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Professional Practice and Insurance Issues

Canadian Technical Guidelines and Best Practices related to Landslides: a national initiative for loss reduction

D. VanDine

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Canadian Technical Guidelines and Best Practices related to Landslides: a national initiative for loss reduction

PROFESSIONAL PRACTICE AND INSURANCE ISSUES

Note to Reader

This is the third in a series of Geological Survey of Canada Open Files that will be published over the next several years. The series forms the basis of the *Canadian Technical Guidelines and Best Practices related to Landslides: a national initiative for loss reduction*. Once all Open Files have been published, they will be compiled into, and published as, a GSC Bulletin. The intent is to have each Open File in the series correspond to a chapter in the Bulletin.

Comments on this Open File, or any of the Open Files in this series should be sent before September 2012 to Dr. R. Couture, Rejean.Couture@NRCan-RNCan.gc.ca

1. INTRODUCTION

Unlike many of the other chapters in the *Canadian Technical Guidelines and Best Practices related to Landslides,* this chapter is not technical, but it is very important from a guidelines and best practices point of view. It presents information and guidance on professional practice. And when any project (related to landslides, or otherwise) is undertaken in a truly professional manner, the likelihood of a successful outcome is greatly increased and the likelihood of professional liability is greatly decreased.

This chapter discusses what is meant by professional practice, reviews current requirements for professionals being involved in landslide studies, qualifications of professionals, responsibilities of professionals and quality management. It also addresses professional liability and professional liability insurance issues as well as property owner's landslide insurance.

Landslides include those that occur naturally in all types of geological materials, and landslides that originate from engineered (and non-engineered) slopes, both cuts and fills. Landslides occur on land (subaerial) and under water (subaequeous). Landslide studies are done for many different purposes, at many different scales and, where potential development is concerned, at different times during development phases. For example, landslides studies can include: regional scientific studies and regional pre-development studies; pre-design engineering studies and studies of a particular potential, impending or imminent landslide; emergency post-landslide studies, studies for the design and implementation of landslide mitigation; forensic landslide studies and regional post-storm landslide studies; and, possibly in the future, landslide studies related to climate change.

For the most part, professionals who study the technical aspects of landslides are typically professional engineers and professional geoscientists although, as will be discussed later in the chapter, not all professional engineers or professional geoscientists are qualified to study landslides. In some circumstances, collaboration between the two professions (and other professions) is required. Non-professionals and unqualified professionals who carry out landslide studies do so at their own peril, and are potentially putting at peril both those for whom they are working, and the general public.

2. PROFESSIONAL PRACTICE

In Canada, except where national borders are involved, landslides fall within the jurisdiction of the provinces and territories. The regulation and governance of professions in Canada are also provincial and territorial matters. Table 1 lists the provincial and territorial regulatory bodies (associations) that govern the practices of engineering and/or geoscience - the two professions most directly involved in landslides and the study of landslides.[1]

Table 1. Provincial and Territorial Engineering and Geoscience Associations in Canada.

Province or Territory		Association(s)
Alberta	AB	Association of Professional Engineers, Geologist and Geophysicists of Alberta (APPEGA)
British Columbia	BC	Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)
Manitoba	MB	Association of Professional Engineers and Geoscientists of the Province of Manitoba (APEGM)
New Brunswick	NB	Engineers and Geoscientists New Brunswick (EGNB)
Newfoundland and Labrador	NL	Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL)
Northwest Territories and Nunavut	NT/NU	Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG)
Nova Scotia	NS	. Engineers Nova Scotia (ENS); . Geoscientists Nova Scotia (GNS)
Ontario	ON	. Professional Engineers Ontario (PEO); . Association of Professional Geoscientists of Ontario (APGO)
Prince Edward Island	PE	. Engineers Prince Edward Island (EPEI); . no regulatory body for geoscientists
Quebec	QC	. Ordre des ingénieurs du Québec (OIQ); . Ordre des géologues du Québec (OGQ)
Saskatchewan	SK	Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS)
Yukon	YT	. Association of Professional Engineers of Yukon (APEY); . no regulatory body for geoscientists

Jurisdictions are in alphabetical order.

