial Guidelines or the local government receives a report certified by a professional engineer or geoscientist experienced in geotechnical engineering stating "that the land may be used safely for the use intended". The use of a covenant under Section 219 of the *Land Title Act* was also authorized.

In 2006 an initiative was undertaken to determine how these 2003 and 2004 legislative changes with respect to floodplain management have been implemented. This was inspired by the Fraser Basin Council's Joint Program Committee for Integrated Flood Hazard Management[1]. Given the importance of floodplain management and the significant changes in roles and responsibilities, the objectives were to document what has worked well, what challenges exist and what improvements are needed with respect to:

- The current flood hazard management approach
- The development of flood hazard management bylaws
- The approval of subdivisions in flood hazard areas
- The disposition of Crown lands in flood hazard areas

Two related questions also arose given the large number of local governments with primary responsibility for floodplain management. Are there significant differences in approach from one region to another or between small and large municipalities? And, are appropriate technical resources available throughout B.C.?

With funding from the BC Ministry of Environment, the Fraser Basin Council was able to proceed with a review of this legislation based on input from affected stakeholders including the Union of BC Municipalities. The Arlington Group Planning + Architecture was retained to assist the Fraser Basin Council in this initiative.

[1] Participants include representatives of local, provincial and federal governments with roles and responsibilities for flood hazard management.

2. Scoping/Feasibility Study

The initial work program consisted of a scoping/feasibility study, which was completed in March 2007. This study started with documentation of legislative changes and a review of existing management tools. This led to the primary objective, which was the preparation of a draft survey instrument for engaging the target audience. The draft survey consisted of a detailed questionnaire with both structured and open-ended elements. The structured questions were included to enable quantitative and comparative analysis of different stakeholders. The open-ended questions were included to enable individuals to provide their perspectives and comments.

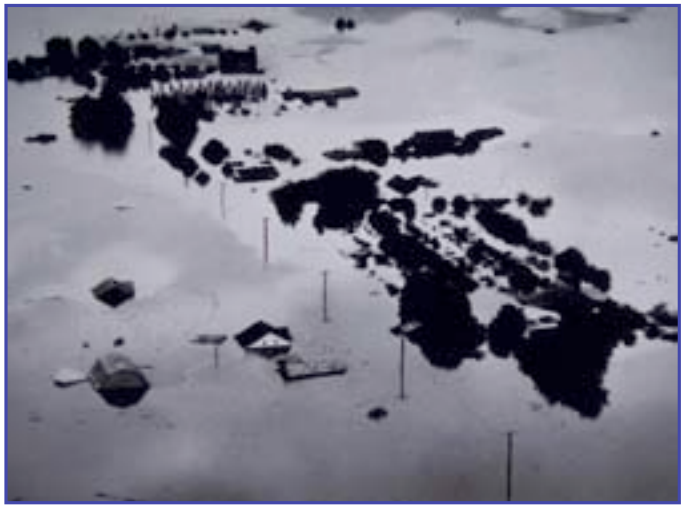


Photo 3 - Fraser River Flooding of Agricultural Land

The target audience was identified as those responsible for floodplain management following the legislative changes. The questionnaire was sent to planners, engineers, geoscientists, building inspectors, and Approving Officers throughout the province, as well as Crown land officers, and others responsible for floodplain management. In terms of employment status, three groups were included: local government employees, Provincial employees and consultants. The March 2007 scoping/ feasibility study also identified other forms of consultation to complement the survey as well as a work plan to complete the project. The legislative changes applied throughout the province, thus the initiative was province-wide and was not limited only to communities within the Fraser River Basin.

3. Methodology

The questionnaire was distributed throughout the province in February 2008 to professionals working in flood hazard management in all municipalities, regional districts, the BC Ministry of Environment, the BC Ministry of Transportation, and to consulting engineers and geoscientists practicing in this specialized area. Responses reflect the respondent's scope of work and experience and do not necessarily represent their organization.

Where more than one person in an organization was involved in flood hazard management, it was up to those respondents to determine if they would complete the survey individually or collectively. Multiple surveys could be submitted for a single organization to reflect the experiences and perspectives of different staff.

Participation was voluntary. Contact information was provided with the understanding that it would only be used to enable follow-up for clarification, and to allow the final report to be provided to respondents by electronic mail. To ensure anonymity and confidentiality, all questionnaire results were aggregated and compiled by function and region. Individual comments were not attributed to particular individuals or organizations.

The questionnaire was available in online and MS Word formats and could be returned by electronic or postal mail. All but three surveys were completed through password protected online procedures. Of the three remaining responses, two were submitted in MS Word format and one was submitted as an Adobe PDF document. The option to respond by mail or requesting that the final report be mailed to them was not used by any of the respondents.

All the completed surveys were entered into a common database. The survey responses are presented below in two parts: demographic profile and key findings.

The survey was initially distributed to municipal Approving Officers, Ministry of Transportation Approving Officers, Ministry of Environment flood safety staff, Crown Lands management officers responsible for Crown land disposition in the Integrated Land Management Bureau, and private consulting engineers and geoscientists working with flood management issues on February 1st with a February 28th return date. Several follow-ups were made to encourage completion of the surveys. The returned surveys were collated and a preliminary draft report prepared. The preliminary findings were presented at the 2008 Planning Institute of BC Conference on June 11, 2008 in Prince George. A similar presentation was made to Approving Officers attending the annual conference of the Local Government Management Association on June 17, 2008, also in Prince George.

Regional district planners attending the Local Government Management Association presentation requested the survey be distributed to all regional districts.

The preliminary findings were also presented to a meeting of the Joint Program Committee for Integrated Flood Hazard Management, as well as a meeting of private consultants working with flood hazard management issues in Vancouver on June 24,

2008. The survey was later e-mailed to by request to several consulting firms not on the original list.

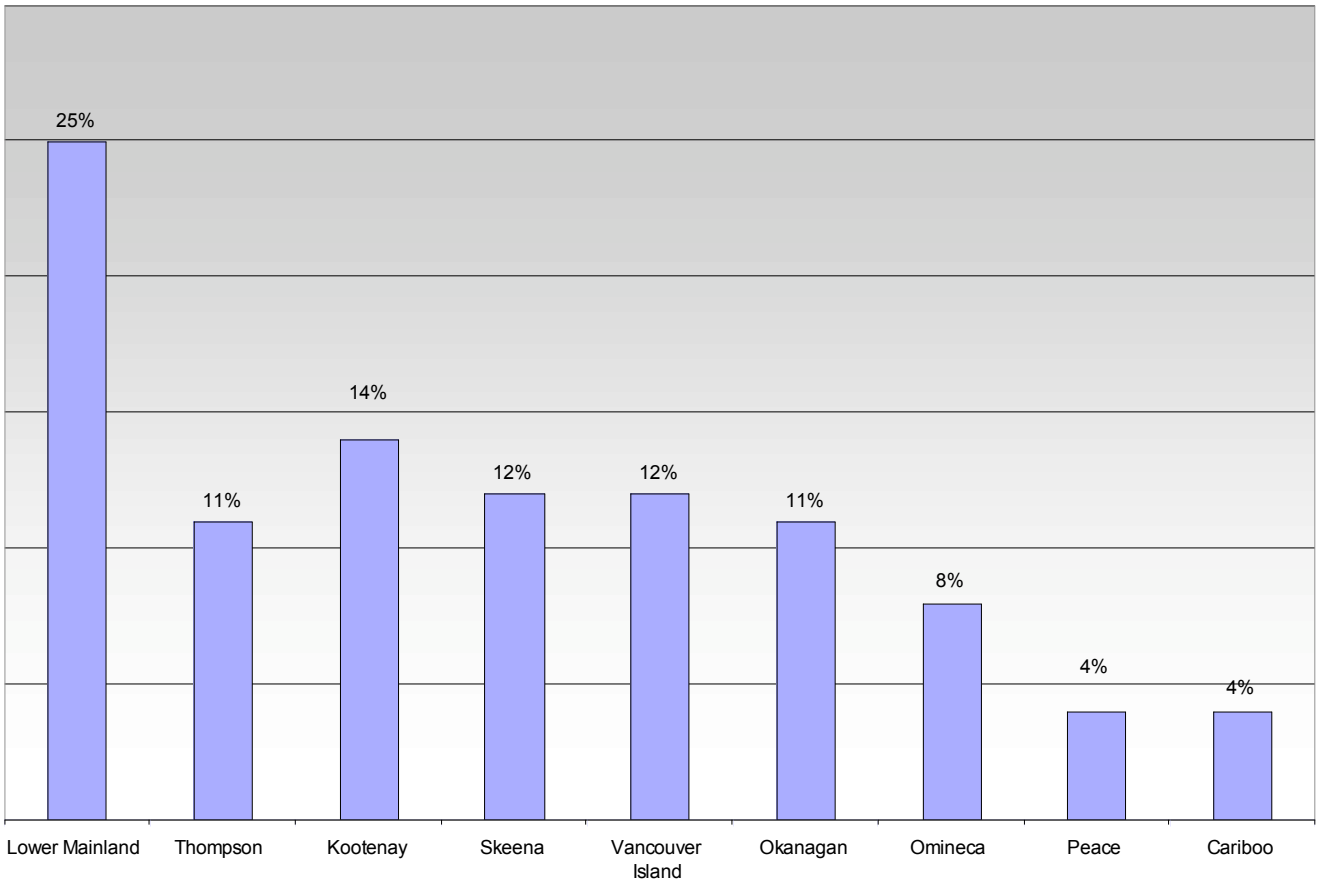
Following presentation of the preliminary results, an additional 16 completed surveys, mainly from regional districts, were received and entered into the database. Altogether, the final report is based on the results of 106 survey responses. All survey questions, a tabulation of numerical survey responses and complete documentation of all individual comments are contained in Appendix B. These comments are contained verbatim except for minor spelling and punctuation corrections to improve readability. The comments were also reviewed with minor edits where appropriate to ensure the anonymity of respondents.

4. Demographic Profile of Respondents

A profile of respondents is provided based on Questions 1 through 9. Responses to these initial questions generated demographic data such as the respondents' professional roles, population and geographic area in which they work, and the length of experience. More detailed documentation concerning each survey question is contained in Appendix B.

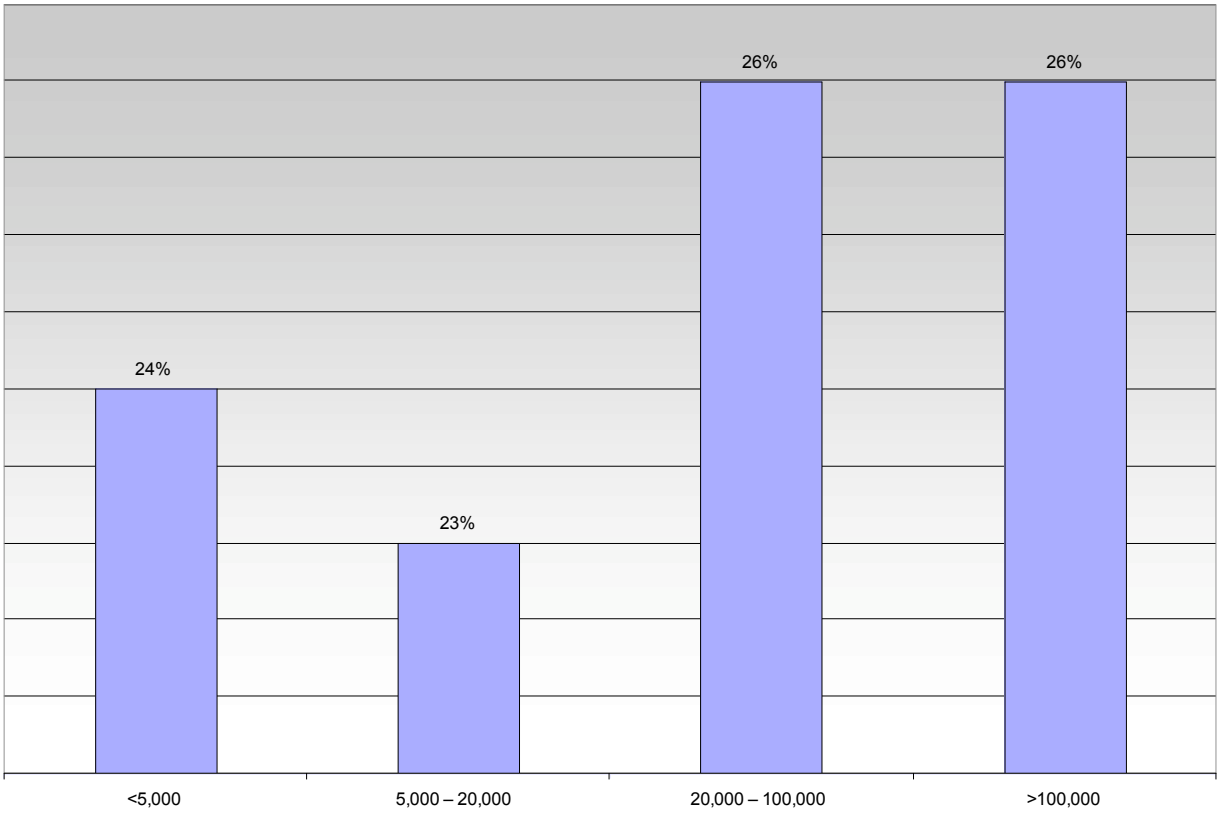
Question 1 (Figure 1) asked respondents to identify the Ministry of Environment Region(s) (MoE) in which they currently work. Areas prone to flooding were well represented in the completed surveys. Of the 139 responses received in total, 105 respondents indicated in which of the Ministry of Environment Regions they work. Nine respondents indicated they work in two or more regions. Not surprisingly, these respondents were consultants and representatives of provincial ministries.

Figure 1 - Respondents' MoE Regions of Flood Hazard Management Work



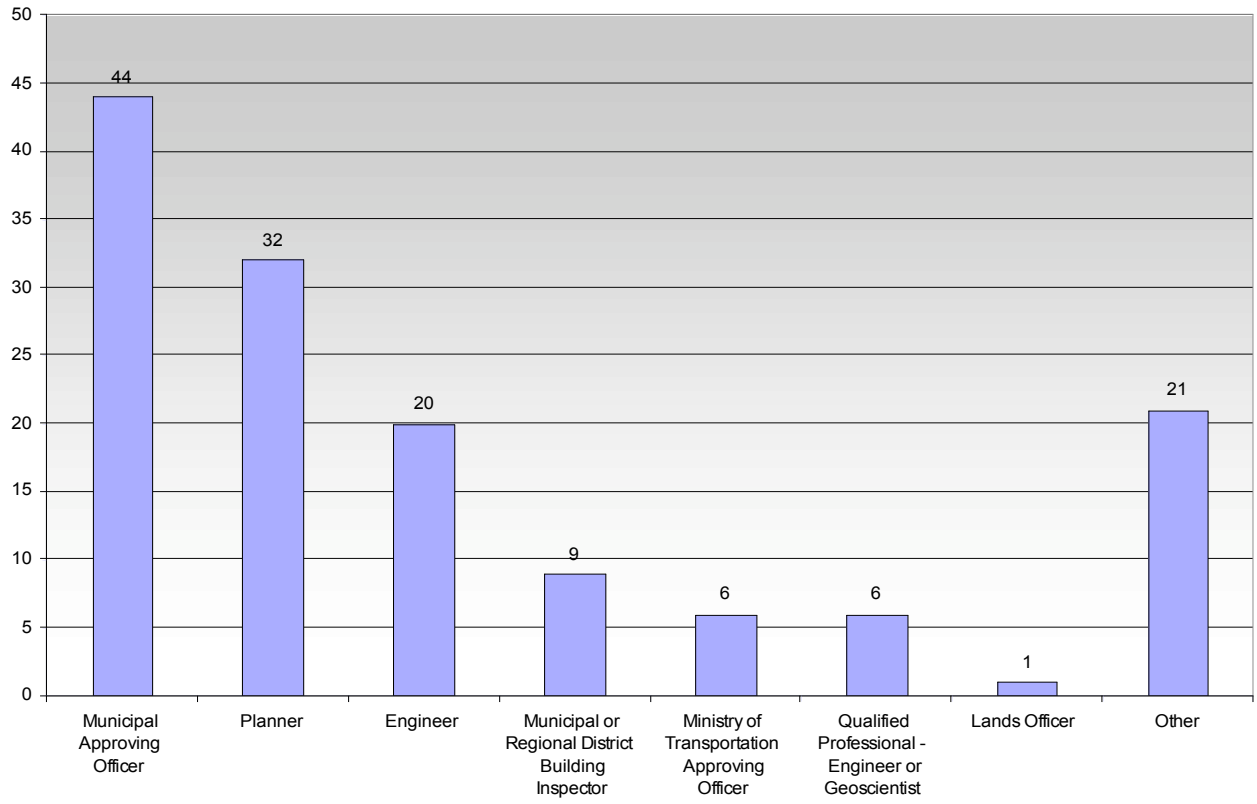
The responses to **Question 2** (Figure 2) profile the population size of the flood hazard management areas in which respondents worked (i.e., municipality, regional district, primary consulting area). Of the 103 respondents to this question, the distribution was generally evenly split among jurisdictions' population size. Approximately one quarter (24%) of respondents represented jurisdictions with less than 5,000 residents, just under one quarter (23%) represented those with 5,000 to 20,000 residents, and 26% each represented those with 20,000-100,000 residents, and more than 100,000 residents respectively.

Figure 2 - Population of Jurisdictions in Which Respondents' Work



Question 3 (Figure 3) concerned the current position of respondents. There were 139 responses from 106 respondents. This is because the largest number of respondents (44) consisted of Municipal Approving Officers, who typically hold other positions as well. Most of them also indicated they were a planner (32) or an engineer (20).

Figure 3 - Respondents' Current Position



The geographic distribution of the municipal Approving Officers is spread over six of the nine regions, excluding the Thompson, Cariboo and Peace regions. The survey results show a representative distribution in population size of jurisdictions where the respondents' work.