Eight of the 13 jurisdictions have combined professional engineering and professional geoscience associations. One association, the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists, acts on behalf of two territories. Three jurisdictions have independent professional engineering and professional geoscience associations, Nova Scotia, Ontario and Quebec. Two jurisdictions, Prince Edward Island and Yukon, do not have professional geoscience associations.

The mandate of the associations is to licence practitioners and regulate the practices of engineering and/or geoscience in their jurisdiction. Associations are mandated to establish and monitor the level of education and experience necessary for membership, and to enforce standards of registration, conduct and codes of ethics of their members. The associations have the legal authority to investigate allegations that members have fallen below those standards and to take disciplinary action against members, where warranted. Registration in an association gives members the right to practice engineering or geoscience in that jurisdiction. Associations can take

[1] This document refers to associations and their members. There is a national move to start referring to the associations as regulatory bodies, and members as licensees.

enforcement action against individuals who are not members (and companies that do not employ members) and who provide or offer to provide professional engineering or geoscience services, or who use a restricted title such as PEng, ing, PGeo, PGeol or géo. Therefore, all professional engineers and geoscientists must be registered in the jurisdiction that they are carrying out their work and they must take responsibility for their work. Except in Prince Edward Island and Yukon, where there are no professional geoscience associations, professional geoscientists must also be similarly registered and take similar responsibility.

Over the past 100 years, the above associations have been given this powerful mandate by their respective provincial or territorial government, to hold paramount the safety, health and welfare of the public, including workers, and to protect the environment in matters related to the practice of professional engineering and geoscience. All associations have codes of ethics which members must follow. Codes of ethics typically include items similar to those shown in the example below from British Columbia (APEGBC, 2011):

- hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace;
- undertake and accept responsibility for professional assignments only when qualified by training or experience;
- provide an opinion on a professional subject only when it is founded upon adequate knowledge and honest conviction;
- act as faithful agents of their clients or employers, maintain confidentiality and avoid a conflict of interest but, where such conflict arises, fully disclose the circumstances without delay to the employer or client;
- uphold the principle of appropriate and adequate compensation for the performance of engineering and geoscience work;
- keep themselves informed in order to maintain their competence, strive to advance the body of knowledge within which they practice and provide opportunities for the professional development of their associates;
- conduct themselves with fairness, courtesy and good faith towards clients, colleagues and others, give credit where it is due and accept, as well as give, honest and fair professional comment;
- present clearly to employers and clients the possible consequences if professional decisions or judgments are overruled or disregarded;
- report to their association or other appropriate agencies any hazardous, illegal or unethical professional decisions or practices by members, licensees or others; and
- extend public knowledge and appreciation of engineering and geoscience and protect the profession from misrepresentation and misunderstanding.

Two key points from such codes of ethics are that professionals must be qualified by training and experience for the work they do, and they must know the limits of their knowledge.

Professional engineering and professional geoscience associations are likely aware that most technical landslide studies are done, or should be done, by members of their associations. However, landslides studies are typically not specifically mentioned in the definitions of engineering and/or geoscience in their governing statutes.

Besides being appropriately registered and following the code of ethics of their association, professionals must also meet the appropriate standard of care in carrying out any project. The appropriate standard of care as it applies to professional engineering and professional geoscience is a measure of activity, care and judgment expected from, and ordinarily used by, a reasonable and prudent engineer or geoscientist. It is a relative measure based on the activity, care and judgment that another similarly trained and experienced professional would use under the same or similar circumstances. The appropriate standard of care is not static, but changes with time. Exercising the

appropriate standard of care includes taking and recording all reasonably necessary steps so that professionals can demonstrate that they have given appropriate consideration to all relevant factors.

With respect to landslide investigation, analysis, mitigative design and reporting, important aspects of exercising the appropriate standard of care include following current legal requirements and following current guidelines and best practices to the level of detail appropriate for the project. The appropriate standard of care also includes quality assurance/quality control; internal and external peer review; and documentation, filing and archiving of project information.

Exercising the appropriate standard of care does not and should not impinge on professional creativity, judgment or innovation. As such, appropriate guidelines and best practices should not tell professionals how to do something, but should provide guidance as what should be done.

3. REQUIREMENTS FOR LANDSLIDE STUDIES BY PROFESSIONALS

Requirements as to when and where landslide studies must be carried out by an appropriately qualified professional are in legislation and regulations of only some provinces and territories. In a number of jurisdictions, guidelines and other stipulations also apply. Tables 2 and 3 below summarize, respectively, the applicable legislation and regulations, and the guidelines, that are understood to be currently in effect. These tables are summaries only and that information is subject to change. Specific legislations, regulations, guidelines and other requirement, and their currency, should be verified from the jurisdiction in question.

Table 2. Current Provincial Legislation and Regulations for Landslide Studies.

Province	Current Provincial Legislation and Regulations for Landslide Studies
AB	• *Municipal Government Act* and *Subdivision and Development Regulation* for subdivision approval under some circumstances
BC	• *Land Title Act* and *Local Government Act* for subdivision approval, development permits, flood plain bylaw variance or exemptions under some circumstances • *Community Charter* for building permits under certain circumstances • *Forest and Range Practices Act* for certain forestry activities in some circumstances (for example road location, road construction, road deactivation and timber harvesting)

See Table 1 for abbreviations; jurisdictions are in alphabetical order.

Note that currently there is legislation or regulations for landslide studies in only two of the 13 jurisdictions, Alberta and British Columbia.

Note that currently there are guidelines or other requirements for landslide studies in only five of the 13 jurisdictions, Alberta, British Columbia, Ontario, Quebec and Yukon.

From the documents referenced in Table 2 and 3, a description of the professionals required to carry out landslide studies is summarized in Table 4.

Where identified in the above legislation, regulations or guidelines, the required professionals are referred to as something similar to geotechnical engineers or geotechnical consultants. However, there are no geotechnical engineering or geotechnical university degree programs in Canada. Geotechnical engineering and geotechnical courses and options are typically offered, in civil engineering, geological engineering and/or mining engineering degree programs. Because there are no geotechnical engineering or geotechnical university degree programs in Canada, there are no standard or minimum syllabi.

No Canadian professional association registers, licenses or designates its members as geotechnical engineers or geotechnical geoscientists. Those who refer to themselves as geotechnical engineers or geotechnical consultants are typically registered with their professional engineering association in the discipline of civil engineering, geological engineering or mining engineering, or with their professional geoscience association in the discipline of geology, or environmental geoscience (in at least one province, this discipline was previously referred to as geotechnics).

Table 3. Current Guidelines and other Requirements for Landslide Studies in Provinces, a Territory and some Local Governments.

Province Territory	Current Guidelines and Other Requirements for Landslide Studies in Provinces, a Territory and some Local Governments
AB	• *Guidelines for the Evaluation of Hazards to Residential Subdivisions from Valley Slopes*, Chapter 5 in *Draft Environmental Guidelines for the Review of Subdivisions in Alberta* (Alberta Environment, 1998) • some municipalities (eg City of Calgary (2001); City of Edmonton (2010); City of Lethbridge (Lombard North Group Limited and Reid Crowther & Partners Ltd, 2004)); top of bank requirements)
BC	• *Guidelines for Legislated Landslide Assessments for Proposed Residential Development in British Columbia* (APEGBC, 2006, updated in 2010), for subdivision approval, development permits, flood plain bylaw variance or exemptions, building permits under some circumstances • *Guidelines for Terrain Stability Assessments in the Forest Sector* (APEGBC and ABCFP, 2010), for terrain stability mapping and assessments in the forest sector • *Terrain Stability Mapping in British Columbia – A Review and Suggested Methods for Landslides Hazard and Risk Mapping, Final Draft* (BC Ministry of Environment, Resources Inventory Committee, 1996); for resource development planning, for land use and development planning, and for planning linear projects
ON	• *Hazardous Sites Technical Guide and Geotechnical Principles for Stable Slopes* in *Natural Hazards Technical Guides* in *Adaptive Management of Stream Corridors in Ontario* (Ministry of Natural Resources of Ontario (MNRO), 2001); for site development where requested or required by local government • Policies and regulations of a number of Conservation Authorities are nominally based on the above MNRO (2001) document • *Slope Stability Guidelines for Development Applications* (City of Ottawa, 2004)
QC	• In landslide-prone areas, the provincial government has a 1/5000 scale mapping program and standard framework that regional governments and municipalities must follow for subdivision planning and approvals (Québec, 2005; Demers et al, 2008)
YT	• The Yukon Government and the City of Whitehorse ask for a professional geotechnical assessment before allowing construction on steep slopes; and ask that professionals conduct geohazard studies.