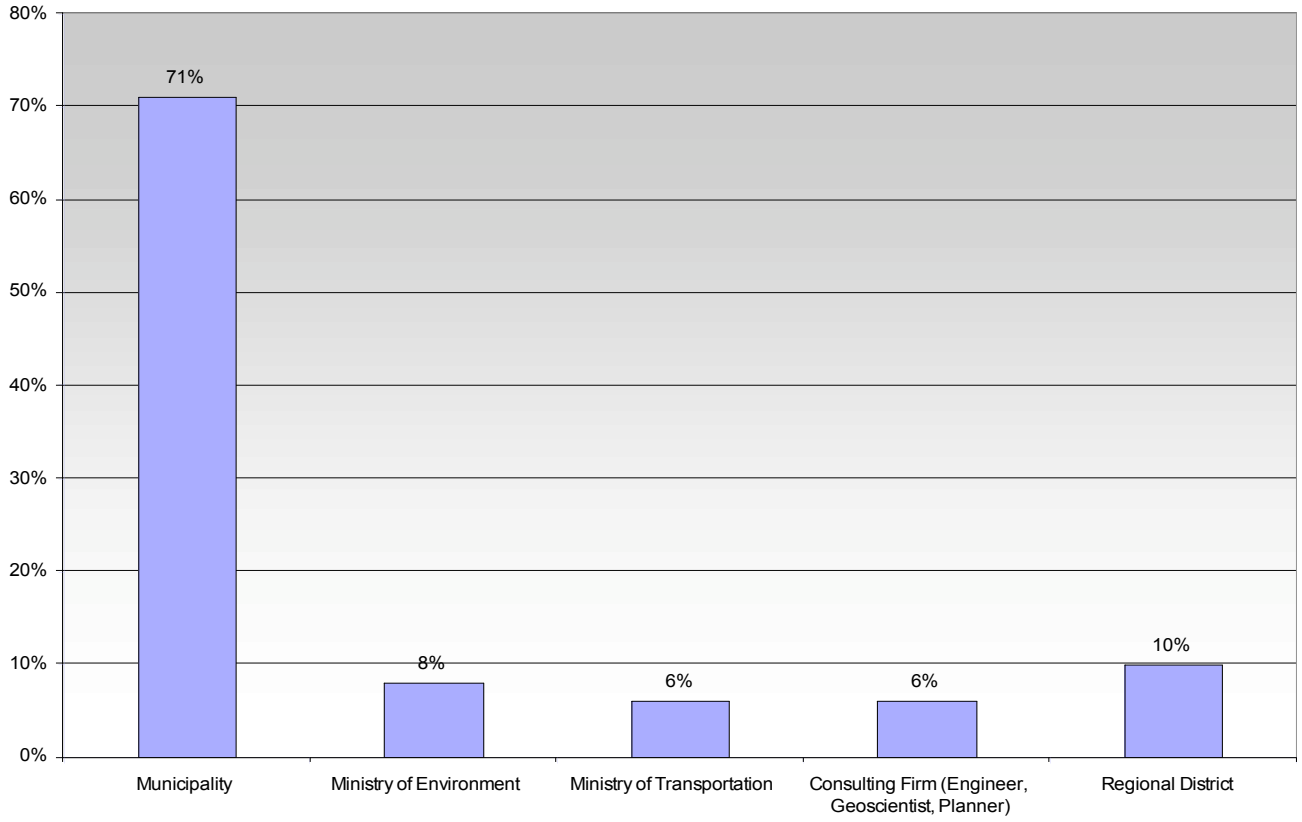
There were three other groupings with more than five respondents. They consisted of building inspectors (9), Ministry of Transportation Approving Officers (6) and Qualified Professionals (P.Eng. or P.Geo.) (6). There were also a large and diverse number of other positions, cited as follows:

- Director of Public Works
- Provincial Ministry Official (5)
- Manager of development approval including approving officers, building inspectors, planners, and engineers
- Deputy Municipal Approving Officer
- Director of Community Development; Director of EOC
- Chief Building Official
- Emergency Program Manager
- Chief Administrative Officer

- Water Resource Manager
- Flood Hazard Technician
- Director of Planning & Information Services
- Administrator
- Dyking Authority
- Engineering Manager
- General Manager Planning and Development
- Registered Professional Biologist

Question 4 (Figure 4) concerns the type of organization where respondents worked. A large majority of respondents (71%) stated they worked for a municipality. Provincial ministries (i.e. Environment or Transportation) comprised 14% of respondents, 10% represented regional districts, and 6% were received from consultants (professional engineers or geoscientists). Taken together, municipal and regional district employees combined represented 81% of all respondents.

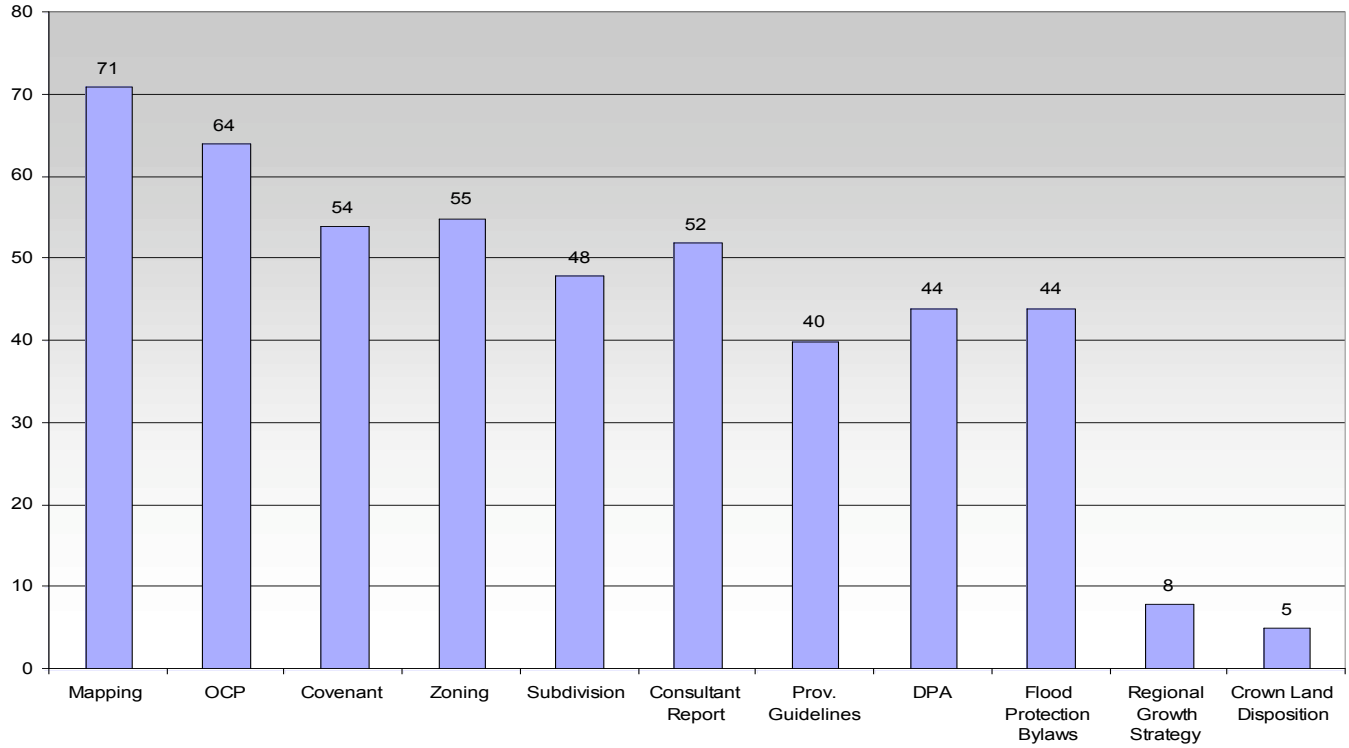
Figure 4 - Type of Organization Where Respondents Work



Question 5 (Figure 5) asked respondents to indicate which flood hazard management tools they have used since the legislative changes became effective in 2004. The following five tools were used by more than half of all respondents, with floodplain mapping most frequently cited:

- Floodplain mapping
- Official Community Plan Goals, Policies and Objectives
- Zoning
- Registration of Covenants
- Engineer's or Geoscientist's Reports

Figure 5 - Most Used Management Tools



Question 6 asked if flood hazard management was an issue in their geographical area. The vast majority (90%) indicated "yes".[2] Only 10% said "no".

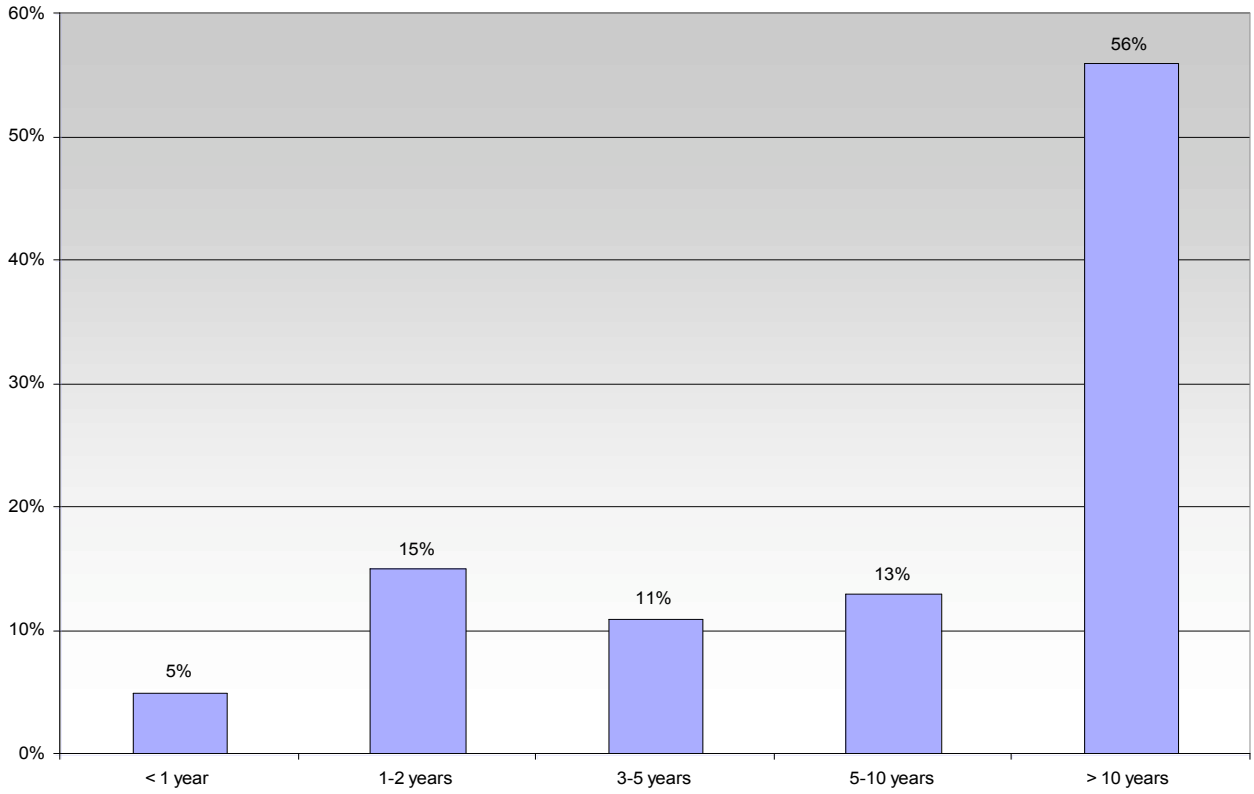
Question 7 applied to the 90% in Question 6 who indicated that flood hazard management was in issue in their geographical area. The vast majority (93%) indicated that it had been an issue for longer than five years while the remainder stated that it had been an issue for less than 5 years.

[2] A more detailed review of responses indicates that a higher response rate was received from those jurisdictions where flood hazards are known to be a significant concern. Logically, jurisdictions (mainly municipalities) where flood hazards are not a concern or are rarely a concern would be less likely to respond to the survey.

Questions 8 and 9 (Figure 6) asked how long respondents had been working with flood hazard management issues, and how long they had been in their current position working on flood hazard management issues. The majority of respondents indicated that they had been working with these issues for more than ten years (56%), and most have worked in their current position for longer than 10 years (35%).

Given most respondents have been working with flood hazard management issues for ten years or longer, it is clear they have a large amount of experience in this field. It should be noted, however, that a significant minority have limited experience with flood hazard management. One fifth of all respondents had two years or less flood hazard management experience in their career and one third had this amount of experience in their current position. This is reflected in subsequent responses.

Figure 6 - Years of Experience with Flood Hazard Management



5. Key Findings

Question 10 asked whether the current legislative requirements, including roles and responsibilities are clearly defined. Almost 50% indicated these are clear in the legislation. The remaining responses were almost evenly divided between those who stated "no" and those who indicated "don't know".

Here is a representative sample of the 32 written comments on this question:

- *Although I think the legislation is clear, there seems to be a fair degree of uncertainty and confusion around which agency or level of government is responsible for what. This seems to be a bigger issue for the smaller local authorities who deal with flood hazard management issues infrequently as well as having limited internal capacity or access to consultants.*
- *There needs to be more clarity with regard to jurisdiction, which makes discretionary decisions, compatibility (overlap etc) with Riparian Area Regulation guidelines, role and control of consulting professionals, etc. There is also a problem with defining the existing state (i.e. is this a oxbow lake with 7.5m setback or is this part of the high water system with a 30m setback)*
- *Responsibility of such matters requires considerable expertise, and historical experience with geographic areas so that one can really have a good pulse on effecting conditions necessary to mitigate all future flood scenarios. This in my view can only be gained when one has a body of flood experts in place to adjudicate on such matters.*

Question 11 takes the previous question a step further by asking whether the legislation and related management tools are sufficient to adequately manage flood hazards. Less than one third (32%) of respondents said, "yes"; 35% said "no" and the remainder (32%) indicated they did not know whether the tools were adequate to manage flood hazards.

Considering that the survey respondents were representative of many of the MoE regions, various Flood Hazard Management (FHM) related professional roles, and a range of years of experience, the fact that most respondents could not say "yes" to questions 10 and 11 suggests a need to improve the legislation and the related tools used to implement flood hazard management.

A representative sample of the 42 comments on this question follows:

- *Flood hazards in many jurisdictions are partially controlled by `managed` river systems. Upstream control of water levels is not within the jurisdiction of local governments so how can we accurately plan for the potential flood hazards that result?*
- *The legislation is of limited assistance in dealing with the management of the flood hazard. For example it does not set out particular levels of protection (1:200 or 1:500 year return periods) or setbacks. This can be decided by municipalities, therefore a variety of standards exist across BC.*

- *Local governments, particularly small local governments, do not have the level of geotechnical and hydrological expertise that was once available in the MoE to review applications and engineers/geoscientists reports. Local governments, particularly small local governments, do not have the financial resources to take on new dyking responsibilities.*
- *No, local government needs support floodplain management. Provincial funding for dyke upgrades, although welcomed, is inadequate.*
- *Only guidelines -- should be regulations, however, don't know how consistent decisions are across the different jurisdictions. As far as management tools, many of the flood maps are out of date and flood map mapping should be extended to the Lower Fraser River Valley.*
- *The decision on what land is safe to develop is left to a consultant working for the land developer whose level of risk tolerance may be quite a bit lower that what general society's risk tolerance may be. The quality of reports varies and many local governments do not have qualified professionals to review reports. So when a proponent and his consultant make an application to reduce say the river setback distance (to maintain a flood way for the river and to prevent future damages due to erosion), even if the local government believes the setback should not be reduced, they have no argument.*

Photo 4 - Thompson River flood, Kamloops, 1972

Question 12 had two parts. The first part, twelve (a), asked respondents if their local government had a bylaw that regulated construction in flood hazard areas. Four out of five (80%) responded "yes". Of those that indicated "yes", the bylaws that regulated construction were almost evenly divided between those under Section 903 of the *Local Government Act* (i.e. zoning) (49%), and those under Section 910 of the *Local Government Act* (51%), (i.e. floodplain construction requirements).

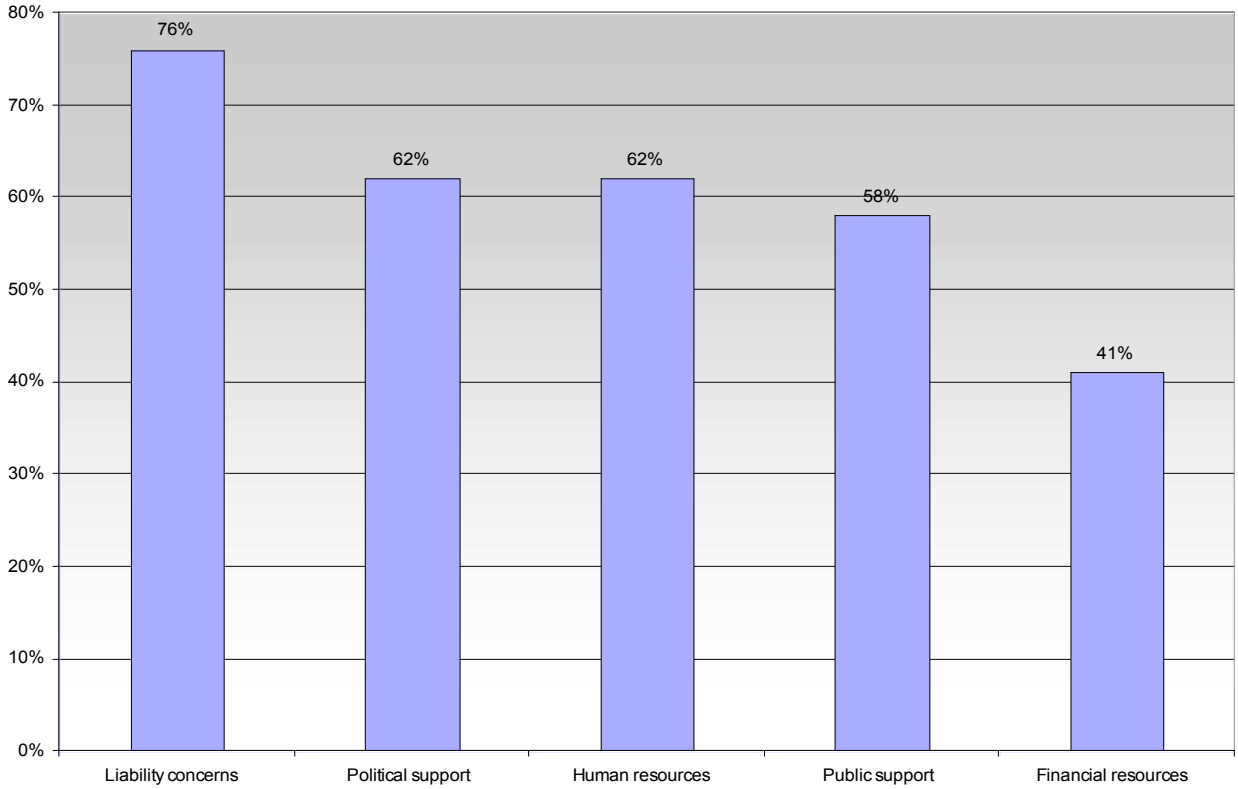
A follow up question asked 'What factors contributed to the need to have/not have a bylaw to manage construction in flood hazard areas?' This question elicited the largest

number of comments in the entire survey. Most of the 59 responses identified local flood hazards. The following comments are indicative of the wide range of regulatory concerns:

- *I deal with eleven regional districts to one extent or other regarding subdivision referrals for my area of jurisdiction. They vary considerably in their approach to land use matters and go from one end of the spectrum to the other. Need I say more!*
- *I would first like to note that I could not choose both sec 903 and sec 910 in the question above this one. We use both because section 910 (4)(b) of the LGA is limited to setbacks for `landfill required to support a floor system or pad`. We feel it was prudent to also regulate building siting in a flood plain using 903 (1)(c)(iii) of the LGA. In answer to a)...Factors in support of regulation: 1) real risk to life and limb, emotional health, property, and economic sustainability, 2) Liability to the local jurisdiction and province.*
- *We control it under Section 919.1(1)(b) of the Local Government Act as a Development Permit Area in our Official Community Plan Bylaw. With so much development happening within our community and so little land that is free from floodplain or geotechnical hazards, it appears that the majority of our development and building permit applications are affected by a development permit for hazardous conditions.*

Question 12 (b) (Figure 7) asked what were the most important considerations in developing and implementing a bylaw to manage flood hazards. Respondents were asked to list their top three considerations from a list of five. Those consisted of liability concerns, political support, public support, human resources and financial resources. The top priority by far was liability concerns (rates as the number one concern by 47% of respondents); more than double that of any other consideration. When the top three priorities were added together, liability concerns rose to the top of the list (76%) followed by political support and human resources (both 62%). Financial concerns were at the bottom of the list (41%). Details of all three priorities are documented in Appendix B. The following graph (Figure 7) illustrates the top three priorities of all respondents, shown cumulatively.