See Table 1 for abbreviations; jurisdictions are in alphabetical order. Note that guidelines and other requirements are not legally binding; they indicate standards of practice.

There is no agreed upon definition of geotechnical engineering or geotechnical in Canada, even by the Canadian Geotechnical Society – the prime national technical society, established almost 40 years ago, to serve and promote the geotechnical community in Canada. Therefore, Canadian geotechnical practice, including the study of landslides, is essentially only self- regulated, or at best regulated by peer opinion. Similar points were made with respect to geohazard work in the pipeline industry by Savigny et al (2005).

4. QUALIFICATIONS OF PROFESSIONALS

Just as not all professional engineers or professional geoscientists are qualified to study landslides, not all professional engineers who practise geotechnical engineering and not all professional geoscientists who practise in the geotechnical field are qualified to undertake and accept responsibility for landslide studies.

All provincial and territorial professional engineering and professional geoscience associations agree that professional geoscientists should not carry out, or accept responsibility for, engineering design. This is an important difference when it comes to, for instance, designs such as reinforced or mechanically stabilized slopes, retaining walls or other geotechnical structures, or engineered slopes.

Table 4. Professionals Required to Carry Out Landslide Studies Referenced in Tables 2 and 3.

Province Territory	Professionals Required to Carry Out Landslide Studies Referenced in Tables 2 and 3
AB	• Alberta Environment (1998): qualified geotechnical consultant • City of Edmonton (2010): geotechnical engineer
BC	• APEGBC (2010): PEng and/or PGeo qualified by education, training and experience; PGeo only where design is not involved; • APEGBC/ABCFP (2010): PEng; PGeo or Registered Professional Forester where engineering design is not involved • BC Ministry of Environment, Resources Inventory Committee (1996): PEng, PGeo
ON	• *Hazardous Sites Technical Guide* (MNRO, 2001): geotechnical consultant • *Geotechnical Principles for Stable Slopes* (MNRO, 2001): geotechnical consultant and qualified professional engineers and scientists “particularly where the stability of a slope may affect public safety or may create large cost implications”; a PEng or PGeo must sign and stamp the report • (City of Ottawa, 2004): engineering consultant, geotechnical engineers and qualified geotechnical engineer licensed in the Province of Ontario
QC	• The standard framework in a landslide-prone area requires a geotechnical study by a professional engineer
YT	• Yukon Government and the City of Whitehorse ask for a professional geotechnical assessment and professionals to conduct geohazard studies. Both may also accept PGeo or PGeol from another Canadian association, as there is presently no equivalent in Yukon.

See Table 1 for abbreviations; jurisdictions are in alphabetical order.

Similarly, all associations agree that professional engineers with only minimal training in the geosciences should not undertake geological studies. If the investigation, site characterization or interpretation of complex geological conditions, geomorphic processes and/or geochronology data in support of landslide studies is required, a professional geoscientist, or a professional engineer, appropriately trained and experienced in the geosciences, is required.

Landslide studies require minimum levels of education, training and experience in many areas of engineering and geoscience. And due to the nature of landslides, there are some areas of overlap between engineering and geoscience. Pending clarification by an appropriate accreditation body, the following should be considered as minimum qualifications of a professional or team of professionals to study landslides (adapted from APEGBC 2010).

- Appropriate education, training and experience in bedrock geology, surficial geology, geomorphology, hydrology and groundwater geology, air photo interpretation, soil and rock mechanics, and various types of landslide risk analyses.
- As the complexity of the terrain increases, and depending on the location in the work, the above minimum qualifications should be supplemented by appropriate education, training and

experience in additional subject areas as required. Such subject areas include Quaternary geology, structural geology, petrology, sedimentology, permafrost, site investigation, slope stability analysis (both static and seismic), and mitigation and remediation. Specialists may have to be retained to provide experience in some of the above subject areas.