Figure 7 - Flood Hazard Management Considerations



Some of the 11 comments related to this question are provided as follows:

- *It is difficult to balance the economic development need to expand and our responsibility to protect the people of our community. When development applications are placed into the Development Permit process, the questions revolve around the `red tape` and hurdles to allow growth but when a major flood event occurs, the first question is why we allowed the development to occur.*
- *Even when people know they are prone to flooding – they expect government to assist during the emergency and to fix the problem so it doesn't happen again – having all levels understand what the hazards are and what it looks like and the impacts on the community is huge. Have*

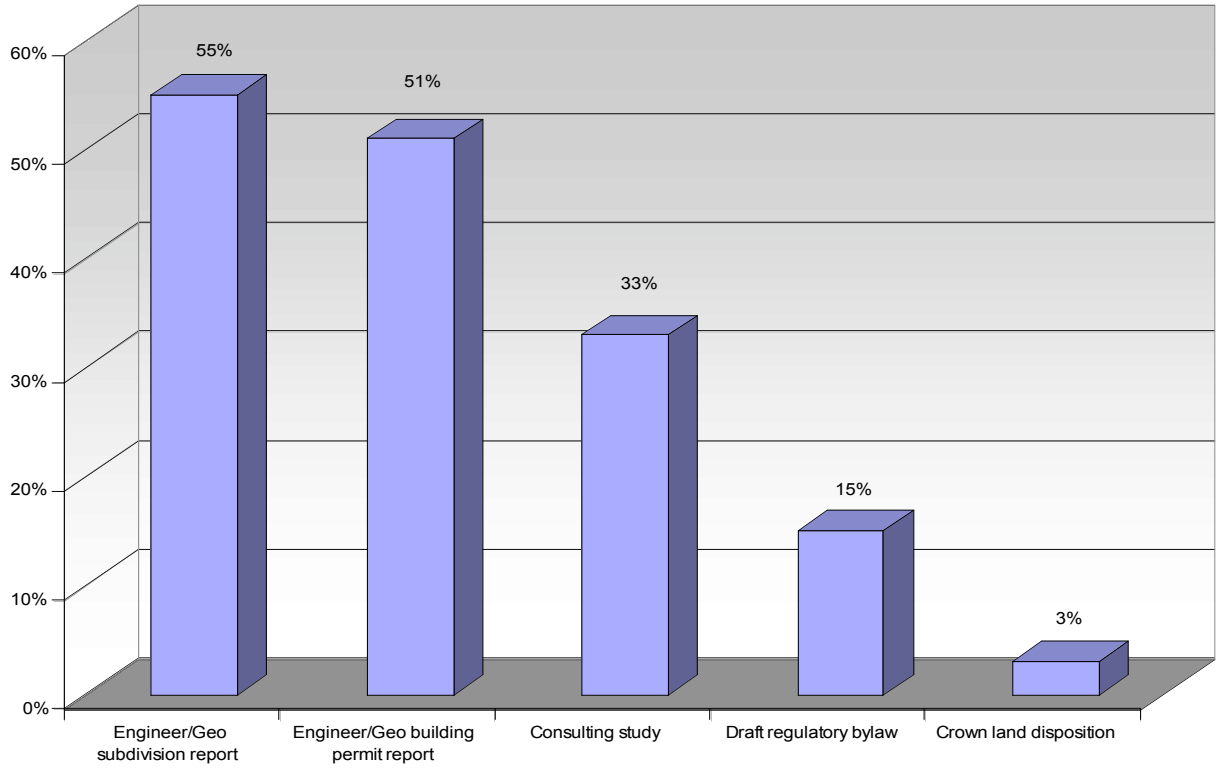
examples where buildings high enough but garages etc flooded and loss of sewer & water services when it floods – people are isolated even though they are "flood proofed". More factors than just building height to consider in floodplain areas.

- *Communities that do not have registered professionals resident and working in their areas have added costs to bring professionals in to over see developments in affected areas. All policies and bylaws are drafted first in an effort to minimize liabilities, which is in turn used to obtain political support. These areas still need qualified professionals to administer the requirements, however.*

Question 13 (Figure 8) asked whether the respondent's jurisdiction engages professional consultants and, if so, for what type of flood hazard management issue. Three quarters of respondents indicated "yes" to the first part of the question. Only 16% responded "no" while the remainder indicated they were not sure or the question did not apply to them. This indicates the vast majority of respondents engage or require consultants when they feel their expertise is required. Furthermore, when looked at in context with question 12(b), financial considerations are not a constraint to the use of consultants.

Of the 75% of jurisdictions that engage or require consultants to address flood hazard management issues, a majority engage Professional Engineers or Geoscientists in regards to proposed subdivisions (55%) or building permit (51%). No more than one third of respondents retain consultants for other purposes as indicated in the following Figure 8.

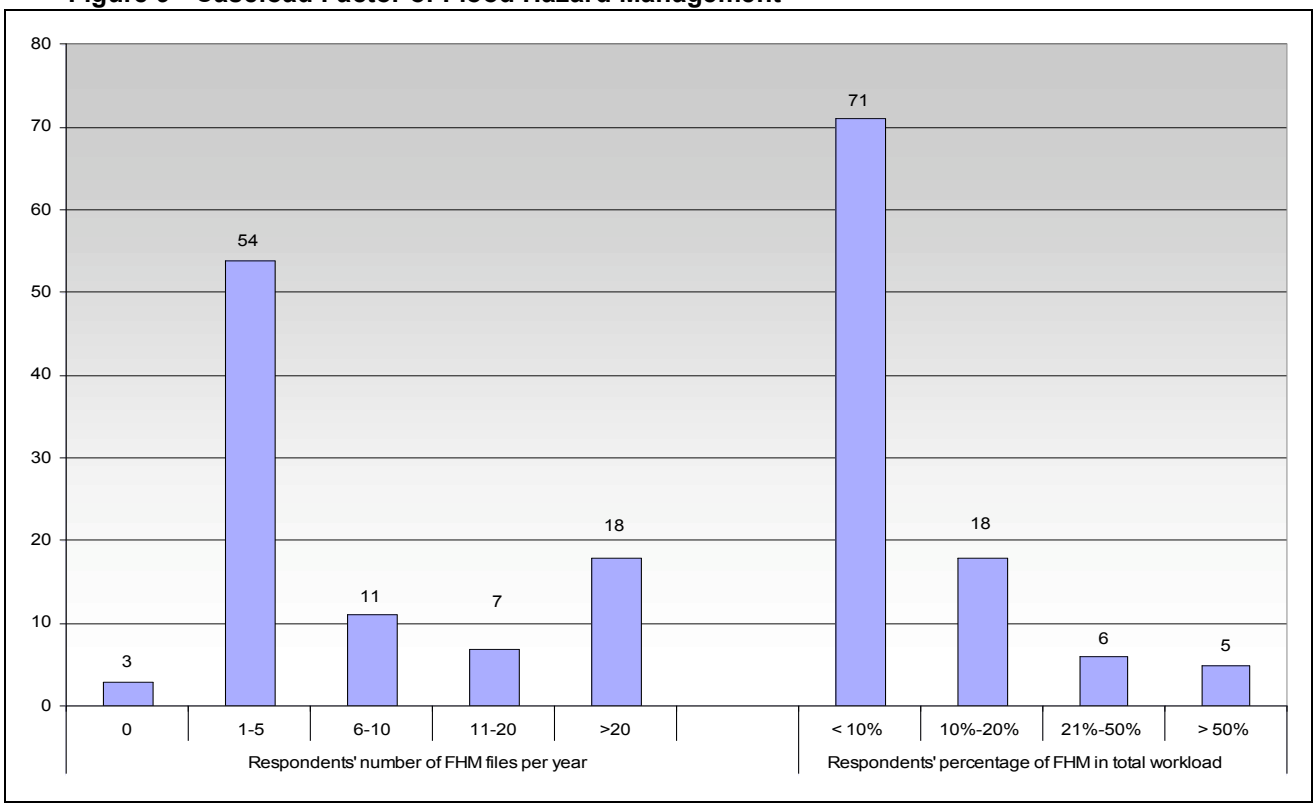
Figure 8 - Work for which Professionals are Most Often Engaged (%)



Questions 14, 15 and 16 documented flood hazard management workloads for respondents. **Question 14** asked 'On average, how many files concerning flood hazard management issues have you worked on annually (since the 2003/4 legislative changes)?' A majority (54%) indicated they work on 1-5 files annually. Only 18% deal with 20 or more flood hazard management files annually.

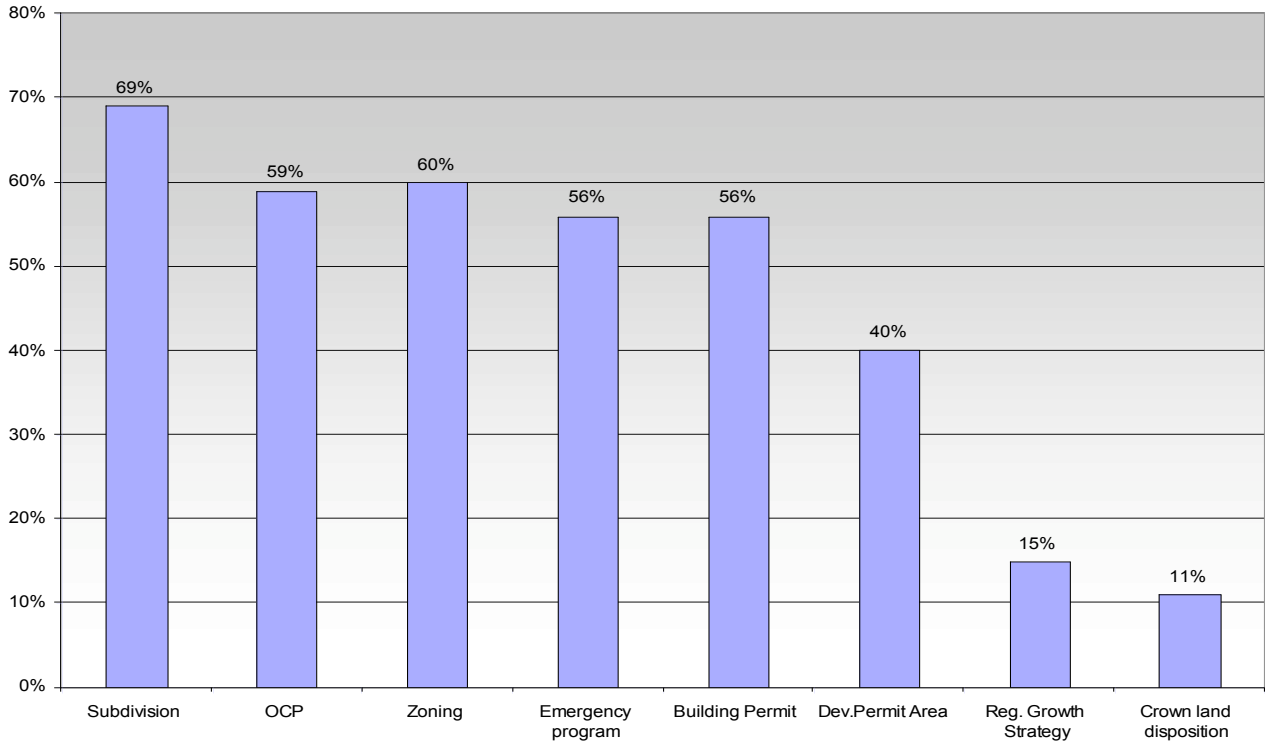
Question 15 (Figure 9) asked 'How much of your workload concerns flood hazard management?' A large majority (71%) indicated that flood hazard management represents less than 10% of their workload. A further 18% indicated that flood hazard management represents 10% to 20% of their total workload. This means that flood hazard management represents no more than 20% of the workload of nearly 9 out of 10 respondents. Figure 9 summarizes the results of Questions 14 and 15.

Figure 9 - Caseload Factor of Flood Hazard Management



Question 16 (Figure 10) asked respondents to check off which aspects of their workload activities concerned flood hazard management. Five activities were cited by a majority of respondents: subdivision (69%), zoning (60%), Official Community Plan Goals, Policies and Objectives (59%), emergency program and building permit (both 56%). Official Community Plan Development Permit areas were cited by 40% of respondents. Other activities were identified by 15% or less of respondents.

Figure 10 - Areas of Workload Involving Flood Hazard Management



Question 17 asked whether the respondent's organization had made any policy or regulatory changes concerning flood hazard management since the 2003/04 legislative changes. Only 36% responded "yes" while 46% indicated "no". However many who had not made any policy or regulatory changes were in the process of doing so. The following responses reflect the range of the 40 comments that were received:

- *Adoption of a new Flood Plain Regulation Bylaw that designates the flood plain, regulates flood levels and setbacks, includes general exemptions to those regulations, and provides for delegated authority to consider site-specific exemption requests from land owners.*
- *At the time Section 82 of the Land Title Act was rescinded, the Provincial Approving Officers (PAOs') requested and received training for our field inspectors. Along with the training, MoT Development Approvals staff received access to digital mapping. With these tools, it enabled the PAO's to protect areas of concern under Section 86 LTA and the Local Services Act.*

- *Changes to the Zoning Bylaws, Rural Land Use Bylaws, Floodplain Management Bylaw, requirements for structural engineering on foreshore foundations etc…*
- *As a consultant, we have advised various clients in this regard.*

Question 18 was a detailed question that asked respondents to rate the effectiveness of 15 Flood Hazard Management tools where 1= Excellent, 2 = Good, 3 = Acceptable, 4 = Needs Some Improvement, 5 = Not Acceptable, and N.A. = Not Applicable.

The tables below indicate three management tools were rated good or excellent by more than 50% of respondents. Tools that were rated favourably included the use of covenants, construction requirements in flood plain areas and the Approving Officer role. Five other management tools received good or excellent ratings by more than one third of respondents. They were the use of geotechnical reports; zoning bylaw provisions; designation of Development Permit areas; objectives and guidelines, Official Community Plans and Provincial Guidelines. All other provisions received good or excellent ratings from less than 30% of respondents.

Figure 11 - Combined Highest Rated Tools

Tools that received the highest combined ratings – "Excellent + Good"		
Tool # 8	Registration of Covenant - Section 219 of Land Title Act	56%
Tool # 5	Construction Requirements in Flood Plain Areas – Section 910 of LGA	54%
Tool # 7	Approving Officer - Section 86 of Land Title Act	52%
Tool # 6	Geotechnical Report - Section 56 of Community Charter	44%
Tool # 3	Zoning Bylaw - Section 903 of LGA	42%
Tool # 4	Development Permit Areas - Section 919.1 + 920 of LGA	39%
Tool # 2	Official Community Plans - Section 877 of LGA	37%
Tool #11	Information Resources Provincial Guidelines - Flood Hazard Area Land Use Management Guidelines	35%

The management tools with the highest negative ratings (not acceptable plus needs improvement) were the use of Regional Growth Strategies plus various Ministry of Environment information resources as noted below.

Figure 12 - Combined Lowest Rated Tools

Tools that received the lowest combined ratings – "Needs Improvement + Not Acceptable"		
Tool # 13	Information Resources Water Stewardship Division of the Ministry of Environment - floodplain maps and associated design briefs.	31%
Tool # 1	Regional Growth Strategy - Section 849 of Local Government Act (LGA)	21%
Tool # 12	Information Resources Guidance for the selection of Qualified Professionals and preparation of flood hazard assessment reports prepared by the Water Stewardship Division of the Ministry of Environment.	19%
Tool # 15	Information Resources	18%

	BC Water Resources Atlas of the Ministry of Environment displays water resources information including dykes.	

A significant number of management tools were not considered applicable to respondents. This is likely a result of the types of respondents and their primary roles. The four management tools deemed not applicable by 40% or more of respondents were the following:

Figure 13 - Highest "Not Applicable" Ratings

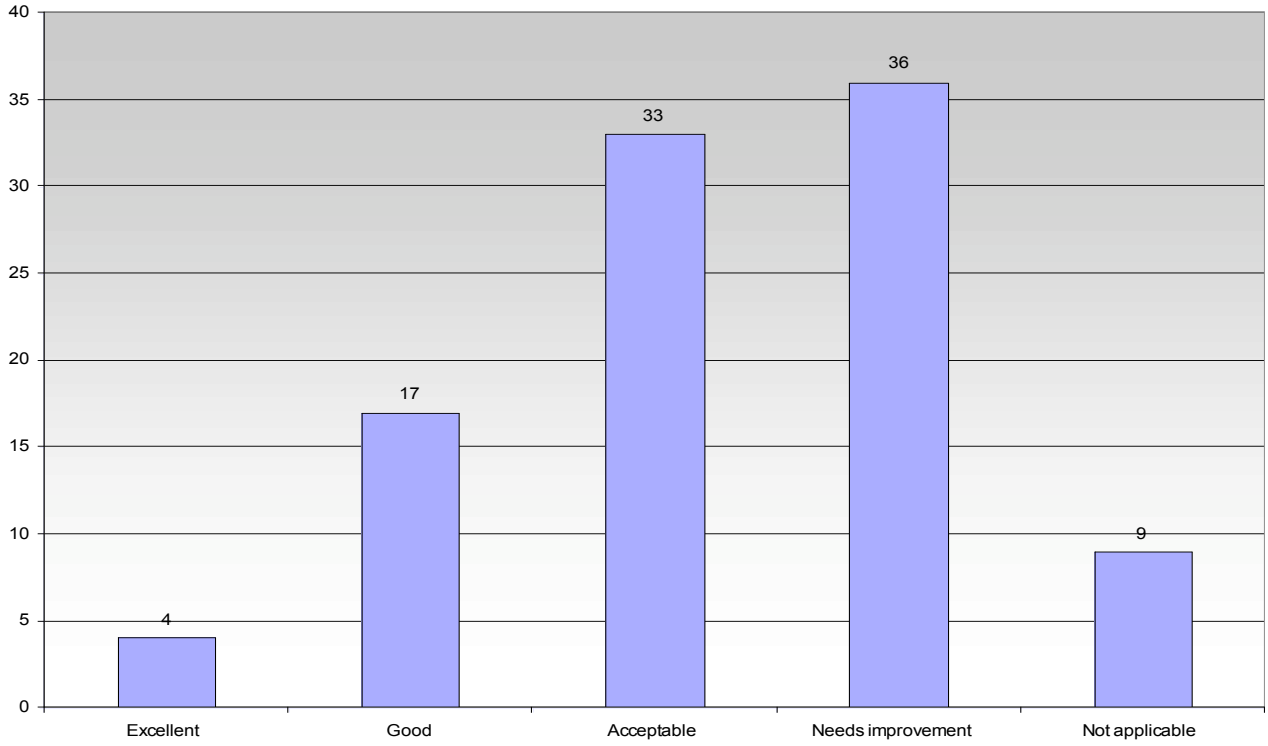
Highest "Not Applicable" Ratings		
Tool # 1	Regional Growth Strategy - Section 849 of Local Government Act (LGA)	58%
Tool # 10	Drainage, Ditch & Dyke Act – Sections 167, 170.1 + 172	52%
Tool # 9	Dyke Maintenance Act - Sections 1 to 6.2 + 8	49%
Tool # 14	http://www.env.gov.bc.ca/wsd/ public_safety/flood/structural.html . Water Stewardship Division of the Ministry of Environment documents all flood protection structures by Dyking Authority and Watercourse. This Website also contains related publications including dyke design and construction guide, a template for operations and maintenance (O&M) manuals, and inspection guide for flood protection works.	41%

There were 34 comments of which the following four are representative samples:

- *We would like more Provincial assistance with Dyking from Provincial especially for small municipalities with newer administrators. i.e., who is qualified to do what; i.e., a list of possible engineers to help! River forecast system excellent; PEP system excellent; Available info is on too many different websites and is confusing. Should have a one stop guide for everything.*
- *Floodplain Maps - MOE does not have a specific program to update/produce flood plan maps. MOE has provided some ad hoc funds to organizations to do maps, but it is very limited. The new BC Flood Protection Program (10yr - $100 million program) may be an avenue to obtain funds to undertake mapping, but the FPP doesn't have a strategic plan to evaluate 'needs' or do mapping in a coordinated or on a priority need basis.*
- *Growth Strategies Act - Liveable Region Plan has not been effective in controlling or limiting floodplain development (i.e. Richmond has rapid transit and is a de facto `growth concentration area).. Geotechnical Reports - `Safe for Use Intended` is open to interpretation by individual professionals. Covenants - don't prevent damage and in most cases will not reduce flood damage claims to senior government. Drainage Ditch and Dyke Act - obsolete - to be repealed in 2010. Floodplain Maps - badly out of date for most of province, or lacking altogether for parts of the Fraser Valley.*
- *Have been in a position where MoE has not provided information to clients. MoE stating \`the Regional District has the information\`. In majority of the cases, the RD does not have records of reports and mapping which were previously held by the Ministry. The information was not passed on. Additional training on the tools over and above the 2 day workshop would have been helpful.*

Question 19 (Figure 14) asked 'Overall, how would you rate the management of flood hazards through the use of available management tools since the 2003/04 legislative changes'? The flood hazard management tools that have been available since 2003/4 were rated as "needs improvement" by the largest number of respondents (36%), followed by "acceptable", which received 33%. If the "excellent", "good", and "acceptable" responses are taken together, the flood hazard management tools available under the new legislation received a positive rating from 54% of respondents.

Figure 14 - Management of Flood Hazards



The following are representative of the range of views expressed in the 35 comments to Question 19:

- *Local governments are on our own to improve our dykes. Funding levels have been insufficient. Liability is a big issue since we are self funded for liability for flooding below an elevation of 10m. MIA does not cover the City.*
- *In our area, we are getting by mainly because the rigour of our policies has discouraged a lot of new development in the flood plain area. On the other hand, it has also significantly depressed revitalization efforts in these areas.*
- *Give it back to MOE to set standards for every subdivision.*

Photo 5 - Fraser River flood, Mission, 1948

Question 20 asked whether the 2003/04 legislative changes have improved the effectiveness of flood hazard management. Only 15% answered yes, another 35% stated that the new legislation had not improved flood hazard management and 50% of respondents indicated they didn't know or were not sure.

The following are representative of the 32 comments related to question 20:

- *Local governments feel like they are `on their own` to keep up-to-date maps and regulations. Only when a state of local emergency is declared will the province provide support for a future risk reduction and options studies. Shouldn't this support be in place before an emergency?*
- *In my opinion the level of effectiveness of floodplain management has decreased during this period with greater reliance being placed on protective works rather than the more cost effective approach of ensuring new development is built with the appropriate setbacks and flood construction levels.*
- *Ministry of Transportation staff are not flood management experts, yet with the stroke of a pen, they were tasked with flood hazard management in the area of rural subdivisions. I do not believe that management can be more effective without proper training and mentoring.*

- *That remains to be seen. This will only be determined when we have a major event and we can see how the bylaws or lack thereof have established flood protection requirements that protect property owners. Another reason the legislative changes have not been more effective is that local governments were thrust into an area where they had no expertise or staff to handle this new responsibility.*

Question 21 asked whether the 2003/04 legislative changes made the regulatory environment for flood hazard management more efficient or timely, to which 16% responded "yes", 26% said "no", and 58% didn't know or were not sure.

The following typify the 24 comments that were received:

- *Possibly more efficient as you bypass another level of government but it does place a huge burden on a small municipality with limited staffing resources. It is much easier to wait for the province to review an engineer's report and issue their approval rather than an inexperienced local government staff.*
- *We do not need to wait for ministerial approval for bylaw approval. Which is a double edged sword as the province does not support municipalities with mapping updates and coordinated flood plain management.*
- *I avoided the referrals to the Ministry which were time consuming. Nonetheless, I prefer the involvement of the Ministry as a back-stop for less enlightened local governments.*
- *Maybe the timing is more efficient because applicants no longer have to wait for a response from an under-staffed provincial department, but it has added more work and risk for the municipalities*.

Question 22 asked whether respondents had additional comments on particular aspects of flood hazard management and related issues, and invited them to give a written comment. A total of 34 written comments were provided. As the table below illustrates, over half of those who responded to this question had concerns regarding liability issues.

Figure 15 - Concerns regarding Flood Hazard Management Legislation

Type of Concern	Response #	Response %
□ Liability issues	18	51%
□ Use of qualified professionals (engineer/ geoscientist) for site specific reports for development applications	16	46%
□ Regulating construction in flood hazard areas	13	37%
□ Variations/exemptions to Flood Hazard Area Land Use Management Guidelines	10	29%
□ Subdivision approval process	7	20%
□ Crown land disposition	2	6%
Total responses	35	100%
No response	71	
Total respondents	106	

The following illustrate the range of the 34 comments received:

- *Regulating construction in flood hazard areas is the most cost effective approach to flood hazard management if it is used correctly. The use of QPs can be useful provided that the quality of work submitted is of the appropriate standard, particularly where it is blindly accepting by the approving authority. There needs to be better quality assurance mechanisms in some jurisdictions.*
- *Concern with the Crown turning recreational lease property to fee simple without consideration of flooding, in particular the ability of the property to have adequate on-site septic and whether home construction is possible in the flood hazard. Local governments get saddled with enforcing.*
- *Need list of professionals who can help. Also more guidance as to what the engineers charge is fair or not. With high demand for services they tend to pick and choose who they want to work with and smaller municipalities are out in the cold.*
- *Does a restrictive covenant for reduced flood proofing really protect a local government? Has it been tested in court? A geotechnical engineer must certify that a building can be used safely. What does this mean? It can be damaged, but not cause injury? What about structural, electrical, mechanical engineer reports?*

The following additional comments raise important issues concerning the updating of mapping and implementation of floodplain bylaws:

- *Many areas require updating as the mapping has been around for in excess of 30 years and may require updating to confirm that it is current, especially with the pine beetle kill in the Interior of the province.*
- *It is important to have incentives/requirements for local government to implement subdivision and building controls. Other than some concerns over liability, there is very little incentive (and no mandatory requirements) for local governments to have floodplain bylaws. Section 910 of LGA only requires local government to consider the Provincial Guidelines, not implement them. The consequences of not implementing are undefined.*

Question 23 asked respondents to rate six identified areas in terms of the challenges they presented with respect to effective flood hazard management. The uncertainty of flood hazards was rated as the greatest challenge, while staffing issues were rated second-most challenging.

Figure 16 - Areas of Challenge

Challenges	Responses
Uncertainty of flood hazards	66%
Staffing issues	64%
New flood hazard information	60%
Changing flood construction levels	51%
Liability uncertainty	50%
Land use challenges	33%

There were 23 comments elaborating on these challenges, such as:

- *In the municipal environment, flood hazard reduction is implemented only in a very limited manner and most effective when an immediate hazard is present. I am concerned that climate change will result in extreme weather events resulting in debris flow within previously inactive drainages.*
- *In some areas, development in the floodplain has similarities to what is currently occurring in the subprime mortgage sector. Questionable developments are being allowed to be built and sold to unsuspecting purchasers who are then exposed to unrecognized flood risks, with governments and individuals left to deal with the aftermath when a flood occurs down the road.*
- *The province, in exchange for downloading these responsibilities, could fund a new flood-plain mapping program, to identify changes and perhaps predict trends resulting from climate change.*
- *I am an avid supporter of on-site retention/detention systems. When I see a forest fall to the plough and cultivation I often wonder who*

reviews the runoff co-efficient. Rooftops and driveways have a considerable effect upon flood control. I find that there needs to be more emphasis early on.

- *The new flood profile has created a major issue for lands formerly protected by dykes. The flood construction level had been relaxed by the MoE for these lands due to the existence of a dyke. With the new flood profile projected to overtop the dyke, the flood construction level will need to be raised by approx. 2.5m. This difference in flood construction levels between adjacent properties is costly, difficult to construct and aesthetically poor.*

Photo 6 - Pemberton flood, October 2003

Question 24 asked for suggestions for additional tools, support resources, or other improvements that would allow for better management of flood hazards. There were 39 responses including the following representative sample:

- *Provincial study, coordination and administration of flood systems that affect multiple jurisdictions such as river systems. Local governments lack resources (money, time and internal technical capacity) and jurisdiction to effectively assess the risks and develop options. Ultimately the province retains liability, but by downloading regulation of the flood plain simply expands the liability pie.*
- *More accountability for `QPs` who submit substandard reports and recommendations, and local authorities or approving officers who approve questionable developments.*
- *Density plays a critical role in the success of such programs. The point at which we identify increased overland flows is often too late.*

As a result flood hazard is increased from earlier estimates. I would suggest tying density to hydrology to hazard.

- *Need a lot more funding and staffing to adequately address management of flood hazards. Need more flood hazard studies, more funding for dyke construction, maintenance and management*
- *The province needs to takes on a role in regulation of development in flood plains.*
- *Need large regional planning re: flood hazards and risks (like the Lower Fraser study showed)… a hydrologic assessment of the Fraser Basin to determine what conditions could lead to a flood of record … centralized information source that all could use … province be available to help with multi-jurisdictional issues*
- *Financial assistance from the province to local government to improve and raise dykes, and add dykes where needed to maintain the existing landscape.*

Question 25 was the final question which asked if respondents had any other comments about flood hazard management. There were 27 responses including the following:

- *The B.C. system is outdated and ignores the trend towards integrated risk management. There should be one entity per river that manages the river and relates to all stakeholders.*
- *It seems that with climate change, and the heavy loss of tree cover from the Mountain Pine Beetle epidemic, our rivers and streams have taken on a new life. Areas which were pretty much out of danger in the past have now been inundated or threatened with flood waters. There is a feeling that a new era of flood management for the province is in the offing, and local government cannot do the management without the expert assistance from the Province. This expert assistance is not in the form of legislation to make it simpler or more complex for local government to do its own job. The expert assistance is in the form of government ministries and budgets set up to map and analyze the flood potentials of our province\'s water courses.*
- *To do the research on the flood hazards, write the bylaws takes an extreme amount of staff time and resources which municipalities don't have to spare.*
- *Flood hazard management is a challenging process as that which is being managed is not static. Since the change in legislation, the limited technical expertise is outdated and insufficient floodplain and hazard information puts strain on the staff and resources at the local government level.*

6. Conclusions, Discussion and Next Steps

Photo 7 - Dyke break at Hatzic, Fraser River flood, 1948

Overall, the high response rate coupled with the number of detailed responses to this questionnaire, indicate both strong interest and dedication to flood hazard management. The responses repeatedly indicate that those working in this specialized field are well aware of the importance of risk management and are very concerned that the public interest be protected.

Land use management in flood hazard areas includes a diversity of roles and responsibilities, as well as a complex array of issues, challenges and uncertainties. Each community and each flood hazard involves its own unique circumstances; however, some commonalities have emerged through this project. Some of the most common and significant findings of this project include the following:

- There is a very high degree of interest and dedication among the respondents of this survey to make good land use management decisions in the interest of protecting public safety and the broader public good
- This level of dedication is sometimes challenged by issues such as liability concerns, political and public support, competing objectives or regulations, and limited technical and information resources
- There remains some uncertainty about the specific roles, responsibilities and allocation of liability of different jurisdictions

- There is concern about the consistency of flood hazard management applications from one jurisdiction to another
- Local governments are concerned about a lack of financial resources available for dyke upgrading
- There is concern about external impacts on local jurisdictions, particularly the impact of climate change
- Conflicts or conflicting objectives sometimes arise between different jurisdictions having authority with respect to development with flood hazard areas (i.e. DFO, MoT, MoE and local governments)
- Local governments and other Approving Officers have a wide range of internal capacity, expertise and access to qualified professionals. Nonetheless, there is a need for enhanced technical support and improved information resources and related management tools to better enable local governments and other Approving Officers in fulfilling their flood hazard management roles and responsibilities
- There are particular resource limitations among small communities including available staff time and technical expertise
- The need for updated floodplain mapping and other technical flood hazard information is a recurring theme throughout the survey

The survey identified a total of 15 flood hazard management tools. Of this total, 10 were legislative provisions and five were information resources. These tools are well used by survey respondents. The following five tools were used by a majority of respondents, with floodplain mapping cited most frequently:

- Floodplain mapping
- Official Community Plan Goals, Policies and Objectives
- Zoning
- Registration of Covenant
- Engineer's or Geoscientist's Report

While there are considerable differences between the types/roles of respondents as to the level of support for different management tools, most of the legislative tools were rated more positively than otherwise. Ministry of Environment information resources were not as highly rated by respondents. This may be due to a variety of factors including their more specialized nature, less frequent usage, and a general lack of awareness of this resource. Local governments did not comment on Flood Hazard Maps and may not be aware of this information source.

A majority of respondents gave a positive rating to nine of the management tools cited in the survey, (i.e., acceptable, good or excellent). Six of the management tools received a positive rating by two thirds or more of all respondents. The following Figure 17 documents the positive ratings of these management tools.

Figure 17 - Positive Rating of Management Tools (Excellent, Good, Acceptable)

Tool	Tool#	All Respondents	Approving Officers	Regional District Respondents
219 Covenant	#8	78 %	82 %	70 %
Approving Officer	#7	73 %	84 %	50 %
Geotechnical Report	#6	67 %	62 %	70 %
OCP	#2	66 %	64 %	60 %
Provincial Guidelines	#11	66 %	60 %	60 %
Construction Requirements	#5	65 %	54 %	60 %
Zoning Bylaw	#3	58 %	60 %	90 %
Development Permit Areas	#4	57 %	58 %	50 %
Guidance for the Selection of a Qualified Professional	#12	51 %	46 %	70 %
Water Resources Atlas	#15	46 %	40 %	20 %
Floodplain Maps	#13	44 %	38 %	50 %

Overall, it is not clear whether the legislative changes have resulted in a more efficient and effective approach to land use management in flood hazard areas in BC.

Generally, since the 2003 and 2004 legislative changes, local governments have not undertaken (on their own) any updates to flood construction levels or flood hazard mapping. This is likely due to a variety of factors including cost and risk considerations, political and methodological challenges. A strong case for a renewed provincial role can be made in this area, even if that role would primarily be to update technical studies, mapping and risk assessments of flood hazards and would not include new regulations.

This study has collated the opinions of a comprehensive cross-section of flood hazard management practitioners in the province and should be used for future flood hazard management program planning. However, there are significant limitations to the survey approach, and this survey should not be taken as a measure of the actual effectiveness of the current flood hazard management model in reducing flood risks.

For example, while 80% of local government respondents indicated they have some form of floodplain bylaw, the effectiveness of those specific bylaws in reducing flood damage is unknown (and some of those bylaws may not comply with the provincial guidelines; this survey did not document compliance with provincial guidelines). Also, there are several jurisdictions where a local government has chosen not to assume functions of building inspection or zoning. In these instances, there is no mechanism to determine if a new building is complying with flood construction levels or setbacks from water bodies under provincial guidelines.

Further, detailed evaluations of the effectiveness of specific local government bylaws would be required to assess the degree of increase or decrease in flood risk associated with ongoing land development and building construction.

Questions 20 and 21 allowed flood hazard management practitioners to subjectively and broadly address the central objectives of this review (Q20 “Have the 2003/04 legislative

changes improved the effectiveness of flood hazard management?" and Q21 "Have the 2003/04 legislative changes made the regulatory environment for flood hazard management more efficient or timely?") The responses to these two questions were similar: only about 15% answered yes, about 30% stated that the new legislation had not improved flood hazard management, and the balance – over 50% of respondents – indicated they "didn't know" or were "not sure".

The responses to questions 20 and 21, including detailed comments, strongly indicate significant gaps exist and legislative changes have not necessarily resulted in a more efficient and effective approach to land use management in flood hazard areas of BC.

Many of the respondents indicated that the provincial government had given great responsibility to local governments to manage flood hazards but inadequate resources to manage effectively. This resulted in areas of concern which cannot be fully addressed by local governments acting individually.

The following are possible next steps to address the issues and concerns raised in this survey responses:

- The province should provide coordination and technical support such as improved information resources and related management tools to better enable local governments and other Approving Officers in fulfilling their flood hazard management roles and responsibilities. Some examples include:
    - More frequent development, maintenance and updating of flood hazard mapping
    - Periodic hydrological studies with entire watersheds as the focus in order to address the potential downstream flood impacts of upstream activities, such as logging and impacts of the mountain pine beetle epidemic
    - One comprehensive website that is more user-friendly with up-to-date information resources
- The province should conduct detailed evaluations to determine the effectiveness of local governments' use of existing legislation and provincial guidelines in limiting increases to flood risks associated with new development and, if necessary, consider new guidelines and regulations to ensure consistency and compliance with provincial standards.
- The province should develop provincial guidelines and/or provide a coordination role to address flood hazard issues and management decisions that cross local government jurisdictional boundaries. A provincial government role would be particularly beneficial where there is potential for local flood mitigation policies or practices that would result in transferring flood risk from one property or jurisdiction to another.
- The principles of dialogue and collaboration should be applied to continue to share the wealth of knowledge and experience among flood hazard management practitioners and to continue to identify opportunities to improve flood hazard management policies and practices across the province of British Columbia.