- Professionals who offer specialty services require education, training and experience in addition to that discussed above.
- The academic training for the above skill sets can be acquired through formal university or college courses, or through continuing professional development. There may be some overlap in courses and specific courses may not correlate to specific skill sets. Education, training and experience can vary depending on the professional's background and whether review and/or specialty services are being provided, but should be consistent with the purpose and complexity of the landslide study. Appropriate experience can only be gained by working under the direct supervision of a suitably knowledgeable and experienced professional engineer or professional geoscientist.
- Professionals should also remain current, through continuing professional development, with the evolving topics associated with landslides. Continuing professional development can include taking formal courses; attending conferences, workshops, seminars and technical talks; reading new texts and periodicals; searching the web; and participating in field trips.

The sometimes challenging situation of requiring appropriately qualified professional engineers, professional geoscientists or both is exacerbated in jurisdictions where there are separate associations of professional engineering and professional geoscience (Nova Scotia, Ontario and Quebec) and where there is no professional geoscience association (Prince Edward Island and Yukon).

5. RESPONSIBILITIES OF PROFESSIONALS

As mentioned in Section 1, landslide studies can be done for many different purposes, at many different scales and, where potential development is concerned, at different times during development phases. Therefore there is potentially a wide variety of clients and approving authorities involved.

The following paragraphs briefly describe some of the typical responsibilities of landslide professionals who carry out landslide studies. Further technical guidance is provided in the following chapters.

Prior to a landslide study the professional should, as a minimum:

- be clear as to the geographical limits and objectives of the study;
- confirm that he/she has appropriate qualifications to carry out the study with respect to the purpose and terrain and geology involved, and if not, involve required specialists;
- be knowledgeable about any jurisdictional legislation, regulations, guidelines and/or other requirements, and if applicable, any jurisdictional landslide risk tolerance criteria;
- have written agreed upon terms of reference or a contract, outlining the scope of work, cost estimate and schedule, and the need for and scope of specialists and peer review;
- depending upon the purpose of the study, inform the client that the terms of reference or contract may require modification based on on-going findings; and
- ensure he/she has ground access to the study area.

During the landslide study the professional should, as a minimum:

- obtain from the client and other sources, and review all relevant information related to the geology, terrain conditions and slope stability of the study area;
- conduct appropriate office and field studies at an appropriate level of detail;

- conduct the studies in compliance with any jurisdictional legislation, regulations, guidelines and/or other requirements, keeping in mind any jurisdictional landslide tolerance criteria;
- notify the client as soon as possible if the terms of reference or contract require modification;
- write a report clearly, concisely and completely and conform, where applicable, to any jurisdictional legislation, regulations, guidelines and/or other requirements;
- report appropriate conclusions (including predictions) and recommendations, and when appropriate, clearly indicate possible consequences if recommendations are disregarded;
- have a draft of the report appropriately peer reviewed; and
- submit a signed and sealed copy of the report to the client and to others as required.

At the end of the landslide study the professional should, as a minimum:

- clarify questions of the client or others as required; and
- carry out follow up work if requested by, and by agreement with, the client.

In certain circumstances during or at the end of a landslide study, for example if the professional considers the stability of an area could threaten the safety, health and welfare of the public, workers, and/or the environment, the professional must convey such information to the client, the appropriate authorities and others who, for their safety or the safety of others, need to know.

A professional can be asked by a third party to carry out an independent review of the landslide report prepared by another professional. The reviewing professional should:

- inform the professional who carried out original landslide study and prepared the original report, and obtain any additional relevant information from that professional;
- review the report;
- if necessary, discusses any issues with the original professional; and
- prepare and submit a signed and sealed review report, including any limitations and qualifications of the review and results and/or recommendations arising.

Occasionally a professional is asked to provide a second opinion. This role goes beyond that of reviewing and the second professional should carry out sufficient office and field work to accept full responsibility for his/her findings, opinions and recommendations.