Appendix A- Summary of Legislative Changes

Key Legislative Changes are found in:

- Flood Hazard Statutes Amendment Act, 2003 (Bill 56). In force January 1, 2004
- Miscellaneous Statutes Amendment Act (No.2), 2004 (Bill 54). In force May 20, 2004

These acts brought about changes in several statutes concerning flood hazard management as follows:

Changes to the ***Land Title Act*** (Bill 56):

- Remove Ministry of Water, Lands and Air Protection (MMLAP)[3] subdivision approval requirement (repeals Sec. 82)
- Enable Approving Officers to require engineering report and covenants on land subject to flooding and erosion, and landslip and avalanche (amends Sec. 86(1))
- Enable Approving Officers to modify existing floodplain covenants (additions to Sec. 219 (9.1) and (9.2)

Changes to the ***Local Government Act***, Section 910 (Bills 56 and 54):

- Remove the MWLAP floodplain bylaw approval requirement.
- Enable local government bylaws in flood-prone areas (local governments must consider Provincial Guidelines, plans and objectives).
- Enable local government exemptions that are:
  - ✓ Consistent with the Provincial Guidelines, or
  - ✓ Certified by a professional engineer/geoscientist, and
  - ✓ Subject to local government terms and conditions

Changes to the ***Dyke Maintenance Act*** (Bill 56):

- Continue functions of the Inspector of Dykes
- Enable specific powers for the Inspector of Dykes to require reports, inspect records and audit dyking authorities
- Enable the Inspector of Dykes to make regulations and prescribe trusts

Changes to the ***Drainage, Ditch & Dyke Act*** (Bill 56):

- Enable the transfer of a commission's powers to a local government

Changes to the ***Ombudsman Act*** (Bill 56):

- Consequential amendments subsequent to the *Drainage, Ditch & Dyke Act*

These legislative changes also brought about Changes in Roles and Responsibilities

a) For Ministry of Transportation Approving Officers

[3] Now Ministry of Environment

(under the *Land Title Act)*:

- Former: considered landslip, avalanche, and drainage
- Now: adds flooding and erosion

b) For Crown Land Managers:

- Former: referred Crown land disposition to MWLAP for advice
- Now: make decisions based on information including the Provincial Guidelines and flood hazard maps

c) For Local Governments:

Former:

- Subdivision required MWLAP approval
- Bylaw required MWLAP approval

Now:

- Subdivision decisions by Approving Officers
- Bylaw decisions by local government — must consider Provincial Guidelines, exemptions consistent with Provincial Guidelines or certification

Continuing:

- Local operation of dykes where dyking authority
- Local flood response with Local Flood Plan

d) For MWLAP (now Ministry of Environment):

- Former: approved subdivisions/covenants, some floodplain bylaws and appeals
- Now: provides guidelines, guidance and technical information
- Continuing: regulates dykes; provincial flood response — BC Flood Plan

Photo 8 - Flood Emergency Services

Appendix B - Survey Responses

Flood Hazard Management Survey Responses

1. Please check the Ministry of Environment region(s) in which you work:		
	Responses	**% of Total**
Lower Mainland	35	25%
Thompson	15	11%
Kootenay	20	14%
Skeena	16	12%
Vancouver Island	16	12%
Okanagan	15	11%
Omineca	11	8%
Peace	6	4%
Cariboo	5	4%
Total Responses - persons working in more than one region	139	100%
No response	1	
Total Respondents	106	

2. Approximate population of your flood hazard management jurisdiction: (e.g. municipality, regional district, primary consulting area)		
	Responses	**% of Total**
Population < 5,000	25	24%
Population 5,000 – 20,000	24	23%
Population 20,000 – 100,000	27	26%
Population > 100,000	27	26%
Total Responses	103	100%
No response	3	
Total Respondents	106	

3. What is your current position? (check all that apply)		
	Responses	**% of Total**
Municipal Approving Officer	44	32%
Planner	32	23%
Engineer	20	14%
Municipal or Regional District Building Inspector	9	6%
Ministry of Transportation Approving Officer	6	4%
Qualified Professional - Engineer or Geoscientist	6	4%
Lawyer	0	0%
Lands Officer	1	1%
Other (see below)	21	15%
Total Responses - persons in more than one professional role	139	100%
No response	0	
Total Respondents	106	
Other:		
a. Director of Public Works		
b. Provincial Ministry Official		
c. Manager of development approval including approving officers, building inspectors, planners, and engineers		
d. Provincial Ministry Official		
e. Director of Community Development; Director of EOC		
f. Provincial Ministry Official		
g. Chief Building Official		
h. Emergency Program Manager		
i. CAO		
j. Water Resource Manager		
k. Flood Hazard Technician		
l. Provincial Ministry Official		
m. Chief Administrative Officer		
n. Director of Planning & Information Services		
o. Administrator		
p. Dyking Authority		
q. Provincial Ministry Official		
r. Engineering Manager		
s. Provincial Ministry Official		
t. General Manager Planning and Development		
u. R.P. Bio.		

v. Drainage & Environment Manager - Engineering

4. In which type of organization do you work?		
	Responses	**% of Total**
Municipality	75	71%
Ministry of Environment	8	8%
Ministry of Transportation	6	6%
Consulting Firm (Engineer, Geoscientist, Planner or Lawyer)	6	6%
Regional District	11	10%
Ministry of Agriculture and Lands	0	0%
Other	0	0%
Total Responses	106	100%
No response	0	
Total Respondents	106	

5. Which of these flood hazard management tools have you used since the legislative changes became effective in 2004?		
	Responses	**% of Total**
Floodplain mapping	71	70%
Official Community Plan Goals, Policies and Objectives	64	63%
Registration of Covenant	54	53%
Zoning	55	54%
Subdivision	48	48%
Engineer's or Geoscientist's Report	52	51%
Flood Hazard Area Land Use Management Guidelines	40	40%
Development Permit Areas	44	44%
Floodplain bylaw	44	44%
Regional Growth Strategy	8	8%
Crown land disposition	5	5%
Total Responses	101	100%
No response	5	
Total Respondents	106	
Other:		
a. I have counseled local governments on Floodplain bylaws		
b. Did not check off Zoning or Subdivision as our bylaws do not contain flood plain regulations; however, these applications do trigger floodplain management restraints.		
c. Flood hazard maps		
d. Dyking improvements		
e. RAR, EDP and RDP requirements		
f. We are in the process of developing a more comprehensive Flood Plain Management Plan as part of our larger Storm water management plan		
g. Beach Avenue Neighbourhood Plan		
h. Building Permits		
i. Field inspections		
j. PEP and Ministry Guidelines for Dyking Authorities		
k. Dyke construction standards		

6. Is flood hazard management an issue in your area?		
	Responses	**% of Total**
Yes	94	90%
No	11	10%
Total Responses	105	100%
No response	1	
Total Respondents	106	

7. If yes, how long has flood hazard management been an issue in your area?		
	Responses	**% of Total**
Recently i.e. < 5 years	6	7%
Long Term i.e. > 5 years	85	93%
Total Responses	91	100%
No response	15	
Total Respondents	106	

8. How long have you been working with flood hazard management issues?		
	Responses	**% of Total**
< 1 year	5	5%
1-2 years	14	15%
3-5 years	11	11%
5-10 years	12	13%
> 10 years	54	56%
Total Responses	96	100%
No response	10	
Total Respondents	106	

9. How long have you worked with flood hazard management issues in your current position?		
	Responses	**% of Total**
< 1 year	11	11%
1-2 years	23	23%
3-5 years	13	13%
5-10 years	17	17%
> 10 years	34	35%
Total Responses	98	100%
No response	8	
Total Respondents	106	

10. Are the current legislative requirements, including roles and responsibilities clearly defined?		
	Responses	**% of Total**
Yes	50	48%
No	26	25%
Don't know	28	27%
Total Responses	104	100%
No response	2	
Total Respondents	106	

Comments
If no, please elaborate, identifying areas where further clarification is needed.
a. Although I think the legislation is clear there seems to be a fair degree of uncertainty and confusion around which agency or level of government is responsible for what. This seems to be a bigger issue for the smaller local authorities who deal with flood hazard management issues infrequently as well as having limited internal capacity or access to consultants.
b. The legislative references to Provincial Regulations" under sec. 138(3)(e) of the Environmental Management Act leads one to believe the Provincial Government will take an active role in establishing "flood plains" in the Province.
c. I believe they are clearly defined but I do not know if I have seen all current legislative requirements" documentation."
d. Roles and responsibilities are clearly defined (but not well known) at the local and provincial government level but local and provincial governments have shifted the hazard assessment role to qualified professionals without providing adequate guidance on what is 'safe for its intended use'.
e. MOE needs to take the responsibility back. Some Regional Districts and Municipalities are not part of the covenants being placed on titles for subdivisions. Its totally left to MOT to define flooding by way of engineers which is placing more costs on projects
f. There needs to be more clarity with regard to jurisdiction, who makes discretionary decisions, compatibility (overlap etc) with RAR guidelines, role and control of consulting professionals, etc. There is also a problem with defining the existing state (i.e. is this a oxbow lake with 7.5m setback or is this part of the high water system with a 30m setback)
g. Even if a local government has not yet amended its flood plain elevations for full floodproofing (as recommended by the FBC), is the Approving Officer still required to consider the higher elevations. Every local government seems to be doing something different with the new hydraulic modelling.
h. The downloading of RAR unto local governments has been an issue as MoE and DFO are reluctant to allow existing properties within minimal buildable areas to re-develop and they are also reluctant to support development on lands in accordance with existing OCP and zoning designations.
i. Still not clear if municipality has more liability for flood damage with new approval powers.
j. Based on the questions I have received as a MOE employee, many local governments seem to be uncertain whether or not the Flood Hazard Area Land Use Guidelines have to be followed. They are also uncertain whether or not adopting a floodplain bylaw is a good idea for their community.
k. General policy for building permits and subdivisions. Council Policy or Bylaw preferred.
l. I may need to do some reading. The tools and information may be there and I am just not aware.
m. 2008 work program item to identify municipal role and requirements.
n. Responsibility of such matters requires considerable expertise and historical experience with geographic areas so that one can really have a good pulse on effecting conditions necessary to mitigate all future flood scenarios. This in my view can only be gained when one has a body of flood experts in place to adjudicate on such matters.
o. Quite confusing for consultants to know which rules apply where; regional districts vs. municipalities etc.
p. Apparently floodplain legislation has been downloaded onto local government. What is the purpose of this questionnaire?
q. So many overlapping jurisdictions - dykes, flood compensation, mapping makes it difficult to navigate
r. There have been many changes in the legislation, of which the municipality may not be aware of all the implications.
s. When the Province off-loaded" responsibility for flood plain management to the municipalities
t. Dykes that are privately held and previously monitored by the Ministry of Environment -

Where are they?
u. They should be more clearly aligned with riparian area regulations.
v. Yes but very cumbersome!!
w. Although the roles appear quite clear, local government/dyking authorities often do not have internal resources or expertise. As a consultant, we provide these services. However, the province often becomes involved in floodplain management decisions. This often appears to be outside of their mandate.
x. Some clients are unclear on their responsibilities and authority, and/or are unwilling to take action from concern over exceeding authority or assuming liability as a result of acting.
y. Simply not clear enough
z. The requirements are clearly defined but there is a lot of complexity depending on the issue.
aa. Still some confusion with regards to works to be reviewed approved by inspector of dykes staff, also confusion on the switchover of the dyking districts – no consultation on this yet
bb. Local government may grant exemptions to guidelines, but only if such exemptions are in agreement with guidelines….?
cc. They are clearly defined but that does not mean they are easy to implement or use or read.
dd. I would suggest that there is a fair amount of leeway for local government in defining their own parameters when dealing with flood management. The provincial staff is spread too thin, particularly in the north, to provide the expertise needed to assist local government, and apart from general guidelines that come out of Victoria, there are no hard fast rules.
ee. The implementation of the legislative requirements for Regional Districts has been difficult as we do not have an approving officer function, and rely on other agencies such as MoT to capture things like covenants.

11. Are the legislation and related management tools sufficient to adequately manage flood hazards?

	Responses	% of Total
Yes	32	32%
No	35	35%
Don't know	32	32%
Total Responses	99	100%
No response	7	
Total Respondents	106	

Comments - If no, please elaborate.
a. Lack of a local bylaw is a problem
b. The concern is that the minimum requirements for development are applied inconsistently across different jurisdictions resulting in different levels of risk to development in different communities. Also, depending on the community there can be significantly different levels of understanding of the risks which they are exposing their communities to.
c. We have yet to deal with a substantial development proposal within a flood plain area so have not had the opportunity to fully explore the issues and legislation.
d. Flood hazards in many jurisdictions are partially controlled by `managed` river systems. Upstream control of water levels is not within the jurisdiction of local governments so how can we accurately plan for the potential flood hazards that result?
e. The Provincial Guidelines for selecting a Qualified Professional consistently refer to a Geotechnical Engineer, where they should use the terms 'Geotechnical or Hydrotechnical Engineer' and 'Geoscientist'.
f. The floodplain mapping of the Fraser River in the Hope Area is in desperate need of updating especially with the deposition of gravel on the river bed. We also lack floodplain information on tributaries upstream of our municipal boundaries.
g. Allows a Council to make decisions in an area that they have no knowledge
h. The decision on what land is safe to develop is left to a consultant working for the land developer whose level of risk tolerance may be quite a bit lower that what general society's risk

tolerance may be. The quality of reports varies and many local governments do not have qualified professionals to review reports. So when a proponent and his consultant make an application to reduce say the river setback distance (to maintain a flood way for the river and to prevent future damages due to erosion) even if the local government believes the setback should not be reduced, they have no argument. Some local governments are now requiring peer review on high hazard areas which is good. Prior to legislative change, MOE had a policy of discouraging use of high hazard lands (alluvial and debris flow fans especially). Using this policy, many development proposals on very high hazard areas were outright refused. Now the response received by developers from approval authorities in these same areas and other high hazard areas is to go hire a qualified professional to provide guidance on how to develop. This is/will continue to increase exposure to residents in these high hazard areas which should be used for other less vulnerable uses such as farm land, parks, etc.
i. Local governments lack the professional expertise to effectively administer some aspects
j. When in 2002 MOE got out of the business and downloaded to MOT there was nor input from say on how it was to be handled nor how to deal with modifications of old MOE covenants
k. Downloading of the responsibility for flood plain management from the province to the local governments has placed greater pressure on local governments to deal with applicants, without additional resources. Local governments now have to be the `bad guy` to say no, and are under pressure to be innovative in finding ways to approve. We continue to be uncertain about our exposure to liability for such decisions.
l. Downloading of aspects of flood management from Province to Municipalities has created some uncertainties.
m. The challenge that we have is with the changes to the Fraser River flood profile.
n. They do not deal adequately with reconstruction/repair of flood damage. The building is fixed up and then subject to the same damage by a subsequent flood.
o. Very difficult to establish appropriate Flood Control Elevations, beyond simply adopting the old Provincial numbers. E.g. should these elevations change in consideration of climate change impacts?
p. Insufficient floodplain mapping available.
q. But only if the provincial standards are followed.
r. Only guidelines -- should be regulations, however, don't know how consistent decisions are across the different jurisdictions. As far as management tools many of the flood maps are out of date and flood map mapping should be extended to the Lower Fraser River Valley.
s. Legislation is so loosely written that agencies now only have to CONSIDER the floodplain guidelines in their decision making.
t. City Council has different level of concern regarding development in floodplain area.
u. The legislative tools are probably ok, but it depends whether (and how) they are being used. Floodplain mapping is generally out of date. Engineer's and Geoscientist's reports are of variable value as individual professionals can have differing interpretations of what may be `safe for the use intended`.
v. Concern flood management needs to have strong Provincial role and regional approach based on watersheds.
w. Consultants can do their best at making such recommendations however in my view their is really no substitute for having a body of flood experts in place that have the expertise, experience and wisdom required to make such determinations.
x. Despite requesting pertinent information from Water Management/Inspector of Dykes, rationale they used in allowing development at reduced elevations has not been provided. Further, there is a defined area in our industrial area where the Ministry will not tell us whether the basis they used in establishing the old flood construction levels is still valid and can be considered in allowing future development to those elevations.
y. With global warming, 200 yr. floods appear to be on the rise (i.e. more frequent).
z. Not familiar with provincial management tools
aa. Local government has no resources ($), expertise or knowledge/training to enforce provincial legislation

bb. We will see after we have a significant flood event here.
cc. My biggest concern is that the flood elevation information provided is based on a calculated volume of water laid over top of topographic information. Most guidelines for development, however, call for elevated fill around new developments to bring the floor level above the calculated flood elevation. Increased development of this nature, however, will actually reduce the water storage area and further increase the calculated flood elevation over time if and when new mapping is provided.
dd. They should be more clearly aligned with riparian area regulations
ee. Yes but so much info. Where to start if new to this is difficult. Need one guide with ALL in it. Not all over the internet here and there.
ff. No, local government needs support floodplain management. Provincial funding for dyke upgrades, although welcomed, is inadequate.
gg. Local government does not have the expertise to adequately address floodplain development issues.
hh. The legislation is of limited assistance in dealing with the management of the flood hazard. For example it does not set out particular levels of protection (1:200 or 1:500 year return periods) or setbacks. This can be decided by municipalities, therefore a variety of standards exist across BC.
ii. Redevelopment of small lots on soft soils in the floodplain is still an issue when house is 2-4 m below FCL. Multijurisdictional dyking systems i.e. Fraser Port/CN/Highways/City and others are a challenge – City does not necessarily have the teeth to have other levels work together when old dyke ROWs not complete or infrastructure not complete.
jj. Local Governments do not have the expertise that the Province had. The flood hazard management tools are too general to apply to specific creeks.
kk. Insufficient information relating to the assessment and classification of flood hazards provided to local government at time of transition. Limited technical resources available - no further updating of data - data provided by Province was a snapshot in time.
ll. Need floodplain mapping for all areas and updated mapping where it exists. Regional districts do not have the financial capacity
mm. It comes down to what is considered \`adequate\`, and that seems to have been left to local government to determine. There is little guidance on developing a \`level of acceptable risk\`
nn. We need to update our Floodplain Management Bylaw to reflect current trends and better information.
oo. Found it difficult to manage as the tools for management were not well presented to us. Lack of specialty in the field of flood management also was a problem when trying to use the tools provided due to lack of understanding.
pp. Local governments, particularly small local governments do not have the level of geotechnical and hydrological expertise that was once available in the MoE to review applications and engineers/geoscientists reports. Local governments, particularly small local governments, do not have the financial resources to take on new dyking responsibilities.

12. Does your local government have a bylaw that regulates construction in flood hazard areas?

	Responses	% of Total
Yes	81	80%
No	11	11%
Don’t know	1	1%
Not applicable to my work	8	8%
No response	5	
Total Responses	101	

If yes: (a bylaw is in place that regulates construction in flood hazard areas)		
	Responses	**% of Total**
Section 903 of the *Local Government Act* (Zoning)	35	49%
Section 910 of the *Local Government Act* (Construction requirements in flood plain areas)	36	51%
No response	35	
Total Responses	71	
Total Respondents	106	

Comments
12 a) What factors contributed to the need to have/not have a bylaw to manage construction in flood hazard areas?
a. Due to the extent of existing development in the flood hazard area, local government decided a number of years ago that a flood management bylaw would be inappropriate. Due to workload constraints, the issue has not been recently considered.
b. Water levels of the Skeena River rise above ground over the lower portion of the City. In addition a couple of creeks impact local areas.
c. Dense residential development in known floodplain
d. While development of the bylaws occurred prior to my employment I expect that simply the presence of the flood plain areas was the key factor.
e. I would first like to note that I could not choose both sec 903 and sec 910 in the question above this one. We use both because section 910 (4)(b) of the LGA is limited to setbacks for `landfill required to support a floor system or pad`. We feel it was prudent to also regulate building siting in a flood plain using 903 (1)(c)(iii) of the LGA. In answer to a)...Factors in support of regulation: 1) real risk to life and limb, emotional health, property, and economic sustainability, 2) Liability to the local jurisdiction and province.
f. Potential Fraser River and coastal flooding
g. Not aware of the historical specifics requiring the section in our zoning bylaw, however we do have several areas that are/could be exposed in a flood event.
h. Awareness of flood hazard awareness of flood hazard tools (bylaws) willingness to address flood hazards in development trained staff to design, implement and manage flood hazard bylaws
i. We have significant areas of residential subdivision in mapped flood plain or at the periphery of flood areas with concerns for high water table problems.
j. Liability issues
k. We control it under Section 919.1(1)(b) of the Local Government Act as a Development Permit Area in our Official Community Plan Bylaw. With so much development happening within our community and so little land that is free from floodplain or geotechnical hazards, it appears that the majority of our development and building permit applications are affected by a development permit for hazardous conditions.
l. Development on a flood plane and alluvial fan areas initiated by MoE prior to the legislative changes
m. Proposed developments in the floodplain.
n. Public interest to ensure safety and no liability to government
o. City water source is aquifer under the City. Water table rises significantly in springtime. Development pressures are continually being placed on streamside.
p. A large percentage of the City of Abbotsford lies within the Matsqui and Sumas flood plains.
q. Significant development occurring within the floodplain.
r. A large portion of the land along the Skeena River is subject to the water rising onto the land.
s. Clear definition of lands affected by the by-law, and enforceable regulations (primarily erosion

protection, setbacks and flood construction levels). Also, risk management by ensuring that flood management decisions are made by elected officials.
t. Localized flooding potential from Fraser River and tributary creeks
u. Have areas in District limits, which lie within the floodplain.
v. We do not have a flood hazard area
w. RAR, OCP policies and good planning principles
x. Okanagan Lake, water levels, lake action
y. High ground water table and periodic surface flooding. Have had a bylaw in place for many years.
z. Fraser River Coquitlam River Coquitlam Dam
aa. I deal with eleven regional districts to one extent or another regarding subdivision referrals for my area of jurisdiction. They vary considerably in their approach to land use matters and go from one end of the spectrum to the other. Need I say more!
bb. From our perspective what was valid prior to 2004 was valid after 2004 under the bylaw that had been validated by the Ministry. The Jan 27, 2007 edict makes it necessary to reevaluate the bylaw provisions but we are having difficulty obtaining certain information about how the old provisions were established and why certain relaxations were granted.
cc. Liability issues
dd. Liability issues, setting min. construction elevations, enforcement
ee. Lack of expertise
ff. Flood mapping indicated flood construction level was too low so revised but exempted commercial properties due to political initiative.
gg. Historical flooding issues and damage in our municipality Mitigate the risk to private property and public safety
hh. If we did not establish new policies and guidelines, we would have been more liable for not administering the information previously prepared for the area by joint federal/provincial mapping agreement. On the other hand, however, we now simply pass that responsibility to the property owner and registered professionals should they desire to subdivide or build in the identified area.
ii. We have one area of concern only for the entire municipality - it affects 12 single family residential lots.
jj. My understanding is that the bylaw was implemented in the early 1990's at the direction of the Ministry of Environment
kk. Creeks running through residential neighbourhoods
ll. Our bylaw has been in place since the early 1980's. There is industrial development and rural residential lands within the floodplain (protected by dyke) -- this created the need for flood construction levels in a bylaw.
mm. Village on the Skeena River and susceptible to flooding
nn. A large portion of the municipality is a flood plain
oo. Property loss and damage.
pp. As a consultant, we provide advice on the needs and contents of floodplain bylaws. New developments interspersed with historic development often creates conflicts. Geotechnical issues, visual impacts, servicing challenges are a few of the concerns.
qq. Richmond is entirely in a flood plain, at an elevation below the 1:200 year sea level (2.9 m Geodetic)
rr. Down loading from the Province
ss. City's Zoning Bylaw is out of date in this regard.
tt. Delta is low lying and susceptible to flooding. Bylaw is not a specific flood plain bylaw dealing only with flooding, but deals with all construction issues.
uu. Bylaw regulations from 1975; zoning bylaw carried forward to current zoning bylaw
vv. Type of development plays a huge role – Agricultural lands and industrial easier to manage – residential lands even if houses are floodproofed – loss of services and access have huge impacts to residents. Also whether it's an old redeveloping area as opposed to "greenfields" development – With greenfields can get better design or clustering etc – old development has

more constraints.
ww. Possibility of flooding in floodplain areas
xx. flooding wet crawl spaces
yy. flooding & erosion
zz. We front onto the Fraser River. There is a need for a floodplain bylaw because it is important that not only municipal staff but also property owners are aware of what the FCL requirements are to protect buildings from damage and what setbacks are required. The established floodplain bylaw will ensure that there is consistency and rational in applying floodplain regulations throughout the municipality.
aaa. The factors were the long history of flooding in the areas covered by the zoning bylaws. The current bylaws for the most part were created in the early to mid 1970\'s after the creation of the Regional District in the late 1960\'s. Flooding was recognized as an issue in some of these areas and zoning bylaw makes reference to building to flood level determined through Provincial floodplain mapping. Most of the subdivision lots in the high flood hazard areas were created by the crown prior to the existence of the regional district and without much consideration of flood hazard.
bbb. Provincial downloading of responsibility
ccc. RD has had a policy on flood hazard requirements since 1972. Policy remains in place for unzoned areas. RD has 6 floodplain management bylaws of varying ages. A number of high flood risk areas are contained within the RD that necessitated the implementation of the floodplain regulations.
ddd. In this District, we have many rivers, streams, and lakes, along with a variety of mountain related hazards which have impacted residents. There is a definite need for construction management in hazard areas. There is also a definite need for the province to reinstate the provincial flood plain mapping program to provide information on which local governments can base their requirements.
eee. Much of the area is subject to flooding and high freshets in addition to steep topography resulting in alluvial fan hazards
fff. Not sure. We have a policy for unzoned areas dating to 1978. Before my time, however, we have major waterways which flood in our area.
ggg. The need to protect people and property from the effects of flooding and erosion.

12 b) From your perspective, what are the most important considerations in developing and implementing a bylaw to manage flood hazards? (Rank the top three in order of priority with 1 being most important.)

Cumulative total of respondents' top three priorities.

	Responses	% of Total
Liability concerns	68	76%
Political support	56	62%
Human resources	56	62%
Public support	52	58%
Financial resources	37	41%
Total Responses	90	100%
No Response	16	
Total Respondents	106	

b-1: The following list represents respondents' number one consideration:	**No.**
□ Liability concerns	43
□ Political support	18
□ Public support	16
□ Human resources (including technical capacity)	11
□ Financial resources	3

b-2: The following list represents respondents' number two consideration:	No.
□ Political support	27
□ Human resources (including technical capacity)	22
□ Public support	14
□ Liability concerns	12
□ Financial resources	16
b-3: The following list represents respondents' number three consideration:	**No.**
□ Public support	22
□ Human resources (including technical capacity)	23
□ Financial resources	18
□ Liability concerns	13
□ Political support	11

Comments:

a. It is difficult to balance the economic development need to expand and our responsibility to protect the people of our community. When development applications are placed into the DP process the questions revolve around the `red tape` and hurdles to allow growth but when a major flood event occurs, the first question is why we allowed the development to occur.

b. Public safety is the overriding concern.

c. Designate the area for public information of the liability

d. One could argue that all of the above are important!

e. 1. Valid technical information. 2. Rationale previously made by the ministry in reducing flood construction levels indicated in our bylaw.

f. Communities that do not have registered professionals resident and working in their areas have added costs to bring professionals in to over see developments in affected areas. All policies and bylaws are drafted first, in an effort to minimize liabilities, which is in turn used to obtain political support. These areas still need qualified professionals to administer the requirements, however.

g. This is difficult to answer as they are all important. All of the above issues have to be considered / addressed in order to manage flood hazards.

h. City staff do not have the expertise of education of the Min of Environment staff who previously managed floodplains

i. Lack of any other process to assist the public in seeking floodproofing relief where appropriate.

j. Access to professional engineers willing and able to do the work required by bylaw. There are not enough in the north. The public must go to great expense to get reports.

k. Even when people know they are prone to flooding – they expect government to assist during the emergency and to fix the problem so it doesn't happen again – having all levels understand what the hazards are and what it looks like and the impacts on the community is huge. Have examples in Cloverdale where buildings high enough but garages etc flooded and loss of sewer & water services when it floods – people are isolated even though they are "flood proofed". More factors than just building height to consider in floodplain areas.

13. Does your organization engage or require consultants to address flood hazard management issues?

	Responses	% of Total
Yes	81	75%
No	15	16%
Not sure	5	5%
Not applicable	3	3%
Total Responses	104	100%
No response	2	
Total respondents	106	

If yes: (consultants are engaged/required)	**Responses**	**% of Total**
□ Engineer or Geoscientist Report concerning subdivision application	57	55%
□ Engineer or Geoscientist Report concerning Building Permit application	53	51%
□ Consulting Study	34	33%
□ Draft Regulatory bylaw (e.g. Development Permit Area, flood plain construction requirements)	16	15%
□ Crown land disposition	3	3%
□ Total responses	104	
Comments:		
a. Engineers required occasionally for variances to setbacks		
b. We have covenants placed on properties in floodplain areas. Currently we have a moratorium on new development in the Serpentine, Nicomekl and Campbell River floodplain areas (i.e. Greenfield development). Currently developing floodplain policies based on incidents that have occurred in recent past and to protect for future changes i.e. climate change and possible FCL increases. RE: next question: Can't quantify as work at planning level and also all around flood complaint management not development related – have over 20 flood complaints/year throughout Surrey		

14. On average, how many files concerning flood hazard management issues have you worked on annually? (since the 2003/4 legislative changes)		
	Responses	**% of Total**
□ 0	3	3%
□ 1-5	56	54%
□ 6-10	11	11%
□ 11-20	7	7%
□ > 20	19	18%
□ Not applicable	8	8%
□ Total responses	104	100%
□ No response	2	
□ Total respondents	106	

15. How much of your workload concerns flood hazard management?		
	Responses	**% of Total**
□ < 10%	73	71%
□ 10%-20%	19	18%
□ 21%-50%	6	6%
□ > 50%	5	5%
□ Total responses	103	100%
□ No response	3	
□ Total respondents	106	

16. Please check off any of the following areas of your workload that concern flood hazard management?		
	Responses	**% of Total**
Subdivision	68	69%
Official Community Plan Goals, Policies and Objectives	58	59%
Zoning	59	60%
Emergency program	55	56%
Building Permit	55	56%
Official Community Plan Development Permit Areas	40	40%
Regional Growth Strategy	15	15%
Crown land disposition	11	11%
Total responses	99	100%
No response	7	
Total respondents	106	
Other - describe	0	

17. Has your organization made any policy or regulatory changes concerning flood hazard management since the 2003/04 legislative changes?		
	Responses	**% of Total**
Yes	37	36%
No	48	46%
Not applicable	6	6%
Don't know	13	13%
Total responses	104	100%
No response	2	
Total respondents	106	
Comments		
If yes, please indicate what type of changes (e.g. bylaw, policies, procedures, etc.)		
a. Revisions of flood proofing elevations to reflect re-assessment of flood plain		
b. Rewrite of the OCP and zoning bylaws		
c. OCP changes		
d. Policy and procedural changes associated with working with different levels of government		
e. Adoption of a new Flood Plain Regulation Bylaw that designates the flood plain, regulates flood levels and setbacks, includes general exemptions to those regulations, and provides for delegated authority to consider site-specific exemption requests from land owners.		
f. We have produced a number of guidelines for local governments and local approving officers to use.		
g. Back in the 1990's our flood hazard requirements were in our Zoning Bylaw. In 2004 much of our flood hazard controls were inserted into our OCP but we still had a few regulations in our Zoning Bylaw. In 2006, we transferred all flood hazard regulations into our OCP.		
h. Floodplain Bylaw		
i. Making sure an engineer takes a look if, in the past, MOE did not review anything in the immediate area or just place standard MOE covenant if they have …		
j. Amended Zoning Bylaw to conform to the Land Use Planning and Management in Floodplains		
k. Most significant changes have been since 1997 - e.g. most of our downtown area is within the floodplain but considered exempt. After 1997 this area (and others) was no longer considered exempt. Since 2003/04 legislative changes increased City responsibility (e.g. approval of covenants by Approving Officer where Province used to). Changes to floodplain bylaw were required to reflect 03/04 legislative changes.		

l. Minor updates to the flood-proofing policies in our Vancouver Building By-law in April 2007.
m. Update of flood construction levels
n. Process changes
o. Amended the OCP and Zoning Bylaw in accordance with RAR
p. Dyke Design & Construction Guidelines
q. Adopted new OCP with hazard lands development permit area.
r. Revised the Building Bylaw to reflect increased flood construction levels
s. Pending.
t. Additional staff and resources were not given to help with the additional workload and responsibility involved.
u. Specific wording for flood proof covenants in preliminary layout approvals for subdivision.
v. New flood construction bylaw
w. New OCP policies and development permit guidelines. New building bylaw.
x. At the time Section 82 of the Land Title Act was rescinded the Provincial Approving Officers (PAOs') requested and received training for our field inspectors. Along with the training MoT Development Approvals staff received access to digital mapping. With these tools it enabled the PAO's to protect areas of concern under Section 86 LTA and the Local Services Act.
y. Yes, we are currently in the process of updating the flood construction levels in our bylaw to reflect the revised Fraser River 1:200 year levels.
z. New bylaw after leg changes
aa. As a consultant we have advised various clients in this regard.
bb. New flood plain management bylaw New flood protection strategy New flooding related emergency response plan
cc. The OCP has been changed and we are currently working on a flood plain bylaw.
dd. Floodplain Exemption Bylaw and policies
ee. We are in the process of writing a new floodplain bylaw and hope to have this completed by August 2008.
ff. Assumed powers to offer floodproofing relief as appropriate
gg. Designated floodplain and Non-standard Flooding and Erosion areas that require a P.Eng to sign off on prior to BP.
hh. An application process to consider site specific floodplain exemptions was implemented in mid-2007.
ii. Section 910 Floodplain Bylaw Zoning Bylaw setback from water features Policy re floodplain development in non building inspection areas
jj. Changes to the Zoning Bylaws, Rural Land Use Bylaws, Floodplain Management Bylaw, requirements for structural engineering on foreshore foundations etc…
kk. Bylaw to deal with site specific exemptions previously handled by the Province.
ll. To make flood management bylaw consistent with legislative changes, particularly relating to site specific exemption approval authority.
mm. Yes, we are currently in the process of updating the flood construction levels in our bylaw to reflect the revised Fraser River 1:200 year levels.
nn. Drainage standards, soil deposition bylaw and all applications therein

18. Management Tools Ratings							
Tool #	**Management Tools**				**Description**		
1	Legis-lation	Regional Growth Strategy - Section 849 of Local Government Act (LGA)			Work toward settlement patterns that minimize risk associated with natural hazards.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
1	3	15	14	6	54	13	106
1%	3%	16%	15%	6%	58%	Total Responses: 93	

Tool #	**Management Tools**				**Description**		
2	Legisl ation	Official Community Plans - Section 877 of LGA			Must address restrictions on the use of land that is subject to hazardous conditions.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
10	26	28	9	1	22	10	106
10%	27%	29%	9%	1%	23%	Total Responses: 96	

Tool #	**Management Tools**				**Description**		
3	Legisl ation	Zoning Bylaw - Section 903 of LGA					
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
18	21	24	9	3	18	13	106
19%	23%	26%	10%	3%	19%	Total Responses: 93	

Tool #	**Management Tools**				**Description**		
4	Legisl ation	Development Permit Areas - Section 919.1 + 920 of LGA			Designation can apply to protect development from hazardous conditions.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
15	22	17	6	2	32	12	106
16%	23%	18%	6%	2%	34%	Total Responses: 94	

Tool #	Management Tools				Description		
5	Legis-lation	Construction Requirements in Flood Plain Areas - Section 910 of LGA			Bylaw concerning flood construction levels, setbacks, etc. must consider Provincial Guidelines.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
24	28	10	9	1	23	11	106
25%	29%	11%	9%	1%	24%	Total Responses: 95	

Tool #	Management Tools				Description		
6	Legis-lation	Geotechnical Report - Section 56 of Community Charter			Building inspector may require report by qualified professional if he or she considers the proposed construction is on land subject to a flood hazard.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
21	21	22	9	3	19	11	106
22%	22%	23%	9%	3%	20%	Total Responses: 95	

Tool #	Management Tools				Description		
7	Legis-lation	Approving Officer - Section 86 of Land Title Act			Approving officer may require geotechnical report to address land safety.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
22	28	20	4	2	19	11	106
23%	29%	21%	4%	2%	20%	Total Responses: 95	

Tool #	Management Tools				Description		
8	Legis-lation	Registration of Covenant - Section 219 of Land Title Act			Can be required to regulate subdivision of land or safety of development.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
22	32	21	6	2	14	9	106
23%	33%	22%	6%	2%	14%	Total Responses: 97	

Tool #	Management Tools				Description		
9	Legis-lation	Dyke Maintenance Act - Sections 1 to 6.2 + 8			Continues and broadens role of Inspector of Dykes including a requirement for a dyking authority to construct protective works, inspections, reports and audits. Offenses are increased for interfering with a dyke or its operation. The LGC may make regulations and prescribe trust funds concerning the construction, operation and maintenance of dykes.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
5	14	19	7	3	46	12	106
5%	15%	20%	7%	3%	49%	Total Responses: 94	

Tool #	Management Tools				Description		
10	Legis-lation	Drainage, Ditch & Dyke Act - Sections 167, 170.1 + 172			Enables a municipality or regional district to have the powers and duties of commissioners under the Act.		
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
1	11	17	10	5	48	14	106
1%	12%	18%	11%	5%	52%	Total Responses: 92	

Tool #	Management Tools			Description			
11	Inform-ation Res-ources	See URLs below		Provincial Guidelines; guidelines for selecting a consultant; legislative changes, MoT development approvals			
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
7	25	28	11	2	18	15	106
8%	27%	31%	12%	2%	20%	Total Responses: 91	

Tool #11 URLs:
http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/guidelines.pdf

http://www.env.gov.bc.ca/wsd/public_safety/flood/landuse_mgmt.html

Tool #	Management Tools			Description			
12	Information Resources	See URLs below		Guidance for the selection of Qualified Professionals and preparation of flood hazard assessment reports prepared by the Water Stewardship Division of the Ministry of Environment.			
Excel-lent	Good	Accept-able	Needs Improve-ment	Not Accept-able	Not App-licable	No Response	Total Res-pondents
4	16	25	11	5	27	18	106
5%	18%	28%	13%	6%	31%	Total Responses: 88	

Tool # 12 URL:
http://www.env.gov.bc.ca/wsd/public_safety/flood/pdfs_word/guidance.pdf

Tool #	Management Tools			Description			
13	Information Resources	See URLs below		Water Stewardship Division of the Ministry of Environment provides available floodplain maps and associated design briefs.			
Excel-lent	Good	Accept -able	Needs Improve-ment	Not Accept-able	Not App-licable	No Res-ponse	Total Res-pondents
13	14	14	19	9	22	15	106
14%	15%	15%	21%	10%	24%	Total Responses: 91	

Tool #13 URLs:
http://www.env.gov.bc.ca/wsd/data_searches/fpm/reports/index.html

http://www.env.gov.bc.ca/wsd/plan_protect_sustain/index.html

Tool #	Management Tools			Description			
14	Information Resources	See URLs below		Water Stewardship Division of the Ministry of Environment documents all flood protection structures by Dyking Authority and Watercourse. This Website also contains related public publications including dyke design and construction guide, template for O&M manuals, and inspection guide for flood protection works.			
Excel-lent	Good	Accept -able	Needs Improve-ment	Needs Improve-ment	Not Accept-able	No Res-ponse	Total Res-pondents
7	18	17	8	2	36	18	106
8%	20%	19%	9%	2%	41%	Total Responses: 88	

Tool #14 URLs:
http://www.env.gov.bc.ca/wsd/public_safety/flood/structural.html

http://www.env.gov.bc.ca/wsd/public_safety/index.html

Tool #	Management Tools			Description			
15	Information Resources	See URLs below		BC Water Resources Atlas of the Ministry of Environment displays water resources information including dykes.			
Excel-lent	Good	Accept -able	Needs Improve-ment	Needs Improve-ment	Not Accept-able	No Respon se	Total Res-pondents
4	14	22	9	7	32	18	106
5%	16%	25%	10%	8%	36%	Total Responses: 88	