The following are several considerations from a professional-client relationship viewpoint:

- In an emergency response situation some or many of the above responsibilities are not practical or can not be achieved in a timely manner. In such situations, a professional and a client should at least have an agreement as to the objectives and the deliverables of the landslide study.
- Professionals should be aware that not all clients like to receive bad news. For example, a professional may conclude and/or recommend that a client's proposed development should not proceed because of potential slope instability. In such situations, unless appropriate contracts are in place and depending upon the client, it can be difficult for the professional to receive payment for his/her services.
- Writing proposals for landslide studies has limitations and pitfalls. Before a professional writes a proposal for a landslide study he/she should be somewhat knowledgeable about the study site; more knowledge typically equates to a better proposal. Unless professionals are appropriately pre-qualified by education, training and experience for studies of similar landslides in similar terrain, it is difficult for clients to appropriately evaluate competitive proposals. Some less-informed clients evaluate competitive proposals solely on price. A firm price for a landslide study rarely translates into a good landslide study.
- Professionals tend to do their best work when retained by clients who are knowledgeable about the nature and vagaries of landslides and landslide studies, and who appreciate that costs for services can change during a landslide study depending upon ongoing findings.

APEGBC (2010) provides further examples of the responsibilities of professionals, as well as clients and approving authorities, for legislated landslides studies for proposed subdivisions in British Columbia.

6. QUALITY MANAGEMENT

Quality management includes Quality Assurance/Quality Control (QA/QC), peer review and appropriate filing of both hard copy and electronic project files and retention of those files for an appropriate number of years

QA/QC should be carried out and documented on an ongoing basis throughout the landslide study. Such activities include ensuring appropriate guidelines and standards are followed with respect to the processes of identification, mapping, investigation, laboratory testing, analysis, modelling, design, implementation, and monitoring; direct supervision of non-professionals; the implementation of technical recommendations and documented checking procedures of engineering and geosciences work; and field reviews of construction activities.

The following discussions are adapted from APEGBC (2010).

- Direct supervision means taking responsibility for the control and conduct of the engineering or geoscience work of a subordinate. With regards to direct supervision, professionals having overall responsibility should consider:
  - geological and geotechnical complexity of the terrain and level of landslide risks;
  - which, and how much of those, aspects of the landslide study should be delegated;
  - training and experience of individuals to whom work is delegated; and
  - amount of instruction, supervision and review required.
- Field work is one of the most critical aspects of a landslide study. Therefore, consideration must be given to delegating field work. Due to the complexities and subtleties of landslides, direct supervision of field work is difficult and care must be taken to ensure that delegated work meets the standard expected by the professional. Professionals should exercise judgment when relying on delegated field observations and conduct an appropriate level of field work to be satisfied with the quality and accuracy of delegated field observations.
- Peer reviews can be internal and/or external; carried out periodically during the landslide or towards the end of the study. Typically an internal peer review is carried out by another professional, usually in the same organization. An external peer review is carried out by an independent professional who may be a specialist, and is typically a more formal review. Both reviews should be documented. The level of peer review should be based on considerations such as the geological and geotechnical complexity of the terrain, the stability and risks involved, the availability, quality and reliability of background information and field data and the training and experience of the professional or professional team studying the landslide.
- The internal and external peer reviews discussed above are not the same as an independent review by a professional who is typically retained by a third party, or in some cases by the original client who wants a totally independent second opinion of the initial study.

Professional engineers and professional geoscientists should consult their respective professional associations for requirements relating to appropriate filing of both hard copy and electronic project files, and retention of those files.

7. PROFESSIONAL LIABILITY AND PROFESSIONAL LIABILITY INSURANCE

Professionals carrying out landslide studies, participating on a team or acting as a specialist, including internal or external peer reviewers, are exposed to possible claims for errors and omissions or professional liability. In the event of a claim, the current practice in the legal profession is to identify as many professionals as possible who participated in the landslide study, so as to increase the potential number of parties available to contribute to the loss or damage allegedly suffered by the plaintiff(s). While a particular professional may have no real exposure to liability in a claim for professional negligence, he/she may still have to expend considerable time and expenses to defend himself/herself.

Canada has one civil law jurisdiction, Quebec, while the remaining jurisdictions practice common law. In Quebec a professional's standard of care is defined by the Quebec Civil Code, a statutory codification of civil law rights and obligations. In the common law jurisdictions a professional's standard of care is defined by the rationale in prior court decisions with similar facts.