Tool #15 URLs:
http://www.env.gov.bc.ca/wsd/data_searches/wrbc/

http://www.env.gov.bc.ca/wsd/data_searches/fpm/index.html

Comments
a. Some of these tools, although are important, are not being currently used.
b. Not applicable as most refer to lower mainland
c. Wherever I indicate Not Acceptable, it reflects too limited local resources and expertise to be practical or useful
d. There is a heavy reliance on Qualified Professionals, often to the point where there is little if any review of the reports being submitted. While many of the QP do high quality work there are a number of others whose work is more questionable. The later reports are often accepted without proper review resulting in developments being built in locations or in a manner which do not comply with the provincial guidelines.
e. Mapping lacks clarity and detail, and only covers one half of our municipal area.
f. Available flood plain maps will quickly become out of date as the province does not intend to update the mapping and instead will leave this up to local governments. See question 22 for my comments on qualified professional support.
g. Hydrotechnical Engineer should be used in the QP Guidelines Floodplain mapping program should be reinstated Hydrometric program needs increased permanent funding
h. In my opinion many of the broader growth strategies and official community plans simply get ignored. I won't make any comments on the MOE management tools on the web as I work for MOE and I'm obviously biased, but I think they are good. It's important that we find out what the users think though.
i. growth strategies still denote nodes of growth within the local hazard area(s)
j. There is not the provincial gov't capacity to assist local gov't with regional growth strategy, regional growth strategies do not take flood hazards into consideration that I am aware of. Regional scale flood hazard maps would assist regional planning - re geo
k. I used N/A for not applicable, we are in the interior and dyking is a minor concern
l. RGS does not have sufficient regulatory power to be effective tool other than for future planning.
m. Floodplain maps that we have are more accurate. If maps provided by Province were equal or better we could utilize them more. Guidelines can be difficult to enforce at times.
n. LGA less relevant to Vancouver than our City Charter. Dyking not generally our strategy for flood protection works. Erosion protection, setbacks, and FCLs are applied within Vancouver. Any `dykes` are old structures that are discontinuous and unmaintained (e.g. South Van. Sea Dyke)
o. Floodplain mapping does not encompass the whole District of Elkford boundary.
p. Floodplain Maps - MOE does not have a specific program to update/produce flood plan maps. MOE has provided some ad hoc funds to organizations to do maps, but it is very limited. The new BC Flood Protection Program (10yr - $100 million program) may be an avenue to obtain

funds to undertake mapping, but the FPP doesn't have a strategic plan to evaluate 'needs' or do mapping in a coordinated or on a priority need basis.
q. Would like more knowledge on MOE positions and research on flooding issues. I was not working in BC in much of the early part of 2000.
r. Growth Strategies Act - Liveable Region Plan has not been effective in controlling or limiting floodplain development (i.e. Richmond has rapid transit and is a de facto `growth concentration area`. Geotechnical Reports - `Safe for Use Intended` is open to interpretation by individual professionals. Covenants - don't prevent damage and in most cases will not reduce flood damage claims to senior government. Drainage Ditch and Dyke Act - obsolete - to be repealed in 2010. Floodplain Maps - badly out of date for most of province, or lacking altogether for parts of the Fraser Valley.
s. As with most downward delegation that occurs there seems to be the misconception that if the one delegating makes volumes and volumes of info available whether by web sites or what ever they feel that they have done their job but unless experts are available or the resources are available to review and adequately understand such material how can the final outcome be as good as the decisions that were made by a body of flood experts that did nothing but such flood review and formulated their recommendations based on years of expertise in the flood field for geographic areas that one often would also need to be aware of to formulate thorough decisions on such matters. Consultants can do their best however they are cannot adequately replace the experts that made such decisions at M/Env, prior to Bill56.
t. We can't get necessary answers from the Ministry about the effectiveness of existing dykes and whether they can be relied upon in making the same value judgments in reducing flood construction levels as the Ministry had.
u. Many times staff are too busy to be aware of some of the above tools or how to apply them
v. Rather than use the provincial documentation, we used legal assistance with the objective of minimizing potential liabilities, which is the bigger issue for municipalities.
w. I believe that on-going training is necessary in these changing times. We have many new staff that did not receive the initial training. As I understand it the Floodplain Mapping had no on-going maintenance agreement. That being the case our field inspectors will be reviewing out dated information. I believe that will result in faulty field evaluation.
x. Not aware of tools
y. Would like more Provincial assistance with Dyking from Provincial especially for small municipalities with newer administrators. I.e., who is qualified to do what i.e., a list of possible engineers to help! River forecast system excellent PEP system excellent Available info is on too many different websites and is confusing. Should have a one stop guide for everything.
z. Bylaw concerning flood construction levels, setbacks, etc. must consider Provincial Guidelines - Local governments are left to fend for themselves and struggle with deviating from historic provincial requirements. Provincial guidance would be helpful to assist with understanding acceptable levels of risk.
aa. In writing a floodplain bylaw under section 910 and using the Provincial Guidelines, the guidelines were very general. For example, it is not clear to a Planner the difference between an ordinary watercourse and a smaller stream. Nor do municipalities have the data or expertise to determine if the discharge is less than 80 cubic metres per second.
bb. The flood plain mapping is generally old (1980\'s) and only covers main stem Skeena and Lakelse Lake. Additional areas need to be mapped and the existing maps need to be updated and in an advanced format.
cc. Hazard assessment information (ratings) and classifications were provided by the Provincial government, but not supporting documentation is available. There has been limited provision for the collection or sharing of updated information on flood hazards or flood mapping that may have been collected in the years since the shift to local government responsibility. Local government has limited resources and specific mandates that do not necessarily facilitate the development of the data that could be utilized by local government staff or potential applicants. Technical limitations at the local government staff level, particularly at the RD level, where there are not engineers on staff and are not the approving authority makes assessing applications and any associated reports challenging.

dd. Section 849 of Local Government Act (LGA) not practical in north. Ability to find a qualified professional willing or able to provide a report is a challenge - very costly to secure and bring to region from south. BC Water Resources Atlas info is useful for on site evaluations.
ee. Have been in a position where MoE has not provided information to clients. MoE stating \`the Regional District has the information\`. In majority of the cases, the RD does not have records of reports and mapping which were previously held by the Ministry. The information was not passed on. Additional training on the tools over and above the 2 day work shop would have been helpful.
ff. Flood hazard guidelines should provide more specific information relating to site specific exemptions - as these guidelines are specifically referred to in the Act. Local government staff need to better understand if a proposal conforms with guidelines and document this with reference to specific guidelines. More detail needed. Local governments, particularly small local governments, find the dyking requirements relating to them to be cost prohibitive.
gg. Guidance for selection of professionals should state hydrotechnical engineers not just geotechnical engineers. More floodplain mapping needed
hh. Have not made use of items marked NA

19. Overall, how would you rate the management of flood hazards through the use of available management tools since the 2003/04 legislative changes?

	Responses	% of Total
Excellent	4	4%
Good	17	17%
Acceptable	33	33%
Needs improvement	36	36%
Not applicable	9	9%
Total responses	99	100%
No response	7	
Total	106	

Comments:

a. Local management of flood plain hazard is simply another workload component that is not acknowledged or funded. Improved management of flood hazard is not occurring.
b. There does not seem to be clear direction on reconstruction of damages after a flood which allows the same damage to occur over and over.
c. The tools which have been developed work well.
d. The overall management is highly variable. In many cases the management would be considered good to excellent while in others it either needs improvement or is poor at best.
e. Although we haven't had to work through a development proposal within our flood plain yet I have the sense that I have the `tools` available that I will need.
f. The feed back I receive is that local government staff feels uncomfortable with their technical knowledge of flood hazards.
g. Fraser River Floodplain mapping is poor in the Hope area.
h. Should not allow municipal councils or boards to interfere - think building code as provincial regulations
i. new homes are being built in high hazard areas
j. No knowledge of prior legislation
k. Give it back to MOE to set standards for every subdivision
l. Local governments are on our own to improve our dykes. Funding levels have been insufficient. Liability is a big issue since we are self funded for liability for flooding below an elevation of 10m. MIA does not cover the City.
m. MoE and DFO officials are reluctant to approve development in accordance with OCP and zoning designations.

n. Not enough clarification of liability issues with local gov't new role in approval process.
o. Regulations would provide more consistency, and to ensure it, auditing of floodplain decisions should be carried out on a regular basis.
p. Legislation needs improvement to ensure that floodproofing conditions are appropriately prescribed.
q. Would like information on what these changes were.
r. It is difficult to know what is actually happening on the ground without detailed tracking the amount of new floodplain development and a comprehensive review of the floodproofing standards (if any) being incorporated into new buildings on the floodplain by each local jurisdiction.
s. Have not reviewed all aspects yet.
t. I do not work directly with the legislative aspect of flood hazards
u. Will receive further review as part of 2008 work program.
v. See comments above!
w. We've already stated our perspective on our bylaw validity up to Jan 27, 2007. Not much help from the Province since their edict to increase elevations for flood management.
x. Municipalities should not be financially responsible for dyke management
y. In our area we are getting by mainly because the rigour of our policies has discouraged a lot of new development in the flood plain area. On the other hand, it has also significantly depressed revitalization efforts in these areas.
z. The regulatory side of flood plan management is fairly well in hand. Where we have problems is with the lack of flood plain mapping for our area.
aa. Can not compare.
bb. Flood protection is not being implemented in a consistent manner throughout the Province.
cc. Feel that the Ministry of Environment staff were much more qualified to manage floodplains
dd. Would prefer the management to be delegated back to MoE where the experts are.
ee. Staff at MoE were very, very helpful when the legislative changes were first introduced in helping local governments understands the provincial guidelines and in assisting with developing floodplain bylaws that were consistent with the provincial guidelines and provincial floodplain policies. However, as I understand staff at MoE is no longer able to provide assistance in the development of floodplain bylaws or even the interpretation of the mapping from the Northwest Hydraulics study. Thus, for those municipalities still working on implementing of the changes in regulations there is minimal support available from the flood hazard management division of MoE. As a municipality we do not have the staff with experience or training in flood hazards and thus developing a floodplain bylaw based on the provincial guidelines that were written for the entire province does not provide accurate or specific enough information for municipalities to develop a good product. As well, in doing research to determine what other municipalities are doing in terms of the legislative changes, some of them to date are not even aware that the exemptions that were approved by MoE and that are in the zoning bylaws or old floodplain bylaws that were written prior to the legislative changes are no longer in effect.
ff. We have not fully used many of the tools. In particular have not designated any floodplain areas under section 910 LGA.
gg. Need floodplain mapping resources and technical expertise.
hh. It is very nice to have a number of guidelines and tools to manage development in flood prone areas, but I would still have to suggest that the whole onus of determining what is and what is not a flood prone and/or dangerous area has been pushed onto the local governments. The province had an excellent flood plain mapping program with many skilled people dedicated to providing information to local governments and the citizens of this province. This program should be reinstated to provide on the ground information for local government and the people of this province.
ii. Does not assist when variances based on old development are required

20. Have the 2003/04 legislative changes improved the effectiveness of flood hazard management?		
	Responses	**% of Total**
Yes	16	15%
No	36	35%
Don't know/Not sure	52	50%
Total responses	104	100%
No response	2	
Total	106	
Comments:		
a. I do not believe that the changes have improved the effectiveness; however it certainly has not decreased the effectiveness of the program.		
b. But it has also limited use of vacant lots which are privately owned. This in our case is land lost for development by private owners.		
c. In my opinion the level of effectiveness of floodplain management has decreased during this period with greater reliance being placed on protective works rather than the more cost effective approach of ensuring new development is built with the appropriate setbacks and flood construction levels.		
d. Local governments feel like they are `on their own` to keep up-to-date maps and regulations. Only when a state of local emergency is declared will the province provide support for a future risk reduction and options studies. Shouldn't this support be in place before an emergency?		
e. The local and regional levels of government do not have the expertise or funding to carry out the required studies in some cases.		
f. We haven't had the time or resources to bring our bylaws up to date.		
g. From feedback it appears that a number of hazards are being ignored		
h. made worse as it allows for a Council to vary the ministry guidelines		
i. Professional expertise is missing from the referral process to the Province that was in place		
j. MOT is not an expert. MOE is		
k. We are just now beginning a flood plain management plan		
l. I think less consistent standards are being applied than when it was administered by MOE		
m. Again legislation is poorly written.		
n. Decisions are made by those that have the local knowledge and have jurisdiction over land use matters.		
o. I don't see how the new system could have improved effectiveness - especially since there is no provincial oversight of subdivision approvals and MOE approval of new bylaws. But we really don't know - hopefully this survey may provide an indication.		
p. Significant unresolved issues related to municipal and provincial roles.		
q. Again see comments above. With all the new Approving Officers being hired especially by local government the scary thing is that the resultant approvals may not come to light until years afterwards when the next great flood occurs. Then it will be too late!		
r. Ministry of Transportation staff are not flood management experts, yet with the stroke of a pen, they were tasked with flood hazard management in the area of rural subdivisions. I do not believe that management can be more effective without proper training and mentoring.		
s. Who is monitoring the effectiveness?		
t. we'll see if/when we get a significant flood		
u. As per above, it has discouraged redevelopments in these areas including those for minor improvements.		
v. To rely on MoT field inspectors equipped with a degree of training and digital mapping cannot replace experts. If the issue is not identified in the field then an expert opinion will not be		

requested.
w. The distributed approach to flood hazard management seems less effective. However, the province has provided good overall guidance.
x. `Yes` response is due to the limited resources the Province put into this effort in the years leading up to 2003/04. The answer might be `No` if we were comparing against the provincial effort put forward in the 80's and early 90's.
y. Municipalities are in more control of guiding changes to flood protection measures which is appropriate given local knowledge. Funding is a problem - Richmond has taken ownership of dykes, but there was no transfer of funds or other to maintain and upgrade these assets. Funding through grant programs has had limited success.
z. The changes are effective from a municipal process perspective as Local Governments but from a Provincial Flood hazard management the system is likely less effective.
aa. City hasn't changed bylaws for many years.
bb. That remains to be seen. This will only be determined when we have a major event and we can see how the bylaws or lack thereof have established flood protection requirements that protect property owners. Another reason the legislative changes have not been more effective is that local governments were thrust into an area where they had no expertise or staff to handle this new responsibility. As building permits could not be issued under the old exemptions until the local government adopted or readopted the exemptions building permits were delayed.
cc. It is hard to accurately say based on the fact we haven\'t fully used many of the tools.
dd. The process at the RD has not changed, with the exception of the integration of a site specific exemption process at the RD level.
ee. We don\'t use the Section 910 stuff in this area
ff. Risk from land slides/erosion hazards has been of assistance

21. Have the 2003/04 legislative changes made the regulatory environment for flood hazard management more efficient or timely?

	Responses	% of Total
Yes	17	16%
No	27	26%
Don’t know/Not sure	60	58%
Total responses	104	100%
No response	2	
Total	106	

Comments:

a. The response which I can supply to an applicant is faster as MoE would have other priorities which had to be addressed first before responding to MoT.
b. In our case, Fed Fisheries and Oceans over ruled the provincial regulations.
c. No high water events since 2002
d. More efficient but not necessarily more effective.
e. We do not need to wait for ministerial approval for bylaw approval. Which is a double edged sword as the province does not support municipalities with mapping updates and coordinated flood plain management.
f. I avoid the referrals to the Ministry which were time consuming. Nonetheless, I prefer the involvement of the Ministry as a back-stop for less enlightened local governments.
g. Possibly more efficient as you bypass another level of government but it does place a huge burden on a small municipality with limited staffing resources. It is much easier to wait for the Province to review an engineer's report and issue their approval rather than an inexperienced local government staff.
h. More timely and perhaps more efficient, but expertise in administering is missing
i. Now we have to rely on engineers which makes process longer
j. Local governments are able to make more timely decisions, but we do so with all the

uncertainty that goes with such decisions.
k. E.g. covenants can now be processed in days vs. weeks because Provincial approval not required.
l. Provincial FCLs were very useful, but are no longer being updated.
m. It takes longer and is less efficient.
n. Cookie cutter approach is the only way we can deal with flood hazard management.
o. we'll see
p. Maybe the timing is more efficient because applicants no longer have to wait for a response from an under-staffed provincial department, but it has added more work and risk for the municipalities.
q. The question deals with semantics. That which is `more efficient or timely` to a developer is often ineffectual and rushed to a lay person. From my perspective the changes allowed improved turn-a-round times but I do not know if the field inspections are a weak area.
r. The changes have left smaller clients with limited resources (primarily small communities) unsure of direction/action to take.
s. More direct control over local flood related issues has been beneficial. Responses to funding requests have not been timely and the denial of funding requests simply stops needed work programs from proceeding further, ultimately placing the City at a higher flood risk.
t. Due to the reduced processing time on there is likely more efficiency,
u. It has been very difficult and taken a long time for some municipalities to develop new floodplain regulations, which has cause delays in issuing building permit approvals. As a result of many policy changes at the provincial level, over the past few years local government have increasingly become burdened with developing policies and bylaws to address these changes. As many of these changes were done abruptly there was no time to develop policies and implement new requirements before legislation was created. Thus, there have been significant delays in local governments' ability to adapt to these changes.
v. Quite the opposite
w. Can't relate our approval timeline to that which occurred previously under the MoE jurisdiction, as local government was not part of the previous process (site specific exemptions).
x. Still have the problem of individual lots of record – old development/houses wanting to rebuild in the floodplain

22. Do you have any other comments about any of the following approaches to flood hazard management or related issues?		
	Responses	**% of Total**
□ Liability issues	18	51%
□ Use of qualified professionals (engineers and geoscientists) to prepare site specific reports concerning development applications	16	46%
□ Regulating construction in flood hazard areas	13	37%
□ Variations/exemptions to Flood Hazard Area Land Use Management Guidelines	10	29%
□ Subdivision approval process	7	20%
□ Crown land disposition	2	6%
Total responses	35	100%
No response	71	
Total respondents	106	
Comments		
a. Many areas require updating as the mapping has been around for in excess of 30 years and may require updating to confirm that it is current, especially with the pine beetle kill in the Interior of the province.		
b. Regulating construction in flood hazard areas is the most cost effective approach to flood hazard management if it is used correctly. The use of QPs can be useful provided that the quality		

of work submitted is of the appropriate standard, particularly where it is blindly accepting by the approving authority. There needs to be better quality assurance mechanisms in some jurisdictions.
c. Few qualified professional exist outside major centres. The costs are high for these professionals and they are not very excited about accepting any liability associated with their opinions. They may be willing to write a certified report that the site may be `safely used for the use intended`, but they try and put so many disclaimers on their work that it quickly becomes irrelevant. Maybe the Association of Professional Engineers and Geoscientists needs to come up with a document for flood hazard assessment similar to the `Guidelines for Legislated Landslide assessments for Proposed Residential Development in BC`?
d. The designation Hydrotechnical Engineer needs to be introduced. Most Geotechnical Engineers are not qualified to carry out floodplain management work.
e. Variation and exemptions from feedback is the area where local government staff and approving officers have the least comfort dealing with.
f. Although a huge burden has been placed on local government staff, the major concern is liability. Our regulations may ensure that a qualified professional prove a safe building site but we are not qualified to say which engineer is a qualified professional? All we can do is check that they are in good standings with the association and other than that hope that their recommendations are sound. The other concern is having a smaller firm do the study but may not be around years from now when a major flood event occurs. This is one of the major downfalls of downloading Water Management's role to local government.
g. Would like to see this become a fully provincial requirement that DOES NOT ALLOW a local government to vary - in other words, once a hazard area is identified ALL construction MUST meet the requirements and not have a Council meddle simply for 'cheaper' housing or benefit of an owner constructing a suite for extra money
h. If engineers is wrong and something happens who is going to be sued? The Ministry that approved the subdivision plan as the engineer will close down and not except responsibility.
i. See comments under #19. Does a restrictive covenant for reduced flood proofing really protect a local government? Has it been tested in court? A geotechnical engineer must certify that a building can be used safely. What does this mean? It can be damaged, but not cause injury? What about structural, electrical, mechanical engineer reports?
j. Have difficulty in having developers retain professionals that are qualified to provide site specific reports concerning development applications.
k. DFO and MoE officials do not accept the recommendations of the QEP related to SPEA variances and mitigation actions to be taken to compensate for an encroachment into the SPEA.
l. If I am any gauge of how much understanding there is of the 2003/04 changes, then I think there may be a lack of education and information behind these changes. It would seem that they cross department lines within our municipality. Other departments might be better aware and informed that I but I have heard very little about this before now.
m. Would like more information - seminar may help??
n. Provide as much information (mapping, reports, etc) to the public as possible.
o. Quality of work and analysis varies greatly, especially with respect to ocean flood issues (not my current jurisdiction).
p. It is important to have incentives/requirements for local government to implement subdivision and building controls. Other than some concerns over liability, there is very little incentive (and no mandatory requirements) for local governments to have floodplain bylaws. S 910 of LGA only requires local government to consider the provincial guidelines, not implement them. The consequences of not implementing are undefined.
p. a/a: Important to have incentives/requirements for local government to implement subdivision and building controls. Other than some concerns over liability, there is very little incentive (and no mandatory requirements) for local governments to have floodplain bylaws. S 910 of LGA only requires local government to consider the provincial guidelines, not implement them. The consequences of not implementing are undefined.
r. How can they be expected to have all the knowledge and expertise gained by one authority whose sole responsibility and expertise is flood management? How can their decisions therefore

be as good?
s. The Ministry is doing a lousy job of communicating and being forthright with local government staff so they can undertake changes to their existing bylaws. Ministry enactment of the new flood levels has placed all local governments at risk and great expense, without providing significant assistance to remediate or improve existing dykes. Without the necessary assistance, development could only be pimpled over the current landscape.
t. All properties in Harrison Hot Springs are in the flood plain.
u. It's all about liabilities for municipalities these days in order to keep insurance costs within reason.
v. Must focus on risk, rather than hazard. Abandon notion of 200-year event and base the need and scale of flood risk mitigation solely on risk. Consider alternative flood mitigation rather than raising dykes and removing gravel (floodways, meanders, lakes)
w. The current formulae to calculate flood plain setbacks is not an easy tool to work with. A certified professional is not always available in the Lillooet area.
x. Need list of professionals who can help. Also more guidance as to what the engineers charge is fair or not. With high demand for services they tend to pick and choose who they want to work with and smaller municipalities are out in the cold.
y. Use of qualified professional is encouraged. Decision making should include local government/Regional Districts and Province. There must be `buy in` from province with respect to acceptable levels of risk.
z. Water issues need to be scrutinized more closely by `approving officers`. Decision makers may require more legislative tools to request more detailed information to support decisions.
aa. Local governments are concerned with the increased liability that has been downloaded to them through the legislative changes. We have problems in dealing with existing/historical building in low lying urban areas
bb. Not clear on liability to City for granting setback variances
cc. In this particular area of the Omineca, the more information that can be provided to us, and to the citizens with respect to flood plains, and river elevations is beneficial. All of the topics checked above can relate to flood areas, and it would be nice to have good information rather than sometimes \`seat of the pants\` guesses.
dd. The regulation of construction in flood hazard areas is best addressed at a provincial level, with very specific standards set. The reason is this would result in as much consistency as possible throughout the province and there would be less leverage for developers to try and use different requirements in different areas of the province. Subdivision approval in Regional Districts, where the Province had the ability to refuse to consent to subdivision approval was very beneficial as they have the historical information and data available on the history of creeks that municipalities did not always have. Qualified professionals. Although the LGA refers to P.Engineers experienced in geotechnical engineering, as I understand the types of expertise Engineers should have in terms of calculating flow rates on rivers are hydraulic engineers. Geotechnical engineers may still have to design the bank protection work but a hydraulic engineer would first need to calculate the flow rate of the river to determine what type of bank protection would be necessary.
ee. Concern with the Crown turning recreational lease property to fee simple without consideration of flooding, in particular the ability of the property to have adequate on-site septic and whether home construction is possible in the flood hazard. Local governments get saddled with enforcing.
ff. Would like to see the management of flood hazards be back with MoE.
gg. Suggest amending the legislation to clearly state that qualified professionals shall be solely liable for flooding/erosion damage on properties where a site specific exemption has been approved based upon the information provided in their reports.
hh. The guidelines appear to use circle logic in setting out conditions for granting exemptions including that only exemptions complying with guidelines (?) are allowed.

23. Do any of the following represent particular challenges? (check all that apply)		
	Responses	**% of Total**
New flood hazard information (e.g. flood profile modeling, floodplain mapping);	53	60%
Variations / variances in flood construction levels over time;	45	51%
Staffing issues (technical capacity, turnover, loss of corporate history, etc);	56	64%
Challenges associated with particular land uses (e.g., residential, commercial, industrial, agricultural);	29	33%
Uncertainty with respect to liability issues;	44	50%
Uncertainty with respect to flood hazards (e.g., changing flood frequency, magnitude, climate change, etc);	58	66%
Total responses	88	100%
No response	18	
Total respondents	106	
Comments		
a. In the municipal environment, flood hazard reduction is implemented only in a very limited manner and most effective when an immediate hazard is present. I am concerned that climate change will result in extreme weather events resulting in debris flow within previously inactive drainages.		
b. In some areas development in the floodplain has similarities to what is currently occurring in the subprime mortgage sector. Questionable developments are being allowed to be built and sold to unsuspecting purchasers who are then exposed to unrecognized flood risks, with governments and individuals left to deal with the aftermath when a flood occurs down the road.		
c. It would be nice if the Province, in exchange for downloading these responsibilities, would fund a new flood-plain mapping program, to identify changes and perhaps predict trends resulting from climate change.		
d. We need to do more flood profile modeling and mapping. Flood Hazard data is out of date. Staffing is an issue - expertise is leaving us through retirement.		
e. All of the above. I believe that our community has experienced almost every type of scenario relative to development within a flood hazard area. (i.e. - dykes built to the 200 yr flood levels which almost breach every 5-10 years, conflicting intents between current information and old MOE covenants, etc. etc.)		
f. Professional assistance from the Province is missing.		
g. MOE needs to play a bigger role in flood plain management		
h. Pine beetle effect on water retention and spring runoff		
i. The variations over time create differential elevations on adjacent developments; one is higher than the other. Should elevations for residential and industrial be the same? Agricultural is different again, notwithstanding the above, a comprehensive review is required for different land uses in the floodplain.		
j. Lack of cooperative attitude of MoE and DFO officials in allowing reasonable and sensitive development to occur on existing lands (not new subdivision applications) in accordance with OCP and zoning designations and policies in place.		
k. Many of the floodplain maps are out-of date.		
l. City Council view of flood hazard		
m. What are the Provincial - local interface issues??		
n. Floodplain mapping is highly variable and somewhat accurate only for a brief time. From year to year the river geometry, bedload, logjams, boundary conditions change significantly.		
o. There are many challenges with respect to understanding and updating the hazard information (i.e. floodplain maps) and, in particular, determining the degree of protection provided by each separate dyking system.		
p. All of the above create difficulties with limited staff and the engineering costs along with		

consultant costs can be so high the community is hesitant to proceed.
q. Significant issue and challenge for communities developed within flood plain.
r. Global warming beetle kill and its effect on coefficient of drainage etc. etc. to mention a few
s. Available flood mapping information is now almost 20 years old and may well be significantly out of date
t. I have spoken about staffing above but land use is critical. I am an avid supporter of on-site retention/detention systems. When I see a forest fall to the plough and cultivation I often wonder who reviews the runoff co-efficient. Rooftops and driveways have a considerable effect upon flood control. I find that there needs to be more emphasis early on.
u. The new flood profile has created a major issue for lands formerly protected by dykes. The flood construction level had been relaxed by the MoE for these lands due to the existence of a dyke. With the new flood profile projected to overtop the dyke, the flood construction level will need to be raised by approx. 2.5m. This difference in flood construction levels between adjacent properties is costly, difficult to construct and aesthetically poor.
v. Lack of flood plain mapping, financial impact of undertaking mapping
w. Need funding

24. Do you have any suggested tools, additional support resources or other improvements that would allow for better management of flood hazards?		
	Responses	**% of Total**
Total responses - number of comments (below)	39	37%
No response	67	63%
Total Respondents	106	100%
Comments		
a. I think there is a need for provincial standards rather than just guidelines as well as more accountability for `QPs` who consistently submit substandard reports and recommendations, and local authorities or approving officers who approve questionable developments.		
b. Provincial study, coordination and administration of flood systems that affect multiple jurisdictions such as river systems. Local governments lack resources (money, time and internal technical capacity) and jurisdiction to effectively assess the risks and develop options. Ultimately the province retains liability, but by downloading regulation of the flood plain simply expands the liability pie.		
c. Increased funding for the appropriate Provincial Ministries, e.g. Environment, to provide more support and funding for further studies		
d. New mapping information is needed		
e. Need a lot more funding and staffing to adequately address management of flood hazards. Need more flood hazard studies, more funding for dyke construction, maintenance and management		
f. The one thing that local government lost with the downloading is the consistency with rulings or floodplain development practices. Although all local governments may utilize the provincial regulations, we control them with different tools. One tool is passing the responsibility to the professional sector. If 10 different property owners retain a different engineer for 10 different properties along the same river, we could get 10 different recommendations. One may require expensive enhancements whereas a neighbouring property may require minimal changes. It becomes quite frustrating and all levels of government lose a bit of credibility.		
g. Remove local government from the picture so that once a hazard area is identified, it must be dealt with according to the appropriate professionals and require that any report from a professional that allows for anything different from the ministry guidelines be required to have peer review		
h. To be determined		
i. Guidance document for QP flood hazard assessment reports (I am now working with APEG to draft a proposal for APEG to prepare such a document (one similar to the Landslide Guideline). Regional flood hazard maps would be useful to guide land development Provide guidance		

document to define 'safe for intended use' Provide guidance document to advise when areas are just too hazardous to develop (MOE guidance document which has some statements but they are not binding and I doubt many people are aware of them)
j. Bring back MOE as a referral agency for subdivision. They are the experts.
k. The province needs to takes on a role in regulation of development in flood plains.
l. N/A
m. Better flood forecasting capability (and accuracy) would be beneficial. Better overall river management (specifically, lower Fraser River) including gravel management, routine channel surveys and hydrologic modelling, etc.
n. Provincial support to address FCLs, and climate change impacts would be very helpful
o. Grandfather (i.e. Section 911 of LGA) building setbacks on existing lots provided it can be shown by a QEP that the proposed development is protected from flood damage. In our case the lake level (Okanagan Lake) is controlled by a dam mechanism. There is also to be a `save harmless` Covenant registered on title as a condition of development approval.
p. Probably a floodplain model for Development Permit areas - province - wide applicability.
q. Funding to update flood hazard mapping and assess options for erosion/flood protection works. In light of the severe 2007 freshet, the City received no funding from the recent Flood Protection Program.
r. Strengthen all aspects of an integrated flood hazard management program. The province should set the standards, provide a clear framework and provide financial assistance for floodplain mapping and risk assessments.
s. This is all new to me and still trying to work through all the legislation.
t. To be determined.
u. Go back to the system that existed prior to Bill 56 and have a dedicated resource available that can adjudicate and keep current on all flooding matters for large geographic areas.
v. Financial assistance from the province to local government to improve and raise dykes, and add dykes where needed to maintain the existing landscape.
w. We spent $265,000 for Aqua Dams for flood preparedness and can't get reimbursement. We need more money.
x. The province needs to update the flood mapping information for many areas on a regular basis i.e. at least once every 20 years. They also need to provide assistance for smaller communities that do not have the expertise and resources to properly administer it.
y. Switch to flood risk and must focus on risk, rather than hazard. Abandon notion of 200-year event and base the need and scale of flood risk mitigation solely on risk. Consider alternative flood mitigation rather than raising dykes and removing gravel (floodways, meaderns, lakes)
z. Continue the Flood Plain mapping program to include the Lillooet Area.
aa. Density plays a critical role in the success of such programs. I find the point at which we identify increased overland flows is often too late. As a result flood hazard is increased from earlier estimates. I would suggest tying density to hydrology to hazard.
bb. Have a Provincial Rep work with mgt at smaller municipalities that don't have local expertise in this field but are expected to know what to do and how to do it. This is just another example of downloading liability and costs. This is especially a burden on small municipalities that don’t have the resources or expertise.
cc. Provincial representation to participate and advise in the development of floodplain bylaws.
dd. An overall provincial flood protection plan, quantification of sea level rise, a known funding regime, prioritization of the flood plains where development exists, an empowered lead agency to provide administrative services for the Lower Fraser River.
ee. Ministry of Environment's historical information needs to be made available to other agencies with flood protection mandates.
ff. Adequate resources financial and staffing are always a challenge. More guidance re: Flood Bylaws and definitions would be useful (e.g. FCL, MBE etc.) Several example definitions would be helpful. At present FCL is vague, should it be underside of footing, underside of main floor elevation, top of foundation wall.
gg. The provincial government needs to allocate resources, time and staff to assist local

governments with the development of appropriate flood protection regulations for their specific jurisdiction.
hh. Increased coverage and updated floodplain mapping
ii. The availability of updated mapping or resources to acquire updated mapping would be a valuable resource. Support of a technical nature would also be an asset.
jj. updated floodplain mapping
kk. Have the Province of BC reinstate the provincial flood plain mapping program, adequately staff the program, and get people out in the field recording and mapping our rivers.
ll. Province should continue to update floodplain mapping on a regular basis and provide that information to local governments. MoE technical staff should be required to review qualified professionals reports - similar to approach taken under Riparian Areas Regulation - before local government proceeds with the processing of site specific exemption applications. More financial resources should be made available for dyking.
mm. Need large regional planning re flood hazards and risks like the Lower Fraser study showed and also like the region could benefit from a hydrologic assessment of the Fraser Basin to determine what conditions could lead to a flood of record. Having centralized information source that all could use is helpful. Also having the province be available to help when have multi-jurisdictional issues

25. Do you have any other comments about flood hazard management?		
	Responses	**% of Total**
Total responses - number of comments (below)	27	25%
No response	79	75%
Total Respondents	106	100%
Comments		
a. The Ministry is undergoing a big changeover in staff over the next 5 years and a refresher seminar on floodplain mapping would be well received.		
b. The qualified professional definition specifies a `professional engineer or geoscientist experienced in geotechnical engineering.` Should they not also be required to have some experience with hydrology?		
c. Normally forgotten about until a flood happens or an immediate flood threat exists		
d. I personally feel that the Act caters to the larger municipalities which have a larger tax base, a larger staff with specific expertise and probably a land base with less flood hazards. With the larger municipalities, the `red tape` can be reduced by doing everything in-house. The smaller communities tend to suffer.		
e. require fill to within 5 feet of the required flood construction level so that crawl spaces cannot be converted to habitat space		
f. Some local governments do not control development in flood hazard area at any level (Regional District of Columbia Shuswap for example). Land use control should be made mandatory. Seems odd to require local governments to have emergency response plans for flood emergencies at the same time as new homes are being built in flood prone areas?		
g. Riparian areas should be protected however there has to be a reasonable and practical approach to re-development on existing lots with confined buildable area.		
h. As said before: bring back MOE as a referral agency for subdivision. They are the experts.		
i. Like I mentioned above, I have begun working with a consultant to develop a flood plain management plan as 1st stage of a storm water management plan and it will work in conjunction with a local watershed management plan that is also being developed. But none of this was driven by knowledge of legislation requiring it.		
j. For our particular situation, the new flood plain mapping is very helpful. Politically, it is very difficult for our Administration to present a flood plain by-law that will impact up to 1/4 of the properties within the city. FCL's and restrictive covenants will continue to be used to limit flood damage and liability.		
k. Smaller local governments generally don't have the capacity to administer floodplain management tasks as they don't have engineering or planning staff to deal with the hydrology		

aspect of administering floodplain prescriptions.
l. Is Neil Hamilton still with the Province?
n. Port Coquitlam could have significant impact depending on outcome of court decision regarding Coquitlam dam which directly relates to flood hazard issue.
o. No but I am available to discuss if necessary. Any questions not answered above were because they were not a simple yes or no. Thanks for the opportunity to comment and if you need clarification don't hesitate to call. Thanks...
p. Don't close your provincial eyes and ears to the liability issues for those of us that had valid bylaws sanctioned by the ministry up to your Jan 27, 2007 edict. Now would be a good time to be forthcoming with provincial assistance in making the physical changes in addition to the paper changes.
q. My area of jurisdiction involves contact with more than one local government. Some address flood management through legislative tools available to them through the L.G.A. and some do not.
r. What happened to the experts and funding resources the Province had. Where did they go? It would be beneficial to enable the smaller local governments' access to them!
s. We keep getting questions whether global warming will further impact flood potentials, but there are no scientific data or studies to provide any `best guesses` whether or not it will.
t. The B.C. system is outdated and ignores the trend towards integrated risk management. There should be one entity per river that manages the river and relates to all stakeholders.
u. Implement continued training and support improved flood plain mapping.
v. The Fraser River modelling has been a complex technical exercise, largely done through an engineering working group (FBC). Our local flood protection bylaw, however, is administered and overseen by the planning department. The modelling process and results needs to be presented in a non-technical manner as possible, in order to engage a broader audience including planners, building approvals staff, and politicians.
w. All floodplain/hazardous areas should have a floodplain bylaw and/or hazardous areas designation developed by the local government/regional district with support from provincial representatives and developed by qualified professionals.
x. Lack of expertise in flood hazards a major concern.
y. To do the research on the flood hazards, write the bylaws takes an extreme amount of staff time and resources which municipalities don't have to spare.
z. Flood hazard management is a challenging process as that which is being managed is not static. Since the change in legislation, the limited technical expertise is outdated and insufficient floodplain and hazard information puts strain on the staff and resources at the local government level.
aa. It seems that with climate change, and the heavy loss of tree cover from the Mountain Pine Beetle epidemic, our rivers and streams have taken on a new life. Areas which were pretty much out of danger in the past have now been inundated or threatened with flood waters. There is a feeling that a new era of flood management for the province is in the offing, and local government cannot do the management without the expert assistance from the Province. This expert assistance is not in the form of legislation to make it simpler or more complex for local government to do its own job. The expert assistance is in the form of government ministries and budgets set up to map and analyze the flood potentials of our province\'s water courses. Thank you for providing the opportunity to comment.
bb. Flood hazard/floodplain management will affect the region if a large event occurs. Deeming that local are responsible for all in their jurisdictions including the cost to upgrade/build infrastructure is a problem. If railway, SkyTrain, regional transportation are all affected, then should not be just local government. i.e. SFPR will be constructed through the Fraser Floodplain in Surrey – the new highway will need to be closed well before 200 year levels are reached. This will affect regional economics.