Each jurisdiction in Canada has its own statute of limitations for property damage losses that defines a time after which a claim can not be brought. Each statute of limitations, however, allows for the delay of the start of time until the plaintiff knew, or ought to have known, the facts and the identity of the responsible persons. Theoretically that delay extends the limitation period indefinitely. Therefore, within some jurisdictions there is an ultimate limitation period after which no claim can be brought. Table 5 summarizes the current general and ultimate limitations in each jurisdiction in Canada. Note that these limitation periods are under review in a number of jurisdictions. Because of this and the legal complexities associated with limitation periods, an experienced lawyer should be consulted for further information.

Table 5. Provincial and Territorial General and Ultimate Limitation Periods.

Province or Territory	Limitation Period (years)	
	General	Ultimate
AB	2*	10**
BC	2*	30**
MB	2*	30**
NB	2*	15**
NL	2*	10**
NT/NU	6**	
NS	6**	
ON	2*	15**
PE	3**	
QC	3***	
SK	2*	15**
YT	6**	

See Table 1 for abbreviations; jurisdictions are in alphabetical order.
*commencing when the cause of action is discovered
**commencing when the cause of action arises
***from the time the right of action arises

Professional engineers and professional geoscientists conducting landslide studies should carry errors and omissions (now more commonly referred to as professional liability) insurance. Such insurance covers professionals for the legal, expert and court costs of defending the claim. If liability is established, professional liability insurance will indemnify the professional for the judgment up to the limits of liability in the insurance policy, less the deductible. In the event of a

landslide following a study, the alleged property damage losses and/or personal injury claims can be substantial.

Non-professionals carrying out landslide studies typically can not obtain professional liability insurance. Unqualified professionals who have professional liability insurance are typically not covered by such insurance when they practice outside their area of expertise.

In Canada, professional liability insurance is written in a claims made format. In other words the insurance policy will respond to a claim, made and first reported, within the policy period, regardless of when the alleged negligent act occurred. As a result, it is very important to report all claims and possible claims to the insurer as soon as they come to the attention of the professional. Any delay in reporting of a claim can lead to a lack of coverage of the claim under the insurance policy.

For further information on professional liability and professional liability insurance refer to McLachlin, Wallace and Grant (1994) or Samuels and Sanders (2007).

8. PROPERTY OWNER'S LANDSLIDE INSURANCE

In Canada, risks to both residential property owners and commercial property owners from landslides are typically not insurable. Nor is it typically possible to obtain business interruption insurance, builder's insurance or mortgage insurance for landslides. This is primarily due to two factors:

- from the insurance industry's viewpoint it is not practicable to insure a relatively small group of potential high risk policy holders; and
- there is no standard method for estimating the probability of occurrence of a landslide, as there is for example earthquakes.

The word *typically* is used in the above paragraph because the Insurance Bureau of Canada (IBC) prepares model advisory wordings for its members. The model residential property and commercial property insurance advisory wordings include a specific exclusion for landslides, however, individual insurance companies can choose to modify these wordings or adopt their own insurance policy language. IBC believes few, if any, insurance companies include landslide coverage as an option. Some insurance companies, however, do offer a specific endorsement (a policy extension or extra) for earthquake-related damage that includes damage due to earthquake-related landslides.

In BC, the province can initiate financial assistance after a disaster has occurred. For this purpose, certain landslides are considered disasters. This assistance is intended to help individuals and small business owners replace or restore damaged items or property that is essential to a home, a livelihood or a community service. With some exceptions, successful claimants can receive up to 80% of the total eligible damage (over $1,000) up to a maximum of $300,000 (BC Ministry of Public Safety and Solicitor General, 2011). Other provinces may have similar post-event financial assistance available.

In other countries, most notably New Zealand, damage from natural landslides is insurable. New Zealand's natural disaster insurance program was initiated in 1993; however, various forms of it date back to 1945. The New Zealand program is mandatory for all property owners, is government subsidized, and the insurance risk is shared among numerous natural hazards, including earthquakes, tsunamis, volcanoes, weather storms and natural landslides (New Zealand Earthquake Commission, 2011).

9. ACKNOWLEDGEMENTS

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